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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2034.—VOLUME LXXIX. Number 1. SAN FRANCISCO, SATURDAY, JULY 1, 1899. THREE DOLLARS PER A... Single Copies, Ten Cent...

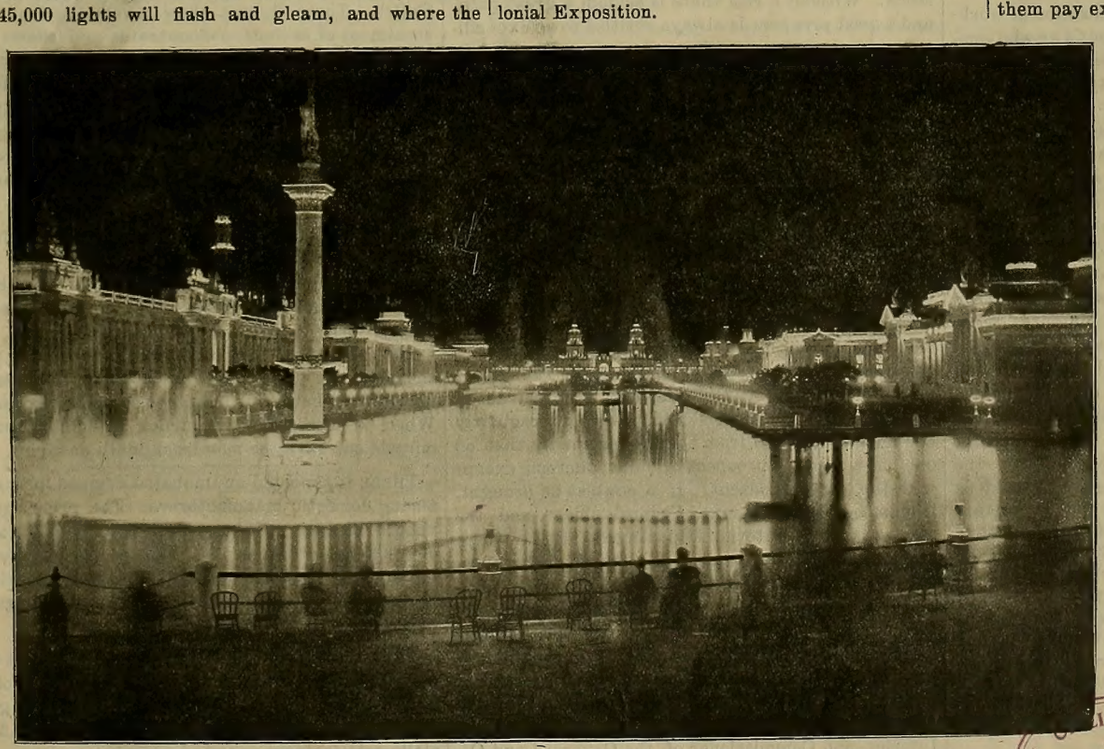
An Electrical Display.

The electric features of the Greater America Exposition to be held in Omaha, Neb., from July 1st to November 1st, '99, promise to maintain the high standard previously set for night illumination. Those who last year witnessed the nightly decorative lighting accomplished in the Grand Court of the Transmississippi Exposition, and even those who had vividly in memory the results attained at the World's Fair at Chicago, were pleased to acknowledge its merit. It is not intended that the results are to be attained by simply increasing the quantity of light, though a fair increase has made it possible to develop advantageously some points prohibited last year, but it is intended to bring out the many sculptured details in clear relief, with a strong effect, much as the star actress in an opera is emphasized by the calcium. Work has been progressing in the electric department rapidly, under the superintendency of Henry Rustin. To realize how much has been done, it must be understood that the wiring and plant of the Transmississippi Exposition were entirely dismantled and put in store.



ELECTRICAL DISPLAY AT OMAHA, NEB.

All the wires and lamp receptacles on the buildings in and around the Grand Court are in place and ready to be lighted up for a test. No ordinary obstacle could intervene to prevent the lighting this year being all that is hoped for. The illustrations shown herewith give an idea of the scene in the "Grand Court of Honor," where 45,000 lights will flash and gleam, and where the electric fountain will play in a radiance of rainbow tints. On the bluff tract and the Midway the lighting will be fine; a race track is being arranged and preparations made for lighting it so that races may be run at night. This will be one of the many new and novel features of the Greater America Colonial Exposition.



ELECTRICAL FEATURE OF THE OMAHA "GREATER AMERICA" EXPOSITION.

Among the several branches of the mining industry in California, that of mining for quicksilver is carried on with so little stir as to attract scarcely passing notice, and yet among the mines operating in this field an unusually large proportion are profitable and are paying dividends regularly, and some of them pay extras. Several mines operated years ago and long since closed are being reopened, notably in Solano and Sonoma counties, it is reported, with good prospects of success. Quicksilver mining is a very interesting business, and the mines are found mostly along the coast range counties from San Luis Obispo as far north as Trinity, with occurrences of cinnabar in other scattered localities throughout the State. The once great mines of New Almaden are still in successful operation, but in a comparatively small way. The occurrence of gold with cinnabar in California is of mineralogical importance only.

Barrel chlorination, which is so largely and successfully applied to the treatment of ores in South Dakota and Colorado, is not in use in California. The only barrel chlorination plant ever installed in the State was at the Mayflower mine, near Amador City, Amador county, but for some reason it did not prove a success. It may be considered rather as an experimental plant than otherwise, for all ores susceptible of treatment by the Plattner process so commonly in use are equally susceptible to treatment by the barrel process, and, it is claimed, at a lower cost.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Electrical Display at Omaha, Neb.; Electrical Feature of the Omaha "Greater America" Exposition, 1. Mohegan Cyanide Mill, Red Bluff, Montana, 4. Peculiar Effects of Subterranean Corrasion of Rocks; Electrolytic Metallurgy; Some Experiences of a Working Miner, 5. Wire Wound Flywheels; Not a Menace to Non-Interfering Travelers; Luminosity of a Nernst Lamp is Deceptive; Large Dividend Payers; Gold Production of the World; Portland Cement Made from Slag; Aluminum Feed Wires for an Electric Road, 6. Latest Mining and Metallurgical Patents, 7. Amalgamated Copper Plates; Official Statement of Annual Gold and Silver Production, 8. Diamond and Gold Mining in Minas Geraes, Brazil; Electrical Equipment of Cripple Creek, Colo., District; Large Masses of Copper, 9. Index to Volume LXXIII, 10-11-12. Industrial Notes, 15. Personal; Recent California Dividends; Recent Mining Incorporations; Commercial Paragraphs; Catalogues Received; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; School of Engineering Graduates, 16.

TWO DAILY NEWSPAPERS in San Francisco, temporarily posing as "friends of labor," have joined the ranks of those who pretend to see State and Federal opposition to organized labor in the present restrictions imposed at Wardner, Idaho. The distinction is clear and well understood everywhere. There is no State or Federal fight against organized labor in Idaho. The only ones that are hurting the cause of organized labor there are the men who have taken its name in vain—men who are guilty of arson and assassination, and who deserve the punishment meted out to such malefactors everywhere. Organized labor has just the same rights as organized capital—in some cases superior rights and privileges—and the drastic measures now in application in the Cœur d'Alene country are not a menace nor an attack, but a protection. The State and Federal authorities are not fighting the Cœur d'Alene Miners' Union as a union or an organization of working men, but as a criminal crew of outlaws who commit dastardly crimes in the belief that the ægis of the Miners' Union will yield immunity from deserved punishment. Those marauders who masquerade as a "Miners' Union" do more damage to respectable organized labor than any of its other enemies possibly could do, and deserve disavowal by any and every labor union, realizing that wrongs cannot be redressed that way and that lawlessness always alienates the sympathy and support of the real "friends of labor," who do not cater to the mob spirit, but plainly tell the men who wantonly destroy life and property that the Molly Maguires were stamped out in Pennsylvania, and that the similar seven years' reign of terror in Shoshone Co., Idaho, must end; that the American spirit must be upheld and American principles must prevail. Much of this mad destruction of property is the bitter fruit of blossoms blown to us from across the seas—the dread result of old-world conditions that should be impossible under our flag. The men who perpetrate such crimes are alien in thought and action; they have no conception of the first principles of American citizenship, nor have they any apparent idea of the cornerstone of American liberty, which is that every man in this country has a right to do as he pleases—*provided* that he does not interfere with any other man's right to do as *he* pleases—a broad proposition and one that applies to encroachments of capital on real workingmen's rights, as well as attacks upon those same rights by any band of men claiming to represent the cause of labor.

Luck vs. Judgment.

The theory that a mine should be worked, or that exploration should be continued throughout an indefinite period, regardless of the results of such operations, is a good one from the standpoint of those who derive a direct pecuniary benefit from such operations, but from the position of those who are furnishing the money to carry on such an expensive enterprise a limit is often found where there is no encouragement in the development. Some veins, at first small and of no great promise, have in the end developed into rich and large-paying mines; and, again, veins which at and near the surface were more than promising on being explored have proved to be practically valueless. How far the element of luck, in the common acceptance of the term, is an important factor in the success of a mine is pretty well determined by the experience of many from among the ranks of both prospectors and capitalists. Almost any man who has any knowledge of mining and business can recognize a valuable mine when it has been developed, but it requires more than ordinary perception to distinguish between one which is really good and one which has the appearance of being good but is not. The annals of mining are full of rich and phenomenal strikes. Instances of good luck in striking a rich ore shoot by a shaft sunk at random, as at the Little Pittsburg mine, on Fryer hill, Leadville, Colo., or the pit sunk on the Mount Morgan mine, in Victoria, are not rare. The rich Hillside mine in Arizona was discovered by a prospector who hesitated for some time whether or not to climb the mountain slope to examine a small red patch of ground or to go home. He decided to climb the hill, regardless of the heat, and found the croppings of the rich vein. A soldier picked up float on the croppings of the Silver King mine in Arizona and could not find it again; a prospector who climbed a white knoll to look around the country for his burro discovered it later. He stood at the apex of an ore shoot which produced millions. Trained mining engineers are apt to be over-cautious, while the prospector and miner who do not feel so heavily the weight of responsibility, and who usually have neither much money nor valuable reputation to lose, are more inclined to take what, in some instances, looks to others like desperate chances. A courage to "stay with it" is laudable in a way, and is always praised if a strike results; but very different words are spoken of the luckless superintendent who wastes the company's money and finds nothing. The greatest ore body and the richest the world has ever known was found by the persistent determination in following a small seam for hundreds of feet until it led to the big bonanza in the Con. Virginia and California mines on the Comstock. Without a risk there is seldom a great gain, and a good prospect is always entitled to an expenditure necessary to prove its real worth. The surface plant should be as inexpensive as it is possible to have it and accomplish its object. If a rich mine is opened the mine will pay for an expensive plant. Put the money underground and follow the ore are good maxims in mining.

THE California Supreme Court decided a case last week that should never have gone to trial in any court. The facts were that in Tuolumne Co., Cal., a mining company prospected and found gold on a tract of land that was held under Government grant as agricultural land. They laid claim to it as mineral land under the mining laws, and, of course, were beaten in the State court of last resort. It ought to be well understood by this time that when a tract of land is held under an agricultural patent, regularly and legally acquired from the Government, that no one has a right to prospect or mine thereon except with the owner's consent. If a contest be brought, it must be before the local Federal officer, and the case goes to the Interior Department. It is a waste of money to institute suit in a State court, because, usually, the proof that the land is held under agricultural patent suffices to throw the case adversely to the miner. About 200 columns appeared in this paper in '94, '95, and '96, in intelligent showing of how this state of affairs could be changed, and success was nearly attained; but an adverse President of the U. S., Speaker of the House, Secretary of the Interior and Commissioner of the General Land Office was too formidable a combination even for the MINING AND SCIENTIFIC PRESS. However, nothing is ever settled till it is settled right; this matter will eventually receive just adjudication; meanwhile, in such cases as the Tuolumne one cited, no miner or mining company has any use in bringing such a suit as that brought by the La Purissima. The greatest surprise is that any lawyer claiming to know anything of mining law should encourage a client to go on to inevitable defeat.

Why Prospectors Want to Sell.

Of mines which pay comparatively few would ever become valuable without the aid of capital, and this primary requisite the claim owner usually lacks. He may have muscle and grit and may be willing to work faithfully to the end, but at best his efforts will develop the mine superficially. Those who are fortunate enough to own a claim so favorably located that the development can be accomplished by means of tunnels have an easier road to fortune than those who must sink a shaft to accomplish the same purpose. In either case cash is necessary for the purchase of tools and supplies. The facility with which a mine may be opened depends wholly upon its situation. Those ideal locations, where the vein may be opened by adits with a thousand feet of backs; where there is an abundance of fine timber to be had for merely cutting it; where a splendid water power is situated at the foot of the hill, and where every ton of ore is rich, are not often found. Good prospects, which have developed into great mines, in many cases have been situated in a region difficult of access, timberless and devoid of water, at least for power, and with every conceivable disadvantage surrounding them. These mines required capital to equip and develop them, and the result has been satisfactory to the investor. The prospector who fortunately finds a vein of ore from which he can ship with profit at once, needs no capital, indeed capital immediately seeks him and endeavors to purchase his claim, usually at a price considerably below what the finder thinks it worth. The other prospector who found a vein of low-grade ore is helpless without financial aid, and realizing his helplessness, while firmly believing in the value of his property, he looks to those having capital to invest in his mine. In consideration of these facts, the question so often put to the prospector, "Why do you wish to sell your mine if it is so good a thing?" is as absurd as it would be to ask the owner of a high-grade property, "Why do you not sell your mine since it is so good?"

THE monthly statements of the leading mines of the Rand in South Africa, which appear elsewhere in this issue, form a fair basis for comparison with large mining and milling operations in the United States. These figures show a very low cost in the treatment of tailings, concentrates and slimes, but the total cost of mining and milling reaches about $5 per ton. This apparently high cost is due to the fact that the mines are deep and the veins relatively small. In the United States there are very few mills containing more than sixty stamps where the veins, the ores of which they crush, are not large—40 to over 100 feet in width.

THE death of several miners and the serious injury of others in a Rossland, B. C., mine last week while running a power drill which struck a "missed hole," shows once more how necessary it is to exercise care after a series of blasts have been discharged. The locality of each hole is known to those who made them and the place should be carefully inspected to determine whether or not all holes were discharged. When a missed hole is struck in drilling, only a miracle can save the men from death or injury.

THERE is reported an unabated demand for copper among domestic manufacturers. The price has advanced slightly. No spot cash Lake copper can be obtained under 18¾ cents. The producers are not forcing sales, and the outlook is good for the price to remain at its present figure, at least not to go below it.

THE State of Nevada is finally realizing that if its few inhabitants would devote less time to politics and more to the development of that State's great mineral resources the outcome would be more financially satisfactory.

Concentrates.

A CUBIC FOOT of platinum weighs 1218.75 pounds.

METALLIC COPPER in bars weighs 542 pounds per square foot.

THE length of a pendulum which will beat seconds, at New York, is 39.10153 inches.

TURPENTINE mixed with black varnish makes an excellent coating for iron smokestacks.

BLUE VITRIOL, bluestone and sulphate of copper are the same thing, by different names.

THE gold output of Nevada for '98 approximates $3,000,000; that of silver about $850,000.

A LARGE area of copper-bearing land is reported to have been discovered in Archer county, Texas.

IF a shaft be divided into two compartments by an air-tight partition it will greatly facilitate ventilation.

IN Wyoming, on the Little Missouri river and elsewhere, are coal beds which have been burning for years.

MOMENTUM in any moving body is its weight multiplied by its velocity in units of distance, as by feet per second.

OLD mill plates over which any considerable quantity of gold has passed are always more valuable than when new.

NEVER clean up an amalgamated plate with a chisel unless the plate is to be melted and sent to the refinery.

WITH a copper hammer a key may be driven as well as with a steel one, and the copper hammer leaves no marks.

SHEET lead makes good gaskets for steam joints. If carefully made they outlast several leather or rubber gaskets.

THE hoisting compartment of shafts should be lined to prevent accident to men riding on cages, skips or buckets.

NO PERSON may enter upon the property of another for the purpose of prospecting without the consent of the owner.

AN element or simple substance is one which can not be resolved into any more simple substance, as oxygen, gold, carbon.

TWENTY miners' inches of water is usually considered a sluice head for sluicing gravel with a fall of about 8 inches to a 12-foot box.

WHEN necessary to cut gaskets from sheet packing, the work is rendered much easier if the knife is dipped frequently into a cup of water.

IN milling gold ore it is desirable to get as large capacity as possible while saving as much gold as possible by simple and inexpensive means.

A REPORT has been received at Nevada City, Cal., that a party of Nevada county, Cal., miners have perished from privation and exposure in Siberia.

ATOMIC WEIGHT is an expression used to denote the amount of a simple substance by weight which will unite with other simple substances to form compounds.

THE dynamo at Kelsey, Cal., was recently destroyed by fire. It was the first electrical mine application in California, and was frequently referred to.

MILL MEN do not agree upon the construction of mortar blocks. There are numerous methods of making these, and a number of ways of putting them in place.

ALL working shafts should be sunk on a uniform line whether vertical or inclined. Prospect shafts should follow the vein no matter which way the dip may change.

THE coinage at the San Francisco Mint for the fiscal year aggregates $63,862,275 — $58,258,000 in gold and $5,604,275 silver—as against $53,820,000 for the previous twelve months.

A CALIFORNIA mining paper of current issue gives two columns to a fight and four lines to the mines in its vicinage, and editorially wonders why capital is slow in investing therein.

STEAM PIPES in shafts, owing to changes in temperature when steam is on or off, are subject to great expansion and contraction, and for this reason should be provided with slip joints.

THE Western Federation of Miners is computed to now number 80,000. It is strongest in Montana, where it originated in '78. There are said to be 11,000 members in that State.

OBJECTIONABLE partners in a mining claim cannot be gotten rid of unless they fail to do or pay for their share of assessment work, when they may be dispossessed by process of law.

THE Yreka, Cal., *Journal* announces the discovery in Siskiyou county of "a tin mine." The ledge is said to be "300 to 400 feet wide." The mine is fittingly located on Little Humbug creek.

THE sizing of pulp as it leaves the amalgamating plates in front of the battery will be found to facilitate the concentration of sulphides, coarser material going to one machine and fine to another.

TO-DAY the Carson, Nev., mint is reduced to an assay office. Efforts are being made to secure authority to make assays and analysis of ores, which is now prohibited at Carson, but allowed at other assay offices.

A STORAGE BATTERY is a cell of acidulated water, into which have been introduced plates of lead. Into this an electric current is directed and stored and which it will give out when required in nearly equal amount.

OF the permits issued to the men at the Standard mine at Wallace, Idaho, last week, all but three of the applicants were native-born Americans. At the time of the strike 80% of the men employed were foreign born.

WHEN trying gauge cocks open them slowly, or you may be deceived. When opened suddenly the relief from pressure sometimes causes water to lift and run out of the cock when the real level is considerably below it.

PURE aluminum is said to possess only 67% of the conductivity of electric currents that copper has, and a very small amount of impurity reduces its conductivity very materially. One per cent impurity reduces the conductivity to 59%.

THE introduction of canvas plants at numerous mines in California has proven their usefulness in almost every instance. Fine slimes are concentrated on these tables from the tailings which have passed over concentrating machines.

ORE BINS in mills and at mines should be of large capacity and should always be kept as full as possible, so that in the event of any difficulty in the mine necessitating a shutdown the ore in surface bins may keep the mill supplied for several days.

A LARGE mine pump was recently disconnected in a Leadville mine, lowered 200 feet, connections made and steam turned in within twenty-four hours. This was done in the face of the danger of being flooded before the work could be completed.

DIVERS are prospecting the bed of the Sacramento river near Redding, Shasta county, Cal. They scoop up the gravel in buckets and it is hauled to the surface, where it is washed. This work is preparatory to putting in a dredge if prospects warrant it.

WHEN a discovery of a mineral vein is made outside of but adjoining an agricultural patent, all rights to the vein stop at the line of the agricultural ground. No extra-lateral rights can be obtained under such conditions beyond the line of the agricultural filing.

BY hard work, those who are not starved on the way nor overcome by the intense heat can pan out $1.50 per day at the San Roque placers in Lower California. Like the Klondike lies, the glittering stories from torrid San Roque are largely in the interest of transportation companies.

IF all the tailings from the Homestake group of mines in South Dakota, which have come from the several mills since the mines were first opened, were piled on a level plain, they would form a cone-shaped pile having a base of not less than 2000 feet diameter and a height of about 600 feet.

A MIXTURE of sulphate of copper (bluestone) one ounce; alum, one-quarter ounce; powdered salt, half teaspoonful; vinegar, one gill and nitric acid, twenty drops, will cut steel too hard to be filed. If applied to bright steel and washed off quickly it gives the surface of the metal a beautiful frosted appearance.

A SUBSTITUTE for galvanizing iron and steel, which consists in the use of a bath composed of zinc, tin and aluminum, produces a coating that is so firmly adherent that the sheets will permit working and will resist corrosion. It is claimed that metal thus treated can be raised to a red heat without injury.

THE grade to give a canvas table built for concentrating slimes is determined by the character of the material, fineness of the sulphides, quantity of quartzose or talcose gangue present and amount of water available. Three-fourths of an inch to the foot is given in some plants with good results.

THEORETICALLY a 1000-pound stamp dropping 6 inches, 100 times per minute, crushes 25% more ore than a stamp of 1000 pounds dropping 16 inches 30 times per minute, all other things being equal. It is claimed for the high slow drop that the character of the ore, where the method is in use in Colorado, demands greater time for amalgamation.

THERE are four idle non-trust smelters at Leadville, Colo., three in Aspen, three in Golden and one at Denver. Where money is made in smelting, where the ore exists and intelligent management can be found outside the trusts, the Colorado smelting situation will doubtless settle itself. Such things usually do, even under the rule of a "benevolent monopoly."

IN designing a quartz mill it should be remembered that the process should be automatic throughout, from the introduction of the ore at the top of the mill to its discharge at the lower floor, and the construction should be arranged with this in view. Always provide abundant dump room for tailings, unless there is a large amount of water at hand to wash them away.

EVERY group of mine and mill buildings should be protected from danger of fire by the location of hydrants at points commanding the various buildings. At some California mines giants such as are in use in hydraulic mines are located at some central point where any of the buildings or timber piles in the yard may be reached with a large stream of water under high head in case of fire.

SNAKE river dredging for gold has not proved an unqualified success. Four dredges are abandoned near Payette, Idaho, from various causes. The one at Bridge Island reports profitable returns. It is a continuous performance, seven men are employed, the average value of the 2000 cubic yards daily treated is claimed to be 12½ cents; 80% of the gold being saved at an expense of 5 cents per yard.

THE eight-hour law contest was fought to a finish in Utah, its constitutionality being finally sustained in the United States Supreme Court. A Denver lawyer who represented organized labor in that fight will represent the smelter men in the test case begun this week in Colorado. The Utah State Constitution contains a clause permitting such State legislation as the eight-hour law. It is understood that the Colorado State Constitution does not explicitly admit of such construction.

TO-DAY goes into effect a reduction of charges at the San Francisco Mint as follows: Bullion containing less than 200 m. gold, from 2 cents to 1⅛ cents; from 200 m. to 399⅛ m. gold, from 3 cents to 2 cents; from 400 m. to 699⅛ m. gold, from 4 cents to 3 cents; from 700 m. and over, from 6 cents to 4 cents; over 100 m. base metal, additional 1 cent; bullion containing less than 897 m. silver, from 2 cents to 1⅛ cents; from 897 m. to 979⅛ m. silver, from 1⅛ cents to 1 cent; from 980 m. to 997⅛ m. silver, from 1 cent to ⅛ cent.

ONE of the modern labor and time-saving additions to gold mills is in the construction of an overhead track in front of the battery line, upon which may be run a traveler carrying an iron bucket. When cleaning up, the grits, et from the mortars are shovelled into this bucket and it is moved along from mortar to mortar and finally to a point above the clean-up barrel, into which it is dumped. It saves much time and keeps the plates from being scratched and indented by shovelling the contents of the mortars upon them.

IN the Cheney coal mine, near Elsinore, Riverside county, California, ventilation was secured by sinking an air shaft from the surface to the workings on the vein, but the shaft being too small to afford the necessary volume of air, a fireplace was constructed underground and a large fire kept burning in it, the coal from the vein being used for fuel. This created sufficient draft to supply the workings with fresh air which entered through the adits.

THERE is much diversity as to the advantage of various positions for the line shaft of a quartz mill. Some believe the line shaft should be extended straight out from the engine or water wheel, on the feeder floor. Others think a short main shaft with belts to a line shaft on the cam floor is superior. The latter affords a better opportunity to make necessary repairs, and has the advantage of more light, and it is always easy to observe anything which may get out of order with the shaft so arranged.

MONTANA'S five mineral commissioners propose to have a fine State exhibit at Paris next year. F. J. N. Skiff of Chicago, who has charge of the American mining exhibit there, says he wants California to send "petroleum, borax, asphaltum, onyx, rich gold ores and gems." A special representative would also be in order. In Colorado the exposition commission is reported to have contracted for a solid gold statue for exhibition: the figure of an American girl, in 18-carat gold, the statue, with its base to be 6 feet 4 inches in height.

THE principle of the long wall method of mining horizontal veins, or those lying at a low angle, consists in taking out all the valuable mineral (coal or ore) in a single operation, maintaining open passageways by building rock walls on either side of the gangway. As the work advances the waste (gob) is thrown behind the miners, and upon this the roof settles. The face is kept open by several lines of props set between the "gob" and the face of mineral. Many of these props may be recovered under ordinary conditions and reused.

THE extracting of gold from its ores by free milling process consists of two operations: the pulverization of the ore to free the gold from its matrix, and amalgamation of the particles of gold with quicksilver. These two processes, simple in themselves, have many modifications in the practice of various districts, the variations being necessitated by the difference in the character of the ores in different regions. Concentration is wholly independent of amalgamation. Some gold ores require no concentration; others can be worked in no other way except smelting.

BULKHEADS and dams constructed in mines to hold water should be built with greatest care, and in such a manner as to resist the greatest possible pressure which they may be called upon to withstand. A channel broad and deep enough to afford secure anchorage should be cut in the floor, roof and sides of the drift where the bulkhead is to be built, which should be provided with a pipe and valve, through which water may escape while the bulkhead is in course of construction. Should a dam break under heavy pressure of a column of water, much damage may result.

DURING the month ending June 30, '99, there were received at this office 5486 issues of different publications, newspapers, magazines, etc. In these were 4462 clippings from the MINING AND SCIENTIFIC PRESS and similar publications. Of the 4462 excerpts, 3289 were from this paper exclusively; the other 1173 were from its contemporaries. That is, the quotations, clippings and selections from the MINING AND SCIENTIFIC PRESS, reprinted in the current literature of the month received, have outnumbered nearly three times those from all other similar journals combined. And this includes only what was credited to this paper.

ADJUSTABLE yokes for the support of steam, air and other pipes in mine shafts may be made by bolting together two pieces of 4x4, or, if necessary, larger dimensions, and boring or cutting out on the center line a hole having a somewhat smaller diameter than that of the pipe. The bolts may be unscrewd, one side taken off and the yoke placed in position in the shaft, the ends resting on the timbers. The bolts should have square heads and each end should be provided with a washer of sufficient size to prevent the bolt head or nut from sinking into the wood when tightened. A yoke of this kind may be changed from one set to another, if occasion requires.

THE word porphyry means purple, and is the name originally applied to the purple colored rock used in Egypt for making monuments, etc. As applied to rocks now, it has only a structural significance. As now understood, porphyry is any rock in which distinct crystals of any mineral occur which are larger than the grains or crystals of the ground mass in which they occur. The ground mass may be very fine in texture or may be quite coarse. A fine-grained, dark-colored rock in which occur white crystals of feldspar is porphyry; a fairly coarse granite in which occur crystals of feldspar an inch or two in length is also porphyry. There is also quartz-porphyry, hornblende-porphyry, feldspar-porphyry, etc. Porphyrite is a name applied to basic rocks having a porphyritic structure, as diabase-porphyrite, diorite-porphyrite, etc.

IN '93 Utah smelters cut wages 10%. When the eight-hour law went into effect arbitration resulted in a restoration of the scale paid before '93, that is, the old standard was resumed, the men being now paid under the present system two-thirds to four-fifths of what they had been paid when working twelve or ten hours per day, respectively. Bingham, Utah, miners are paid from $2.25 to $2.75 per day, according to the wetness of the ground; at Mercur $2.50 is the standard. At the Hanauer, Utah, smelter the present scale is: Day foreman, $144 per month; night foreman, $3.25 a day; master mechanic, $125 per month; engineers, twelve hours' work, $3.15 a day; laborers, eight hours' work, $1.40 a day; crushermen, eight hours, $2.40; boiler and firemen, $1.66; roaster firemen, $1.66; suppliers, $1.50; roaster helpers, $1.50; furnacemen, $2; furnace helpers, $1.50; feeders, $2; blacksmith, ten hours, $4 a day; yardmen, ten hours, $2.25; teamsters, ten hours, $2.25; unloading cars, 20 cents per hour. Up to June 1st, at the Denver, Colo., smelters the twelve hours per day wages for furnacemen were $2.75; tappers, $2.25; other yardmen $1.60.

Cyaniding Slimy Ores and Tailings.

Written for the MINING AND SCIENTIC PRESS by MATT. W. ALDERSON.

Part V.—Refining, Etc.

The gold slimes produced in the United States nearly all find their way to refineries for final treatment. With the exception of the cyanide mill at Cyanide, Colo., where the precipitates are roasted, fluxed and melted direct into bullion, there is practically no system of home treatment in extensive use but the method of reduction by sulphuric acid. This, it has always seemed to me, possesses many disadvantages. In the first place, sulphuric acid will not dissolve all the zinc, and, after pretending to cut it, a considerable portion of the zinc, as well as the sulphur, must still be gotten rid of by roasting and fluxing. A second serious objection with the product of most ores is that, even after the bullion is supposed to be refined, it is not refined, but must still find its way to the refinery, the U. S. assay offices refusing to purchase bullion of a fineness of less than 500 in gold.

After experiments with sulphuric and hydrochloric acids, the writer abandoned both in favor of nitric acid. The zinc and silver can both be dissolved with this acid. The acid is poured direct on the wet cyanides, fresh from the extractor, and sufficient water is added from time to time with the acid to carry the dissolved zinc in solution. After a little experience, it is easy to tell when the zinc has been dissolved, as it settles compactly on the bottom of the vessel after stirring until it is dissolved; or samples can be taken out and tested in a beaker from time to time. Almost every particle of silver can be dissolved, after which the acid is decanted into another vessel and the residual gold washed again and again with water until no trace of zinc or silver shows in the solution, if one wishes to carry the refining so far. The silver in the dissolving fluid and washes is then precipitated by the aid of common salt and recovered as silver chloride. The brown-colored gold paste is dried, fluxed principally with borax, melted and cast into bricks. By this method, practically the same as that employed for refining gold at the U. S. Mint at Philadelphia, one actually refines his product and has his gold and silver in separate bricks. The gold produced is marketable anywhere, and, by running one's own test of its fineness, it is easy to determine its actual value.

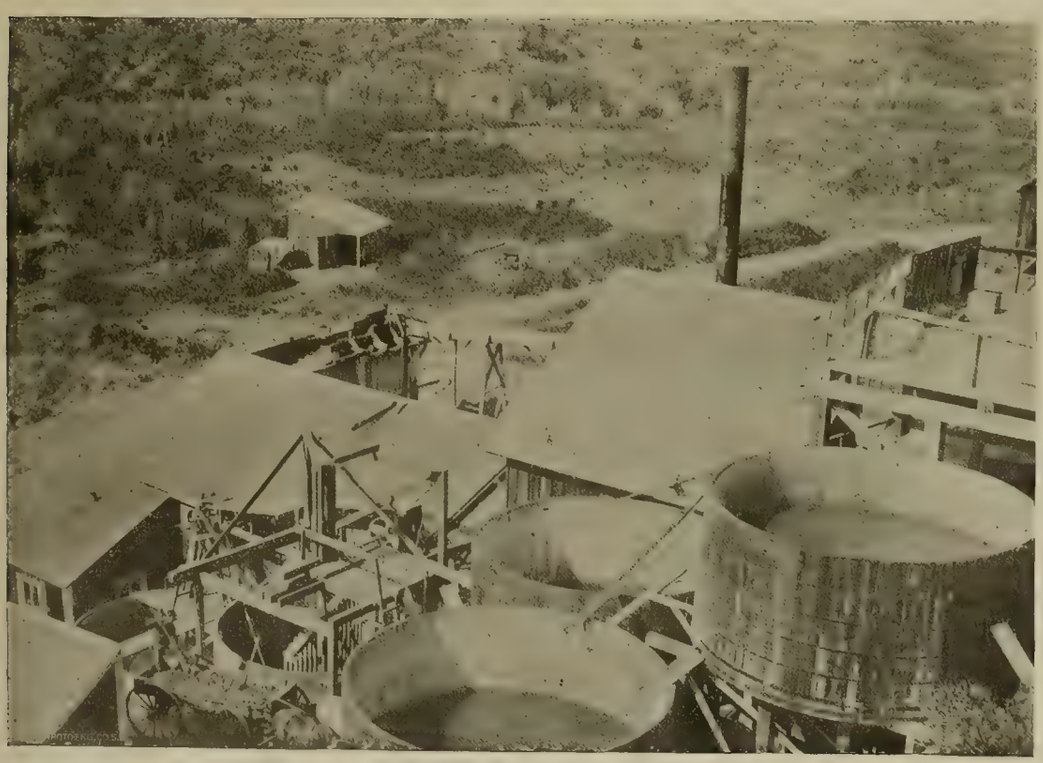


FIG. 7.—MOHEGAN CYANIDE MILL, RED BLUFF, MONTANA.

Fig. 7 is an illustration of the Mohegan mill at Red Bluff, Mont., mention of which has been made in previous issues of the MINING AND SCIENTIFIC PRESS. The agitator is so arranged as to treat tailings or take the pulp as it comes from a 10-stamp battery. All such a plant needs is an abundance of good ore. It handles the material expeditiously and economically.

If details of the system in use here and at other slimes plants in Montana seem lacking in the present article, the reader may find them in a previous contribution ("Aids to the Cyanider," MINING AND SCIENTIFIC PRESS, Oct. 15th, '98). Perfection is not claimed. Good work has been done with material not successfully handled heretofore. At the same time, in the light of past experience, better work can be done to-day. Most good things do not spring up like mushrooms, but are the outgrowth of the experiences of years and of many persons. Most of us may forget to recognize at times that the present skill in treating base ores is the accumulated skill of ages. Slimy ores and tailings are handled as successfully to-day as any other class of material, and the field for work of this character is much broader than many people imagine. There are ores, such as those at Mercur, where a splendid extraction can be secured with coarse crushing. This is an exceptional, rather than a typical, ore of the Rocky mountain region. The ores at the Republic mine, in Washington, need crushing to an impalpable powder before they will yield their values to a solvent. Roasting is essential with many ores, and roasting and fine grinding may be necessary with others before they can be compelled to surrender their precious contents. Even concentration after leaching has been found necessary in Colorado and Montana.

Very marked improvements in treating refractory ores have been made the past few years and the end is not yet. Marked as has been the improvements in handling slimy material, those most in touch with the work can see where changes for the better will soon be made, enabling a more perfect extraction to be secured at still less cost. The writer is of the opinion that the time is not far distant when a number of ores now concentrated will be cyanided. Why concentrate and then treat the concentrates and tailings separately when they both may be treated at once? With conditions right, which comes of course from a careful study of the particular ore and the fitting of the process to it, lixiviation will be the lone competitor of smelting for certain classes of material; for by one or the other of these two only, can an extraction approaching perfection be obtained, and the advantages of economy are decidedly in favor of the liquid process.

In Montana to-day are no less than twenty cyanide mills in successful operation, ranging in capacity from 400 tons a day down. Eugene B. Braden, of the U. S. assay office at Helena, who compiles the record of the mineral output of the State, says in his report for '98:

"The yield of gold from the cyanide plants is an interesting feature of the production. From a small beginning, a few years ago, this product continued unimportant till '97, when it suddenly increased to about 10,000 ounces. This was nearly doubled in '98, and a constant growth for a number of years is anticipated."

No higher compliment can be paid any process than a record of good results. They speak with an emphasis that counts. And as a part of the excellent work that is being done with cyanide in Montana it can be said of the slimes plants that they are keeping up with the procession. At the close of '99 they will come to the front with a record of more than twice the production of the year previous.

Nearly all the works on cyaniding give as their greatest objection to an agitation system that power is required. Thus, one author estimates that 1 H. P. per ton will be needed, and the latest work says: "It requires motive power, which in itself is a source of considerable expense. * * * * Agitation is only adapted to impermeable material of high grade or to concentrates, where the extraction is sufficiently good to justify the additional expense entailed by use of motive power, etc." ("Practical Notes on the Cyanide Process," Bosqui.) While these remarks may apply to some early efforts, they do not apply to agitation as practiced in Montana. No cyanide plant is complete without power to run a zinc lathe and a solution pump, and that same power would run two agitators. Ten to fifteen H. P. would be ample for an agitation plant treating fifty to eighty tons of tailings a day, and this expense for power is easily offset by the saving over percolation in the one item of discharging the material after treatment, even where, as in the latter case, it is sluiced out of the leaching vats.

(CONCLUDED.)

A Method of Arranging Mine Samples.

TO THE EDITOR:—In a paper by Geo. J. Bancroft, entitled "Notes on Mine Sampling," which appeared in the issue of the MINING AND SCIENTIFIC PRESS of June 17th, that gentleman suggests a method of averaging mine samples, based upon the relation of the number of feet sampled to the value per ton as determined by the assay of the sample. He multiplies the number of feet represented in the sample by the number of ounces per ton as shown by assay, and calls this product the "foot-ounce." Mr. Bancroft says: "The sum of all the values in foot-ounces is then taken and the sum of all the widths in feet. Both sums are divided by the number of samples, giving the average value in foot-ounces and the average width in feet. The average value in foot-ounces is divided by the average width in feet, giving the average value in ounces."

This method is perfectly correct, but in many mining regions the value of ore is calculated in the more common commercial terms of dollars and cents, and the quantities are measured or estimated by tons. In a region of large low-grade mines, the system of Mr. Bancroft would also apply, but it would involve generally the employment of fractional quantities, which, while not particularly confusing or beyond mathematical computation, are unnecessary, if the tons and dollars method be employed. The matter of averaging samples can be simplified greatly if the number of feet are assumed to represent tons, as ore going to the mill or smelter is calculated by the ton, and not by the foot. Multiply the number of feet, or fraction of a foot, by the assay value in dollars and cents per ton, and let the product represent the value of a number of tons equal to the number of feet in the sample.

Taking Mr. Bancroft's three samples for the purpose of illustration: Twelve feet of one-ounce ore, 1 foot of twelve-ounce ore, and 6 feet of three-ounce ore. Assuming, as above suggested, that the feet represent tons and the ounces be reduced to dollars at $20 per ounce, we have:

12 tons of ore, worth $20 per ton	$240
1 ton of ore, worth $240 per ton	240
6 tons of ore, worth $60 per ton	360
19	$840

This shows an average value of that portion of the mine sampled of $44.21 per ton, obtained by dividing $840, the total value of all samples, by 19, the total width in feet representing tons. By this method we reach exactly the same result as that obtained by Mr. Bancroft's method in a more simple way and with an expense of much less time and computation, and the result is in a tangible form, which suggests to the mind whether or not the operation of the mine will result in profit or loss.

MINING ENGINEER.

San Francisco, Cal., June 24th, '99.

A SCHEME for damming the Ottawa river at Mechanicsville is receiving considerable attention. It is proposed to build a dam at this point high enough to do away with the Remoux rapids. By so doing the anchor ice, which has given so much trouble to the Ottawa power houses in recent years, would be avoided, and incidentally a 40,000 H. P. would be established. Of this power, 20,000 H. P. will be on the Ontario side of the river and 20,000 on the Quebec side. This power would be utilized by digging a canal parallel to the shore, the power houses to be situated on the piece of land between this canal and the river, with the flumes emptying back into the river. When this projected enterprise is completed and the enormous power obtained, it will give Ottawa probably the largest amount of water power of any city in America outside of Niagara.—Electricity.

Peculiar Effect of Subterranean Corrasion of Rocks.

Written for the MINING AND SCIENTIFIC PRESS.

A more strange appearing region than that about Columbia, Springfield and Shaw's Flat, in Tuolumne county, Cal., would be difficult to find. To the passer-by it presents the appearance of a broad field of what seem to be strangely shaped boulders of limestone thickly strewn over the entire valley, and suggests a vast graveyard in which there are thousands of odd-looking tombstones sacred to the memory of the past.

These peculiarly jagged boulder-like masses owe their present appearance almost wholly to the dissolution of the more soluble or readily attacked portions of the limestone formation by acidulated waters percolating through the alluvial deposits which formerly overlaid the limestone, and form a typical illustration of subterranean dissolution of rocks in contradistinction to erosion in its ordinary sense.

The geological history of the region, if it could be written in detail, would form a most interesting chapter, but at this time only its general conditions can be stated. It is evident that at one time the hills surrounding the valley and also the valley itself were higher than now. On the western side of the valley is the Table mountain gravel channel, which for the past fifty years has been illustrated in all geological text books as the typical form of ancient river channel in California, filled with gold-bearing gravel and overlain by a thick flow of black feldspar-basalt. When this channel was formed it must have been confined by hills rising on either side. Down the valley itself near Columbia was another gold-bearing channel which has the appearance of being older than the Table mountain channel. Immediately above the gravel was deposited a heavy flow of rhyolite tuff. What material overlaid the tuff can only be reasoned by analogy. In Calaveras county gravel channels of similar character and overlaid by rhyolite tuff have a capping of brecciated andesite cemented by volcanic mud. This capping has been entirely removed in the neighborhood of Columbia, and only a portion of the tuff remains.

There may possibly have been other channels crossing the basin, but subsequent erosion has removed all but a few remnants of the gold-bearing streams, and their golden contents have been scattered over the greater portion of the surface of the limestone which forms the larger portion of the floor of the valley.

When gold was discovered on Columbia Flat in '50 it was a broad, beautiful, park-like tract dotted with magnificent oaks and other trees. In spring the meadows were bright with the hues of California's native flora. The soil was rich and the growth of vegetation luxuriant. For centuries the seasons following each other had seen this vegetation come into life with each succeeding spring and seen it die and decay on the damp meadow. The carbonic acid generated by this decay of organic matter was taken up by the water which percolated over and among the rocks, seeking a natural drainage outlet, and soon began carving from the massive crystalline limestone strata the grotesque shapes now seen in this area. Deeper and deeper this agent of dissolution found its way, cutting a labyrinth of passages and tunnels, sometimes completely segregating masses from the main formation, these then becoming detached boulders. All this fantastic sculpturing of the rocks took place beneath the surface soil of the valley. The limestone, where exposed to atmospheric agencies, endures better than some of the eruptive rocks which traverse it. Dykes of diorite are seen in many places.

When the miner first arrived in this valley there was little in its picturesque appearance to suggest that beneath the fertile, loamy soil lay millions in gold; but the industrious pioneers were not long in finding it out and a town of 15,000 people quickly came into life. The beautiful, park-like valley soon became a mass of unsightly heaps of boulders scattered among the 10,000 tombstones, with ditches of muddy water running in every direction.

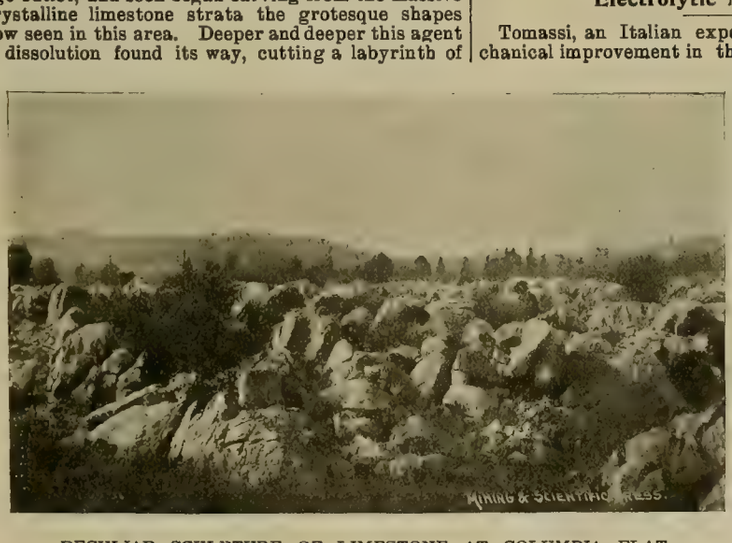
The work of the miners has afforded an opportunity for further study of the peculiar result of the subterranean dissolution of the lime rocks. As the more soluble portions were removed, the surface detritus evidently slowly sank deeper and deeper, the surface level being maintained by the contemporaneous filling in of material from the surrounding hills. The siliceous and clayey portions of the limestone, being insoluble, have remained nearly in their original relative position and have formed a peculiarly tough, compact, greenish-colored clay layer interposed between the gravel above and the limestone formation below. It everywhere coats the boulders and gravel of the lower portion of the deposit with a shining film, and constitutes a large part of the material found within 5 to 10 feet of the bedrock, though generally found to contain more or less of the gravel wash and sometimes gold.

The irregular manner in which the dissolution of the rock progressed resulted in the formation of hundreds of "potholes," in which gold has been found in more or less abundance, and it is claimed that some of the holes were too deep and the quantity of water encountered too great to permit their being bottomed; and these still contain gold, in what amount is a question.

This process of dissolution of the limestone resulted in the removal of a very large amount of material, possibly an average thickness of 50 feet or more over an area of more than a mile square. Naturally it would be expected that the carbonate of lime in solution would be redeposited at the first favorable opportunity, and such seems to have been the case; for, near Gold Spring, two miles northwest of Columbia Flat, on the upper portion of the slope of the canyon of the Stanislaus river, is found an extensive deposit of calcareous travertine, having a maximum thickness of more than 200 feet and covering several hundred acres in extent. It is clearly evident that this was derived from Columbia Flat and is merely a remnant of the original deposit, the greater portion having been removed by recent erosion.

It has been asserted by some, and believed by many, that a rich channel lies underneath the limestone of Columbia Flat; but this is not so. The only channels now remaining on the flat are those which may be traced by their remnants which appear on various portions of the field. These channels have been much disturbed, and are found faulted and tilted by dynamic forces.

Since the removal of the detritus by the miners many dykes of diorite are seen traversing the limestone. Where exposed to the weather, the dykes have suffered from decomposition and are worn by atmospheric agencies to the level of the limestone; but where these dykes have been protected by the superficial deposit of debris, they have proved more durable than the limestone and stand like walls above the level of the latter. W. H. S.



PECULIAR SCULPTURE OF LIMESTONE AT COLUMBIA FLAT, TUOLUMNE COUNTY, CAL.

Electrolytic Metallurgy.

Tomassi, an Italian expert, has proposed a mechanical improvement in the operation of the electrolytic bath used for the extraction, separation and refining of metals which may prove to be of practical value. The aim of the inventor, says the *Journal of the Franklin Institute*, is to reduce the resistance in the electrolytic cell, and thereby reduce the cost. His electrolyzer consists of a rectangular tank in which are placed two anodes, between which is placed a circular metallic disk mounted on a gun-metal spindle, and capable of being rotated. The disk is partly out and partly in the bath, and so comes in contact with the air and the electrolyte. The part of the disk outside the electrolyte comes in contact with two scrapers—one on each side—which scrape off the spongy deposit and depolarize the surface. The anodes are either in the form of plates or in receptacles containing coarse powder. When the cathode has a sufficiently thick layer of metal it is taken to a bath of molten metal similar to that deposited, and the electrolytic deposit is melted in the bath, and then the cathode is taken back to the electrolyzer. Mr. Tomassi claims that polarization is entirely done away with, that the metal deposited is removed as the deposition proceeds and that the density of the liquids is the same.

Some Experiences of a Working Miner.

NUMBER XXII.

Written for the MINING AND SCIENTIFIC PRESS.

Several years ago the G—— brothers located the D—— mine, and, finding some rich ore, became excited over their discovery. The ore occurred in a broad zone on top of a hill about 400 feet high. It could be followed without difficulty along its strike quite a distance either way from point of discovery. To the southward the hill sloped steeply off to the creek below, and here a tunnel might have been started and driven directly in on the vein. This sensible thing they did not do, but started and drove a crosscut tunnel from a neighboring gulch through 450 feet of hard, pyritiferous slate, along the sides and roof of which the marks of the drill holes could be seen almost every foot of the way. It was a hard and expensive job, worth at least $10,000, and the tunnel never reached the vein at all, as their money and patience gave out. Had they started the tunnel on the vein, they would have had the advantage of a lower level, easier ground and been in the mineral zone all the way. The principal reason for starting the tunnel where they did was that it was more convenient to their cabin.

* * *

The D—— mine was not the most simple proposition I ever heard of. The vein was large, low grade and extremely base. The ores were oxidized to only shallow depth and the sulphides presented as complex a composition as the most ardent searcher for base ores, upon which to experiment, could wish. The gangue was massive quartz, in which occurred lead, zinc, iron, copper and antimony sulphides, and also arsenical compounds of several kinds. The values were chiefly in silver, but, as above stated, low grade. The sulphides constituted 5% to 10% of the ore body. How to treat this complex metallurgical problem was a puzzle. Milling was tried without satisfactory result. The ore was roasted and milled. This was somewhat better, but too expensive. Smelting was suggested and a quantity shipped to a distant reduction works, which returned a bill considerably in excess of results, with instructions to send no more such ore to their works. About this time appeared a splendid invention with a German name. It was a smelter, but wholly unlike the common water-jacket affair which has a limited range of application. This new device embodied so many novel and sensible features as to appeal immediately to the common sense of any person—who knew nothing about smelting. This furnace was guaranteed to successfully smelt any ore containing 2½% lead with a minimum of fuel. Not only this, but it had an attachment that at once solved the vexing problem of economical separation of the various metals. This device was of such a character that the various metals in the ore would segregate to themselves. When the furnace was tapped, the molten metal would discharge into a pot, which, when filled, was wheeled to one side and allowed to cool, while another pot took its place at the furnace tap. On cooling, the pot would be overturned and a cone of metal would drop out. A few light taps with a hammer would separate the several metals, which would be found arranged in a series of layers, the gold at the apex of the cone—a beautiful mass of crystallized yellow metal; then would come in the order of their specific gravity the several other metals, as lead, silver, copper, antimony, arsenic, etc. Here was a solution of the troublesome problem, and, without further trial or even investigation, a furnace with gravity separator was purchased and set up at the mine. The furnace was blown in, and for an hour or two all was lovely, and then the antimony, arsenic, zinc, etc., manifested their disapproval of the operation and froze up the charge so hard that it had to be blasted out. No one has since had the courage to work the D—— mine and the furnace stands rusting in the weather.

* * *

When the original discoverers of the H—— mine had performed some development work on their property they needed a little assistance, and accordingly went to a merchant at D—— and offered to exchange an interest in their mine for a small amount of provisions. After some discussion, Mr. Y——, the merchant, decided to accept their proposition, and, later visiting the mine, he concluded to start some work at a new place on his own account. He employed some miners and ran a tunnel into the hill on the vein, developing a promising portion of the mine. Shortly after this a company offered to buy the property at a certain price and what at that time seemed a large figure. Mr. Y——, not being satisfied with his share of the total sum, refused to sell, demanding a higher figure. Argument was useless; he maintained his position, and called attention to the fact that he had exposed the most promising portion of the mine at his own expense, and thought he should receive some reward for his individual enterprise. At length he made a proposition to the company which was somewhat unique in a mining deal. He proposed to haul away the ore on the dump that he had had taken out at his own expense, and to con-

tinue mining and hauling from the same place for a period of twenty days; at the expiration of twenty days he would transfer his interest to the company at the price offered by them. This was agreed to, and before nightfall Mr. Y—— had every custom mill in L—— and the neighboring gulches chartered to crush ore for twenty days to their fullest capacity. All the available teams were hired and a crew of miners put to work—not in the tunnel, as the company had supposed would be done, thereby still further developing the mine. No; Mr. Y—— started a wide open cut and breasted into the hill on a fine body of ore, and as no stipulation had been made as to how much he should mine or as to how much he should take, the agents of the company could only watch the progress of operations with interest. At the end of twenty days the company promptly shut off Mr. Y—— and tendered the price agreed upon, which was accepted by the merchant with even greater reluctance than he had felt when they first offered it. As a result of his twenty days' privilege, he netted nearly as much as the company paid him, and this under the heaviest expense.

* * *

When I first visited the S—— mine my attention was called by Superintendent C—— to a fissure on which he had drifted several hundred feet. The fissure was one of the most interesting and peculiar fractures I had ever seen in any mine. It was about 2 feet wide, had smooth, regular walls, the space between being filled with crushed rock of the same description as the walls. These fragments were all angular, and varied in size from that of peas to pieces larger than one's fist. They were loosely cemented with fine material of the same rock, the result of finer crushing. Not an ounce of ore was visible throughout the entire length of the drift. When at last the face was reached the superintendent jabbed his candlestick into the crushed rock, sat drown on a projecting ledge and abruptly asked:

"Wouldn't you have run this drift had you been bossing this mine?"

My reply was as abrupt as his question:

"No; I would not."

"Why not?" he asked.

"Because there's nothing in the entire length of it," I answered.

"Yes," said he, "but you would not have known that if the drift had not been run."

"Oh, yes I would," I retorted. "This fissure is a cross fracture of comparatively recent formation. It has never been subjected to the influences of mineral solutions ascending from great depth—the solutions which form ore bodies and fill veins. Had this fissure been in existence at such a time I can imagine that it might have become a vein, and possibly a rich one, but there is not the slightest evidence of ore deposition throughout its entire length."

C—— looked at me steadily while I was speaking, and then said:

"I got h—— for running this drift."

I should think he might. MINER.

Aluminum Feed Wires for an Electric Road.

Owing to the success of the aluminum lines at Niagara Falls, and Snoqualmie Falls on the Pacific coast, the Chicago Northwestern Elevated Railway Co. has placed an order with the Pittsburg Reduction Co. for 150,000 pounds of aluminum, to be used as feed wires on that road. Three sizes of aluminum cable will be used, the largest being about 1½ inches in diameter. The order calls for over ten miles each of the two larger sizes. The feeders will be placed in a wooden box or trough covered by the board walk between the tracks of the elevated and will be supported on vitrified clay blocks, about 9 feet apart and designed with an umbrella drip. A special malleable iron chair will be used every 100 feet, the cable being carried in split-spool insulators to hold the slack. It is estimated that the aluminum will be cheaper, as forty-seven pounds of aluminum wire will answer the same purposes as 100 pounds of copper wire. This installation was caused partly by the rising price of copper and will be the first electric road in the country that has attempted the use of aluminum for feed wires.—The Engineer.

Portland Cement Made From Slag.

Portland cement from iron slag has been so profitably and successfully produced from the refuse at the Sparrow's Point Works in Maryland, and at the works of the Illinois Steel Co., that a plant is to be established at Birmingham, Ala. The supply of slag will be drawn from the Emsley furnaces of the Tennessee Coal & Iron Co., the plan being to have an initial capacity of 1000 barrels a day. Machinery has been ordered for the plant, which will be in working order, it is expected, in about four months. This utilization of what was heretofore a useless by-product of pig iron works is one that promises to add largely to the profits of the iron makers, even though the production of the cement, as in this Birmingham case, is turned over to an independent company.—Boston Transcript.

Gold Production of the World.

The gold production for 1899 is estimated at $340,000,000. The returns for the first four months of this year shows that the ratio of increased production continues and will add $50,000,000 to the production of 1898, which was $290,000,000, bringing the 1899 production up to $340,000,000.

The increase in Africa alone, if maintained the rest of the year, will make the output of the country $26,000,000 more than it was in 1898. The period of thirty years (1861–1890) the average annual production in the world was very evenly maintained at $115,000,000, never running below $90,000,000, nor above $130,000,000.

For the seven years (1893–1899) the annual average was double that, or $230,000,000, increasing from $157,000,000 in 1893 to $340,000,000 in 1899.

Mint Director Roberts estimated that in 1897, 25% of the production went into manufactures and arts; 75% of the estimated production of 1899 at the same ratio will supply for monetary uses this year $255,000,000. This annual production, simply maintained without increase for nine years and added to the actual addition made to the monetary gold since 1893, will make the monetary gold in the world in 1907 double what it was in 1893.

The average annual production for the 150 years ending in 1850 was $13,666,000, and for the following ten years $133,000,000, or ten times the old average. New fields were found then. Now new fields and new treatment for immense bodies of ore have been found.

In the report of the Mint for 1898, Director Roberts says: "There is the best of reasons for believing that this increased production is permanent, in the sense of being probable for years. The recent increase has come from discoveries in methods of reducing ores. The known deposits of these ores, which formerly defied treatment, but which must now yield up their treasures, give assurance that the present rate of production is not likely to soon decline. On the other hand, gold production under these conditions has, in great fields lately unknown, assumed the character of a staple manufacturing industry, and capital is available for it in sums which promise unexampled development in the future."

No attempt is made to indicate the tremendous probabilities of this inflation, without precedent in human experience, but it should be noted that the United States is getting its share of gold.

Director Roberts states the stock of gold in the United States is estimated to have been on July 1, 1897, $696,000,000; on Nov. 1, 1898, $915,100,000, making the gain $228,800,000 in sixteen months. This is a gain of $3,333,000 a week.

Luminosity of a Nernst Lamp is Deceptive.

A singular property of the Nernst lamp, that is not alluded to in Mr. Swinburne's recently published paper describing it, is pointed out by T. J. Johnston of Schenectady. Mr. Johnston says that its candle-power is, to use his own words, "enough to deceive the very elect. Persons looking at it and at its apparent illuminating power upon the walls of a room, etc., have made the wildest and most extravagant guesses at the photometer reading. I know that," he continues, "although I have had considerable experience with the photometer, both in gas and electric lighting work, I guessed fifteen candle-power when the Nernst lamp was giving three. I heard one man, of more experience than myself, guess thirty-two candle-power when the photometer was reading five. And another thought it was eight candles when the reading was only three-fourths of one candle-power. Why this is so, I cannot pretend to say."

UNITED STATES CONSUL MCCOOK, writing from Dawson City, says of the difficulties which miners have to overcome in that Arctic region: "The principal drawback is the crude way of mining the frozen ground, as it is necessary to build fires to thaw it out and then wait till summer before it can be sluiced. This requires time. The price of labor in this country is on an average $1 per hour and the cost of living is exorbitant, every necessity of life costing at least five times as much as in the outside world. In addition to all this is the 10% royalty, which must be paid to the Government on the gross output. A claim in the Klondike must therefore be very rich to yield a profit."

ASSUMING the diameter of the earth to be 8000 miles and the thickness of the solid crust to be 200 miles, the crust then represents but one-fortieth part of the earth's diameter. A hollow sphere 40 inches in diameter, representing the earth, would have but 1 inch of shell to represent the earth's crust and the deepest ocean would be represented by an ordinary coat of paint, or varnish; the highest mountain chain would be a mere wrinkle on the surface scarcely noticeable, and the deepest mine an infinitesimally small pinhole one-two-hundredth of an inch in depth.

Not a Menace to Non-Interfering Travelers.

"Is the Blue Lakes power line a menace to travelers who may chance to touch the wires connecting with the ground?"

F. A. C. Perrine, the chief engineer of the Blue Lakes, Cal., Power Co., answers the question as follows:

"Referring to the inquiry regarding possible danger to persons living near or traveling along our pole line leading from the plant near the Big Bar bridge on the Mokelumne river to Stockton Cal., I beg to call attention to the following facts as regards its construction and to the immunity from danger to passers-by afforded by the type of construction we have adopted:

"The top wire of all is a barbed wire, stapled to the top of the poles and connected at every fourth pole to the ground plates under the pole itself by a small galvanized wire. The wire and its ground plates are for the purpose of protecting the poles and lines from lightning disturbance, and amount to a continuous lightning rod forty-three miles in length. The four wires on the crossarms, supported by large glass insulators immediately below this lightning guard, are the power wires and carry a current of 25,000 volts. This pressure is dangerous, and the probabilities are that any contact with these wires would be fatal. But no one can come into contact with these wires without deliberate intent; and as they are the only dangerous wires on the pole line, it is hard to see how anyone can be injured except when purposely subjecting himself to risk.

"Below the power wires is a crossarm on which telephone wires are suspended, which do not differ from other telephone circuits.

"There remains only to speak of the guy wires which are attached to the polehead and run into the ground, taking up part of the strain at corners in the line. The manner in which these wires are fastened into the ground insures their being safe at all times, since even should they become charged, which we consider impossible, they would immediately conduct the current to earth, and installed as they are, they are no more a source of danger than are the tracks in an electric railroad system. The same observation applies to the grounded barbed wire described above.

"It is necessary, however, to point out that any malicious injury to the line or insulators endangers the lives of our operatives, who must always take some risk in making repairs, and it is difficult to see much difference between deliberate shooting at these insulators or other injury to the line and an equally deliberate act of murder, since such mischief may at any time result in a fatal accident."

Wire Wound Flywheels.

In view of the attention that has, of late, been devoted to accidents from the bursting of flywheels, and the various designs that have been proposed to prevent them, it seems a bit strange that only passing notice should have been given to wire-wound rims for such wheels. Several wheels of this character have been turned out and have been at work with good results for a sufficiently long time to take them beyond the purely experimental stage, but still they have remained isolated examples of a possibly excellent type. Cost of construction may have something to do with this, for their cost was, in all likelihood, comparatively high. But if they thoroughly accomplish the attainment of safety, as they seem to have done, they represent an investment quite as profitable as any that might be made with the saving in cost of a wheel of ordinary construction and the usual uncertainties of behavior. What a flywheel rupture is capable of doing in the wrecking of its surroundings has been shown by a long list of costly accidents. The wire wound flywheels that have been used thus far have been of the homemade variety; that is to say, they have been made by their users, and none, so far as is known, have been offered for general service, so that possibly one additional reason why there are so few of them may be lack of advertising and lack of information, to any appreciable extent, of their good points.—Cassier's Magazine for July.

Large Dividend Payers.

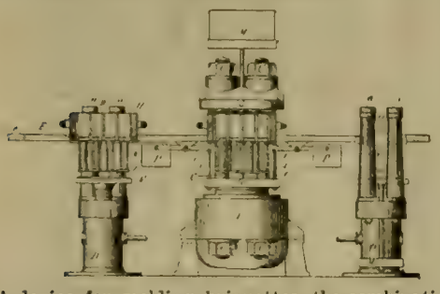
It is said that the largest dividend payer excepting one among the mining companies in America and probably in the world last year was the Calumet & Hecla, which distributed among its stockholders during the year $7,000,000. This amount is exceeded by the De Beers consolidated mines, which paid in dividends last year a total of $7,687,300. In addition to this the latter company paid $862,500 as interest on its bebentures and $642,400 for retiring a portion of its bonded debt, making a total of $1,504,400, bringing the total payments in the nature of profits to $9,192,200, or $2,192,200 more than the Calumet & Hecla. The proportion of profits to the capital stock of the De Beers Co. was 40% when that of the Calumet & Hecla was 280%, the capital stock of the latter being rather small.

Latest Mining and Metallurgical Patents.

Patents Issued June 20, 1899.

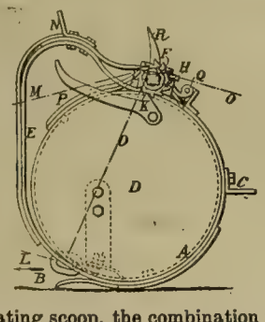
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR MAKING BRIQUETTES.—No. 627,130; F. J. Muller, Bubna, Austria-Hungary.



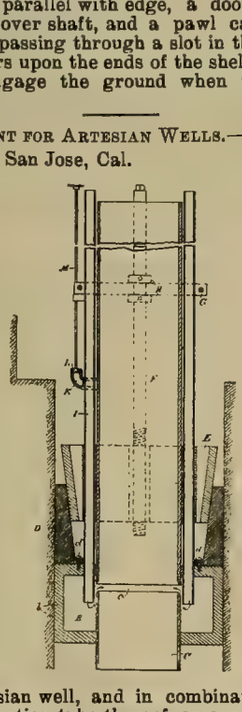
A device for molding briquettes, the combination with the mold *H*, plungers *K* below the same, the press head plate *G*, and the weights *P* for pressing the mold *H* against the head *G*. A mold having depending plungers, a molding press having the head plate *G* and press head *Q*, the weights *P*, supporting levers *f* abutting against mold, and connections between press head *Q* and levers *f*. The combination with a mold, the supporting standards *C*, the press head plate *G*, a press head *Q*, an ejecting plate *N*, the standards or uprights *D* having the fingers *a*, *a'* thereon, arranged above ejecting plate, and the mold supporting tracks *E*, *E*, connecting standards *D*, *D*, and *C*, *C*.

EXCAVATING SCOOP.—No. 627,387; J. E. Brown, Alton, Eng.



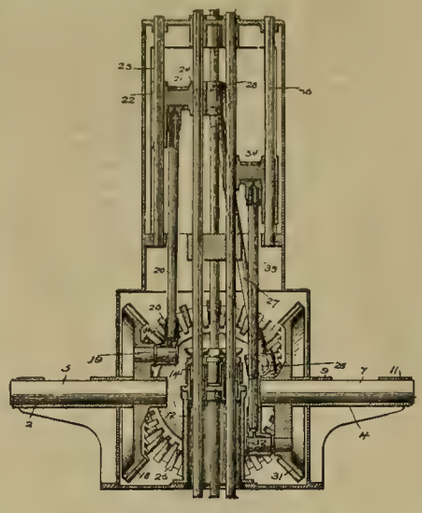
An excavating scoop, the combination with an approximately semi-cylindrical shell having sledge runners at its ends, of a shaft external to the shell but parallel with its axis, draft chains extending from a common shackle to connections at the ends of the shell near its digging edge, ropes diverging from the common shackle to worm bosses on the external shaft, and a ratchet and pawl to hold the shaft at any point to which it is turned, the pawl having a handle by which it may be disengaged. The shell open on one side and provided with an outwardly curved digging edge, of a shaft external to the shell and parallel with edge, a door hinged on shell to close over shaft, and a pawl catch pivoted on shaft and passing through a slot in the door. The sledge runners upon the ends of the shell having projections to engage the ground when the scoop is emptied.

ATTACHMENT FOR ARTESIAN WELLS.—No. 627,250; F. Cavallaro, San Jose, Cal.



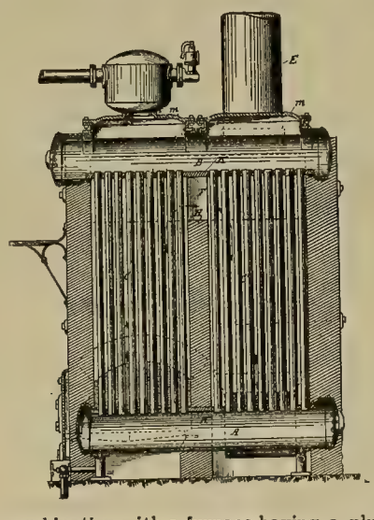
In an artesian well, and in combination with the casing and suction tube thereof, an annular chamber surrounding the lower end of the suction tube fitting loosely within the casing, an expansible gasket fixed to the upper surface of the chamber and an expanding cone with means whereby it may be depressed into the gasket to expand it and make a tight joint within the casing or removed therefrom, of an annular chamber loosely fitting within the well casing, a suction pipe, to the lower end of which the annular chamber is secured, an expansible gasket and means by which it is secured upon the top of the chamber, a movable cone by which the gasket is expanded to make a tight joint between itself and casing, air tubes extending down into the interior of the casing and perforations made through the sides of the casing and connecting with the casing whereby air is admitted into the interior of the suction tube, pipes through which air under pressure may be forced into the interior of the chamber and discharged thence into the suction tube, a gasket fixed to the top of the chamber, and an expanding device whereby a tight joint is made between the gasket and the interior of the casing, and a valve-controlled elbow pipe opening through the side of the suction pipe to admit water from the outside.

TRIPLE PISTON DEEP WELL PUMP.—No. 627,315; W. C. Woodward, Los Angeles, Cal.



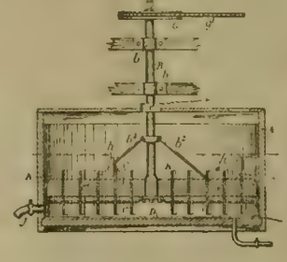
In a lifting pump, the combination with a single pump cylinder, a triple set of valved pistons axially mounted within cylinder, of a triple set of intermeshing miter gears, means for operating gears and a series of piston and connecting rods independently connecting each gear with its respective piston. The gear wheels, independently connected to their respective pistons, and means for simultaneously rotating gear wheels, so as to independently reciprocate pistons.

BOILER.—No. 627,321; M. P. Boss, San Francisco, Cal.



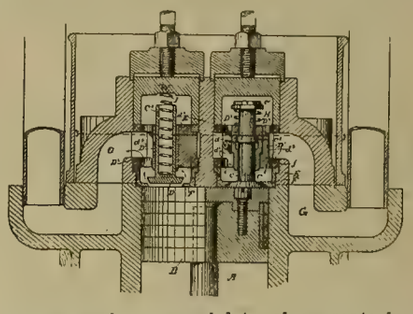
The combination with a furnace having a plurality of flues for the products of combustion communicating to give alternate currents in opposite direction, of a lower water cylinder extending from one flue into the next flue, an upper cylinder extending from one flue into the next, and a group or nest of vertical water tubes in each flue connecting the upper and lower cylinders, the first nest of tubes and first flue being directly above the furnace combustion chamber. A removable plate or cover in one of said cylinders opposite said tubes, whereby upon removing said plate or cover any tube of said group may be withdrawn through the plate opening. The combination with a furnace having a double fire chamber, and a central vertical flue, of a boiler comprising a mud drum located to form the dividing bridge wall of said double fire chamber, a steam drum in the upper part of said vertical flue and vertical water tubes in said flue connecting said drums.

PROCESS OF ELECTROLYTICALLY TREATING ORES.—No. 627,442; L. Pelatan, Paris, France.



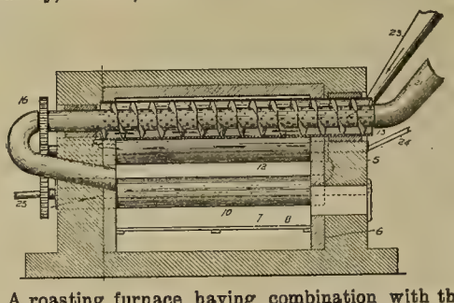
A process for treating ores, the treatment of the charge by first passing an electric current through an agitated mixture of pulverized ore, or the like with water, and salt, and then adding a neutralizing agent, if the sludge be acid, and afterward adding the solvent and continuing the agitation and the passage of the current. The improvement in processes of treating ores electrolytically consisting in adding to a sludge, consisting of ore and water, a solvent and piric acid as an oxidizing agent and then passing an electric current therethrough. The process for the treatment of ores by first agitating the charge consisting of pulverized ore, water and salts, heated to a temperature of from 80° to 100° C., and passing therethrough an electric current of or about the density stated, the sludge being neutralized for acid, and afterward adding the solvent agent and continuing the agitation and passage of the electric current.

SAFETY SUCTION VALVE FOR PUMPS.—No. 627,454; C. S. Booth, Oakland, Cal.



In a compressing pump, inlet valves, seats in the cylinder head against which they are closable, cages having vertical central openings within which the shanks of the valve are movable, annular enlarged chambers formed within the length of central bores and collars formed upon the valve shanks intermediate of their ends and fitting and movable within chambers; inlet valves closable upwardly against seats in the cylinder head and centrally bored cages through which the valve shanks are movable, collars formed around the shanks intermediate of their length, annular chambers formed in the length of the bore of the cage having a length equal to the longitudinal movement of the valve in opening and closing, nuts or collars fitting upon the upper ends of the valve shanks and springs intermediate between the cages and nuts whereby the valves are closed after each opening thereof; the cages being formed in two segments, whereby they may be separated for the introduction of the valves and bolts by which they are held together after the valves are in place.

ROASTING OR DRYING FURNACE.—No. 627,333; W. Harvey, Denver, Colo.



A roasting furnace having combination with the combustion chamber and a number of conveyors journaled therein, means for delivering the material to one of the conveyors, means for discharging the material from one conveyor to the other, means for rotating the conveyors, whereby the material is made to travel through the adjacent conveyors in opposite directions, and a conduit communicating with the combustion chamber and leading to one end of the uppermost conveyor, whose opposite extremity communicates with the smokestack; conveyors journaled therein, each comprising two open-ended tubes, one placed within the other and connecting by an interposed screw thread, the inner tubes being perforated.

Amalgamated Copper Plates.

The bane of the mill man is the collection of oxides of certain insoluble salts upon the amalgamating plates. There are numerous remedies applied for the purpose of removing these patches of discoloration, some of which are good and some are bad. The continued use of cyanide of potassium is injurious to the plate, and this material should not be employed when a harmless substitute will perform the same function and do no damage to the plate. The following paper, written by Mr. N. S. Keith of San Francisco, Cal., treats the subject from a practical and scientific standpoint and cannot fail to be of both interest and value to mill men everywhere. The various suggestions made are the result of his own practical experience, are inexpensive and readily applied:

The discovery of the utility of amalgamated copper plates in the treatment of auriferous rock in the stamp mill has so simplified and cheapened the metallurgy of gold that it is now profitable to mine and reduce many gold-bearing ores and rocks that formerly would not pay the necessary expenses of manipulation by the old processes of amalgamation in arrastras, Chilian mills, amalgamators, barrels, etc. By the aid of the plates, in a majority of cases it is made unnecessary to submit the ore to a separate and distinct amalgamation after the operation of pulverizing, with all the attendant expenses of handling, loss, wear and tear of machinery, power, loss of quicksilver, etc. Instead, the amalgamation takes place in, as it were, the same apparatus which effects the reduction, and in a practical and effectual manner. This is the case, of course, after the gold is freed from its matrix. These virtues are not claimed in the case of ores in which the gold is mineralized (if there are any such) or covered by substances which prevent the contact with quicksilver.

The principal difficulty with which the mill man has to contend is the discoloration of the surface of the plate by oxides or various insoluble metallic salts, when it is so necessary to keep it bright and free from any film or covering preventing the easy and sure contact and adhesion of the particles of gold and amalgam as the pulp passes over. A new plate, then, is not considered in "taking condition" until it will remain bright for at least some hours after "dressing." With most plans of preparation this desideratum is not attained before a firmly adhering layer of gold amalgam has attached itself to the plate, which usually takes place after the loss of much gold, labor and time. The following described plan of preparation and treatment has been found most effective, and at the same time inexpensive, as compared with silver plating.

Composition plates made of copper, with a small quantity of zinc, have been used. Though they are very easily kept clean and are effective, they have been found too expensive, as they are easily broken. Their brittleness is caused by the union of the quicksilver with the zinc alloyed with the copper.

The conditions necessary to be observed in the preparation and care of amalgamated copper plates, that they may be put and kept in most effective order, are these: Quality of copper; method of amalgamating the plate; method of "dressing" the plate; purity of mercury; purity of water; character of ore or rock. In selecting the plate, take only the purest, softest copper, free from dark, rough spots of iron, etc. The quality known to the trade as "brasiers' copper" is the best from which to select the pieces. Do not take that which has been rolled with special care to make the surface smooth and hard, as that will not absorb the quicksilver so well as the softer and consequently more porous. It is best, for efficiency and durability, to select plates weighing not less than three pounds to a square foot; thicker is better. For inside plates, use that which is two or three times as heavy, as not being so easily bent and torn from position. If possible, buy copper which has been annealed subsequently to the last rolling. If not, then anneal the plates by exposing them to heat on the under side, sufficient to ignite sawdust laid upon the upper side. This may be done over a blacksmith's fire, but more handily over an open fire of wood or charcoal. Be sure to subject every part of the plate to the heat. This will soften the plate, making it more porous, and consequently capable of retaining more quicksilver and amalgam than it otherwise would. As the efficiency of copper plates is in proportion to their ability to hold quicksilver, this point must be carefully attended to. After this, straighten the plate by laying it on the table and using a wooden block and hammer. Do not strike with the hammer directly on the plate, but interpose the block, so that the face of the copper may not be compressed or drawn out of shape. Fasten then to the table with iron screws, or, preferably, copper nails long enough to clinch on the under side of the table. In either case, have the heads of screws or nails flush with the face of the plate. Do not use brass screws, as quicksilver soon penetrates and makes brittle the heads so that they will not hold. The minor inequalities may now be removed by the use of the block and hammer.

Next scour the plate with wood ashes and fine sand or tailings, using a scrubbing brush or coarse rag. Bad spots may be scoured with the ashes and sand, and the end of a small block of wood. Continue the scouring until the coating of oxide is entirely removed and the bright, metallic copper exposed. Caustic soda, the concentrated lye of the shops, or sal soda, may be used instead of ashes, the object being to remove all traces of oil or grease by action of alkalies. After washing with clean water, apply with a soft brush, or swab, a solution of cyanide of potassium, say one-half ounce of cyanide to a pint of water. The plate may be readily amalgamated by the use of the following mixture: Fine sand or tailings, powdered sal ammoniac, equal parts, and containing a small quantity of quicksilver sprinkled therein. With the scrubbing brush and this mixture continue the scrubbing until all parts of the plate are amalgamated. During the operation sprinkle on the plate as much quicksilver as the plate will absorb, and water enough to make a thick mud of the mixture. I have used lime with this mixture, but cannot say that the addition is of any special benefit. It is unpleasant, to say the least, as ammonia is set free in great quantity. Allow this mixture to remain on the plate for an hour or so, and then wash it off with clean water and the brush. Follow with the soft brush and cyanide solution, adding quicksilver, if the plate will hold it. By continuing this treatment for three or four rounds, the plate will be found to have taken up or absorbed as much quicksilver as ordinarily after many weeks' running. If fine gold amalgam can be spared, it is well at this stage to rub some upon the plate, using a cloth rubber wetted with a solution of sal ammoniac, in the proportion of four ounces to the pint of water. If the amalgam be heated and rubbed in a wedgewood mortar, so as to insure the solution or minute diffusion of the gold, it will be the more readily attached to the plate. I have used silver amalgam in the place of gold amalgam, with excellent results. Silver amalgam can be made as follows: Dissolve a piece of silver—coin will answer—in the smallest possible quantity of dilute nitric acid. Heat will hasten the solution. Dissolve the resulting crystals of nitrate of silver in water, and pour into the vessel enough quicksilver to reduce and amalgamate the silver in the solution. This reaction will be completed in a few hours. Wash the amalgam with clean water, to remove all traces of nitrate of mercury, and strain to remove the surplus quicksilver, leaving in the cloth a pasty amalgam of very pure and finely divided silver. Use this as directed for the gold amalgam.

The rationale of this plan of treatment may be stated as follows: The first scouring removes oxides and grease, and exposes the pure, bright metal, which by the annealing has been rendered capable of holding a comparatively large quantity of quicksilver and amalgam, by virtue of its porosity. The sal ammoniac, by reason of its property of dissolving oxides, assists the amalgamation by keeping a bright metallic surface, allowing the quicksilver and amalgam to penetrate the copper, filling the minute interstices, and combine in atomic proportions, so as to form an alloy of copper, gold and quicksilver. Thus air, water and various salts are kept from acting directly upon the copper, preventing the formation of oxide and carbonate of copper to coat the plate. This is accomplished in a longer or shorter period, depending upon the mode of preparation and upon the richness of the ore and the ease with which the gold in the ore may be amalgamated. It is probable that the galvanic current due to the contact of two dissimilar metals plays an important part in influencing the chemical reactions and assisting the amalgamation of gold, but as its exact action is not defined it is needless to discuss the point in this article.

The point aimed at in this plan of preparation is to hasten the union of a sufficient amount of gold and quicksilver with the copper. If allowed to take place slowly, the unavoidable loss of gold makes the expense much greater than if forwarded by the use of the needful amount of amalgam, before running any ore over the plate. If an old, well-used plate be cut or broken the amalgam will be found to have penetrated perhaps half, and in some cases completely, through the copper.

Corrosive sublimate, nitrate of mercury, sulphuric acid, and common salt, muriatic acid, sodium amalgam, cyanide of potassium, and other acids and salts, have been used in amalgamating copper; but though the amalgamation may be accomplished in some cases quite easily, the plate cannot be brought to a good working condition so soon, if at all, as in the way described.

The subsequent treatment of plates, amalgamated as described, should be varied to suit the circumstances of kind and quality of ore and purity of water. Water containing carbonic acid discolors plates readily, forming an insoluble coating of carbonate of copper. Though an infinitely thin film, it is sufficient to prevent the contact and adhesion of gold and amalgam, unless in particles sufficiently large to break the coating. The worst form of discoloration of plates proceeds from the action of sulphates or iron and copper present in many ores from the natural decomposition of the pyrites. The addition of lime to the water introduced to the battery, as much as will dissolve therein, will neutralize the carbonic acid and decompose the sulphates. It may be necessary to add lime to the ore to furnish enough to react on all the sulphates.

When the mill is in operation the plates should be "dressed" every six hours, or oftener, should they become discolored. After stopping the mill and washing the plates with a stream of clear water, apply with a soft brush (a whitewash brush is handy) some of the solution of sal ammoniac. Allow the sal ammoniac to remain on the plate a few minutes, wash with clear water, and apply with the brush enough of the solution of cyanide of potassium to brighten the plate. The plate should have upon it as much quicksilver as it will hold without gathering in drops or running off. Experience in this matter will teach the niceties of manipulation to the mill man.

It is essential to use quicksilver entirely free from "base metals," such as lead, zinc, tin, copper, etc. The presence of gold and silver is, of course, desirable. The base metals, when combined with quicksilver, oxidize very readily, especially when the amalgam is finely divided, exposing a large surface to the action of water, air and other oxidizing agents. Thus, with impure quicksilver the coating on plates may arise from the amalgam, instead of the copper itself.

To test the purity of quicksilver, put a small quantity on a sheet of paper while dry; if, when moved upon the paper, by inclining it in various directions, a film adhering to the paper is left on the track, the quicksilver is impure. Another test: Put half an ounce or so in an ordinary iron "gold pan," and by a quick up and down jerk separate the mercury into small globules; if, on inclining the pan, they do not readily run together, the sample is impure. To purify, first retort the quicksilver, and add to it after retorting a few ounces of dilute nitric acid (acid one part, water three parts). An ordinary acid bottle is a handy vessel to hold mercury and acid, as it may occasionally be agitated to hasten the purification by bringing the acid in contact with the impurities. The acid, by reason of its greater affinity for the base metals, removes them by forming nitrates. Some days may elapse before the quicksilver becomes purified. Samples may be tested from time to time by the plans I have mentioned. Before using the quicksilver it should be repeatedly washed with water to remove all traces of nitrates. It is a good plan to keep a supply of quicksilver under treatment, putting all which has been used into the bottle, and drawing from it such an amount of purified as may be required.

A stock of needful chemicals should be kept at the mill. The following list comprises those necessary for the preparation and treatment of plates and quicksilver: Cyanide of potassium (fused), sal ammoniac (powdered), caustic or unslacked lime, caustic soda or "concentrated lye," and nitric acid (commercial acid is sufficiently pure). Cyanide of sodium may be substituted for cyanide of potassium; common salt for sal ammoniac; wood ashes, or the lye therefrom, or sal soda, for the lime and soda, and sulphuric acid and saltpeter for nitric acid. These substitutes are but "makeshifts" at best, and consequently should not be used when the others are at hand or can be procured. It is well to keep ready prepared the solutions of sal ammoniac and cyanide of potassium in well-stoppered bottles. The cyanide solution, being especially liable to decomposition, should not be prepared in large quantities at a time. It should also be carefully kept and labeled as poison, to prevent accidents.

Official Statement of Annual Gold and Silver Production.

Director of the Mint Roberts has announced his final estimate of the production of gold and silver in the United States for the calendar year '98 as follows:

State.	*Gold.*	*Silver, fine ozs.*
Alabama	$ 5,000	100
Alaska	2,524,800	9,200
Arizona	2,465,100	2,246,800
California	15,637,900	642,300
Colorado	23,185,300	22,815,600
Georgia	128,600	500
Idaho	1,716,900	5,073,800
Iowa	100	.....
Maryland	600	.....
Michigan	100	32,400
Minnesota	100	.....
Montana	5,126,900	14,807,200
Nevada	2,944,500	805,000
New Mexico	539,000	425,300
North Carolina	84,000	700
Oregon	1,177,600	130,000
South Carolina	104,200	300
South Dakota	5,699,700	152,300
Tennessee	900	.....
Texas	300	472,900
Utah	2,285,400	6,485,900
Virginia	4,500	.....
Washington	766,200	254,400
Wyoming	5,300	100
Totals	$64,463,000	54,438,000
Totals for '97	57,333,000	53,860,000

The commercial value of silver bullion for '98 was 59 cents per fine ounce, while for '97 it was 60 cents. The above estimate shows an increase in gold for '98 over the previous year of $7,130,000, and 578,000 ounces of fine silver.

Diamond and Gold Mining in Minas Geraes, Brazil.

NUMBER III.

It is impossible to obtain exact information as to the present output of the Diamantina field. No statistics are kept, and the buyers are so numerous and scattered that they cannot be reached. The same was true of the ancient production. The statistics which have from time to time been published by Europeans are merely estimates.

The extensive mining of diamonds in Brazil began in 1740, when the first lease was made by the Portuguese Government. The period of greatest production was between 1750 and 1770, under Caldiera Brant, sole contractor, and his successors. These contractors made a practice of concealing from the Government the amount of their production, and of using a greater number of slaves than that to which they were limited by their contracts. Tradition alone preserves an approach to the truth as to the extent of their operations. If it can be trusted, the production of 1740 to 1750 was not less than 50,000 carats a year, and that of 1750 to 1770, 150,000 a year. From 1771, when the Government began extraction on its own account, until that system fell into disuse, we have fairly trustworthy statistics of the Government production But contraband mining flourished at the same time, and its extent can only be estimated. Between 1771 and 1795, the Government mined 40,000 carats a year. For the next ten years it fell to 20,000 carats a year. During this period, the contraband production was believed to be as large as the legal. From 1807, the disorganization of the Portuguese administrative system and the increasing sentiment of local liberty in Brazil, both largely due to the Nepoleonic wars and the flight to Brazil of the royal family, sapped the efficiency of the Government "extraccao," and private mining gradually but completely took its place. During the present century, the production has varied from year to year. The freedom of mining has tended to increase it; but, on the other hand, alluvial mining has on the whole decreased with the exhaustion of the easily worked beds and known localities. This latter tendency has not been counteracted by the introduction of improvements in the method of working, nor by any great energy in searching for fresh fields. Sir Richard Burton, who visited Diamantina in 1867, reported it to be very prosperous and quotes an estimate made by an exporter, of an annual production of 80,000 carats. The best local estimates of the present output approximate 25,000 to 30,000 carats a year.

Until thirty years ago, there was no diamond cutting in the district. It is now carried on extensively in Diamantina and the neighboring villages. The quaint little mills are supplied with power by overshot water wheels. The process of cutting does not differ from that employed in Europe. The machinery comes from Holland. The work is fairly good and very cheap. Most of the stones are cut into the brilliant shape. In this, they lose about 50%. The rose shape loses 15% more by making an additional row of facets.

Gold Mining.—The principal gold-producing territory of Minas begins 250 miles north of Rio de Janeiro and extends along the Sierra de Espinhaco and much farther toward the north. Gold is found and mined in other localities, but the bulk of the past and present production of Brazil is from this district. The discovery was made in 1693 by slave hunters from the province of Sao Paula, who were after Indians. There was an immediate inrush of adventurers, and by the beginning of the eighteenth century thousands of them with their slaves were scattered all over the territory which has since been so productive. Until 1760 the production continued to increase rapidly, in spite of the exorbitant and tyrannical exactions of the Government and the rude and superficial methods of mining employed. At its maximum, it amounted to more than 320,000 ounces a year. After 1760 it declined, at first slowly and then after 1800 rapidly. The industry revived in the years following the independence of Brazil, in 1822, with the introduction of foreign capital and underground mining. While modern production has never been as extensive as that of the last century, it has been and continues to be fairly profitable and prosperous.

The earliest mining was from the placers in the beds of the small mountain streams. These were exploited in a manner substantially similar to that used for diamonds. At first, the gravel was washed in small wooden or metal plates and the gold picked out by hand. Later, the "batea" was introduced, probably from Africa by slaves. In this, a fairly complete separation of the metal was possible by the use of water and the familiar gyratory motion. When the bed of the stream was exhausted, the miners went up the sides of the valley finding deposits left in abandoned beds of the river or higher up the flanks of the hill. In following the gold the miners finally came to the veins. In Brazil, these are often of friable material, which can easily be pulverized with the aid of running water, and the country rock on either side of the vein is also frequently of the same character. Where such veins were found, the ancient open mines so characteristic of Brazilian gold mining are encountered. It is evident that the miners knew nothing of underground mining, and, except in rare instances, their excavations are open to the top. These great gullies were made with the assistance of running water, brought from considerable distances in canals carried along a high level of the mountain flank. The water was conducted to the point where the lower outcrop of the vein began, and, as it flowed, with the aid of a pick and shovel the ore and surrounding material was cut away. This process was continued backward up the hill until the gully became so deep that the debris was unmanageable. The extent of some of these excavations is enormous. One at Sao Joao de Chapada, a few miles south of Diamantina, is 150 feet deep, 1000 feet wide and 2000 feet long. The mass of material washed down was concentrated in the rudest conceivable manner. Even the use of the sluice was not understood, and in its place the gravel was given its first wash in a "canoa." This is merely a level section of the canal in which the gravel and debris is carried down. The water is allowed to fall into this level space over a lip a few inches high, and a workman stirs with a sort of rake the gravel at that point. Below the "canoa" there is an inclined plane covered with hides laid with the hair up, in order to catch the gold that does not sink to the bottom. In addition to the loss of gold inevitable with such a system of washing, the miners labored under the disadvantage of being likely to lose their vein by the falling in of the side rock. And not only did they lose the clew, but it is lost forever. Many of these old mines are undoubtedly still rich, but the veins are so covered up by the debris that their outcrops cannot be found and traced.

An interesting feature of the larger hillside mines are the "mondeas," rectangular masonry reservoirs 50 to 80 feet square and 10 to 20 feet deep, made to catch and hold the material washed down from the mine until it could be conveniently worked. They were necessary where the amount of water was large. In the few instances where the old miners exploited veins for which no water was available, they simply dug an open pit, carrying out the mineral and earth upon the heads of slaves.

The running of underground galleries and scientific mining did not begin until the Baron de Eschwege, a German expert sent by the Portuguese Government in 1815 to examine and report upon the mining industry, came to Minas and devoted himself to its development. While the enterprises he set on foot were not successful, he gave to the scientific and mining world valuable information concerning the gold deposits of Minas. After 1822, when Brazil became independent, the laws were made more liberal, and foreign companies were permitted to enter the field. With the formation of the Imperial Brazilian Mining Association in 1824, the company that afterwards owned the celebrated and rich Gongo Seco mine, began the introduction of foreign, and especially of English, capital. The major part of the exploitation since has been by foreign companies.

The gold-bearing mineral of Minas is principally of two kinds—quartz in veins and itaborites, or "jacutinga," a nearly pure peroxide of iron in beds. The quartz is sometimes of the ordinary free-milling varieties, white or smoky in color and little mixed with other mineral, or else in the form of quartzite. The principal mines in this kind of quartz are the Boa Esperanca, Carranca and Juca Vieira, near Caethe, and the Banderinha, near Diamantina. The Juca Vieira has lately been producing about 600 ounces annually and the Carranca half as much. The other mines are even less important.

Of greater importance than the free-milling quartz mines are those in veins where the quartz is mixed with pyrites. The vein of the Morro Velho, the largest mine in Brazil, is of this character. The ore is composed of fine-grained quartz and iron and arsenical pyrites, mixed with pyrrhotite and copper pyrites, siderite and calcite. Over 2,000,000 ounces of gold have been extracted from this mine by the Saint John d'El Rei Company, an English corporation formed in 1830. Brazilians worked it during the last century, employing the old open cut method. It is related that when powder could not be obtained, fires were built and the quartz cracked by throwing cold water upon it. In 1818, the mine had been abandoned; but about 1830 it was bought by an Englishman who sold it in 1834 to the present company for £56,000. The mine came into full operation in 1842, and from then until 1867 an annual dividend of 25% was paid upon the capital of £135,000. In 1867 the shafts had reached a depth of 1200 feet, when operations were interrupted by the burning out and falling in of the mine. The destruction was so complete that it was found necessary to sink two new shafts to the same depth as the former ones in order to reach the vein. The cost was about $430,000. In 1874 the payment of dividends was resumed. They averaged 31% until 1882, when difficulties with water began to be met with on account of the depth (nearly 1900 feet) the mine had reached. The ore also became poorer. In 1886 the mine once more caved, and the ruin was again so complete that for the second time new excavations had to be made. G. Chalmers, the present manager, undertook the work. He drove a drift 1100 feet long and put down two shafts, one 2190 and the other 2310 feet deep. Mr. Chalmers abandoned the old milling machinery and has installed a 100-stamp mill of California design and an extensive chlorination establishment, which has proved effective in reducing the refractory portion of the ores. Power is furnished by Pelton wheels operated by water collected by artificial canals from a wide area of mountain. At times this proves insufficient, and it is helped out by steam engines which burn wood cut in the neighboring forests. Since 1890 the mine has once more been profitable. The ore now being extracted yields, under the scientific treatment employed, $\frac{9}{10}$ of an ounce per ton. The annual output is about 50,000 ounces. The form of the ore body is interesting to mining engineers. It consists of an oval swelling in a vein. The vein itself is vertical and the "chimney" is inclined at an angle of 45° in the vein. At the surface its outcrop is 800x60 feet, and it varies considerably in size as it descends, but always maintains an ample width. The average dimensions of the "chimney" are about 50x500 feet. Having such a large ore body in a single mass, the mine is unique in the tremendous extent of the open excavations from which the mineral has been taken.

The mine is situated fifteen miles south of Bello Horizonte, the State capital, and may be reached from there on mule back over a mountain trail. A more convenient route is from the nearest station on the Central railroad, from which it is distant only a few miles by a wagon road. Of the employes, seventy-five are English.

(*To be Continued.*)

Electrical Equipment of Cripple Creek, Colo., District.

To the Editor:—There are four electric power plants whose field of operation comprises Cripple Creek district. That of the Colorado Electric Co. is at Canyon City, thirty-five miles distant, whose source of energy is the Arkansas river. Its capacity of 2000 H. P. is generated at a pressure of 500 volts and is transformed to 20,000 volts for line transmission. At the two distributing stations, one on Globe hill and the other on Bull hill, it is retranformed down to 500 volts for use at the motors. Each distributing station is equipped with three step-down transformers. Thus equipped, this company makes a speciality of supplying power for hoists and mine and mill machinery generally.

The power station of the Cripple Creek Electric Railway Co. is at Lake Moraine, near the foot of Pike's Peak. From this plant the power is transmitted over the line at a pressure of 6300 volts to midway station, where it is transformed down to 350 volts by static transformers, and is then transformed to direct current by rotary converter to 550 volts for car line service. The rails on this line are about eighty-six pounds. The cars have double trucks with two motors on each.

The plant of the La Belle Mill, Water & Power Co. is at Goldfield, and comprises two direct connected, three-phase generators, 600 K. W., of the General Electric revolving field type, and are equal to 801 H. P. They are driven by a McIntosh-Seymour cross-compound engine. Power is generated at a pressure of 6600 volts and will be transmitted at that voltage, transforming to about 440 volts at mines and other points of application in the district. The switchboard is a special type and all the apparatus thereon is designed for this plant, possessing the novel feature of having no high-tension parts within reach or in any way exposed. The steam plant consists of six Babcock & Wilcox boilers, each of about 400 H. P., having automatic stokers, the coal being supplied from hoppers suspended in front and above the boilers, which are features of economy. The plant includes a cross-compound compressor of the E. P. Allis type, but with Ingersoll-Seargent cylinders, being of thirty-drill capacity. By this auxiliary compressed air is to be transmitted to various large mines of the district.

The main province of this plant is supplying hoisting and drill power to the mines and motive power to the mills. It is estimated there are about sixty electric hoists operated in the district. While the three plants named incidentally furnish light for various plants and the last named for various towns of the district, the plant of the Cripple Creek Light Co. at Cripple Creek, operates for lighting purposes exclusively. WASCOTT.

Cripple Creek, Colo., June 17th, '99.

Large Masses of Copper.

It is now claimed that the largest mass of copper ever found in the Lake Superior region was taken from the Phœnix mine, and not from the Minnesota mine, as commonly supposed. It weighed 665 tons, considerably more than the Minnesota mass. A piece weighing 11 tons was sent to Boston and placed on exhibition. Forty kegs of common black powder were required to dislodge the chunk in the Minnesota mine, in 1857. The mass weighed 527 tons, was 39 feet long and 9 feet thick. Thirty men were employed on it at one time and twelve months were consumed in cutting it up and getting it to the surface.

INDEX TO VOLUME LXXVIII

—OF THE—

Mining and Scientific Press.

FROM JANUARY TO JUNE, 1899.

A

PAGE.

Ability to Rightly Guess...118
Abrasive, New...616
Absorption of Gold in Cupellation...429
Acetic Acid, Price of...59
Acetylene Gas...457
How First Made...59
Act, Amendatory, for Protection of Stockholders...118
Activity in Iron and Steel Mills...615
Advertiser in a Trade Journal...90
Advice Worth What it Costs...3
Adjustment and Control of Stamp Mill...532
Aerial Bombardments...237
*Agitators in Montana Cyanide Mill...609
Aids to Development of Mines...89, 369
Air Compressor, Theoretical Loss in Operating, 531
To Liquefy...59
In Pipe Line...611
*Hose Coupling...201
Friction of, in Pipes...231
Alabama Mines...210, 590
Alabandite...507
Alameda Co., Cal., Mines...435, 538, 670
Alaska Mines, 67, 127, 183, 210, 239, 295, 323, 351, 379, 405, 435, 486, 513, 538, 590, 642, 670.
Commercial Co. Gold Receipts...31
Exaggerated Reports from...662
Not a Sucked Orange...5
Petroleum Co...214
Source of Placer Gold in...36
Alaska-Treadwell Mill Tailings...427
Alder Gulch, Montana's, Gold Yield...559
Alderson, M. W...125
Alien Legislation in California...315
Alloys of Brass...147
Alluvial Mining in New Zealand...208
*Deposits of Western Australia, 238, 266, 292, 321, 342, 349.
Alpine Co., Cal., Mines...183, 379, 590
Altitude of California Peaks...147, 315
Alternating Current...559
Aluminum in England...509
For Electrical Conduction...315, 512, 610, 666
How Produced...5, 202
Bronze...175
Deterioration of...427
Feed Wires...615
Amador Co., Cal., Mines, 6, 67, 93, 127, 183, 210, 239, 267, 293, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 670.
Amalgamated Copper Co...506, 530, 558
Amalgam Collecting and Plate Dressing...175
Plates, How Cleaned...259
Amalgamation of Fine Gold in Fine Tailings...175
Water Required in...231
American Institute Mining Engineers, 118, 230, 455, 610.
Manufacturers' Export...610
Smelting and Refining Co...287, 297, 484
Miner...59
Ampere, What it is...583
Amphibolite...611
Anaconda Copper M. Co...509
Analogy of Black Hills and Leadville Ore Deposits...234
*Ancient River Channels...285
Aneroid Barometer, Forecasts by...233
Anti-Darwin...564
Antidote for Cyanide Poisoning...147
Anticlinal Folds...635
Apex, British Dominion...2
In Mining Claim...507
Applicants for Patent for Placer Claim Possessing a Lode Must so State...119
Aragonite...583
Area of Pipe, How to Find...287
Of Ditch Cross Section...611
Argonaut, Cal., Mine Vein, Geology of...316
Vs. Kennedy Decision...286, 316
Arizona Mines, 6, 37, 67, 93, 127, 155, 183, 210, 239, 267, 295, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 670.
Copper Development...560
Fraudulent Mining Companies...662
Miners' Wages...343
Assaying...399
Necessity...206
Mining Law...87
Mining Boom...610
Armature, What it is...611
*Arrastra, How to Build and Operate...32, 97
Field of...375
*Structure and Operation...86
Arsenical Gold Ore Milling...616
Ashcroft Process...371
Assay Ton, What it Is...259, 427
Office Practice...371
*Furnace...382
Assessment Work...259, 287, 371, 426, 507, 531, 611
Atmospheric Pressure...479
Auriferous Zones in Hanging Wall of California "Mother Lode,"...507
Australia, Drought in...31
Cheap Mining in...256
*Alluvial Deposits...238, 266, 292
Australian Mines, 213, 269, 296, 325, 353, 407, 437, 462, 488, 539, 566, 592, 644, 671.
Government Assistance...481
*Automobiles...173, 180, 237, 342, 611
*Autotruck...237, 342
Autograph, How Etched on Silver Plate...203
Automatic Accountant...262
Railway...263
*Division of Irrigation Water...293
*Auxiliary Pneumatic Hoist...661
*Avalanches Among Colorado Gold Mines...257
Averaging Assays...399
Azurite...507

B

Ball, Robert...2
Ballou, E. L...32
Barometer, Forecasts by Aneroid...233
Basalt...611
Battery Water Feed...559
Plates, Grade of...92
*Screens...176
*Stem Guide...484
Water, Re-Used...259
Water, Temperature of...5, 41, 58, 62, 119
*Battleships' Engines...453
Bauxite...636
Belt Leather, Strain Resistance of...287
Transmission of Power...427
Belts, How to Find Required Length of...259
Rubber, How to Treat...259
Bibliography of Cyanide Articles...371
Bicycle Trust...375
Bismuth, Assaying for...31
Black Sand Carrying Gold...559
Black Hills and Leadville Ore Deposits...234
Hills Telluride...377
"Blow-Out," What It Is...583
Blue Asbestos...510
Blue Lakes Power Co...214, 230
"Blue Vitriol," Annual Consumption of...343
Bolivia's Gold Yield...559
Boiler Evaporation of Water...455
Explosion...427
*Explosion, Ionia, Mich...57
Boilers and Engines, Efficiency of...87
Bookkeeping by Electricity...262
Books for Prospectors...314
Borax and Boracic Acid...507
Borneo Mines...39
Bornite...507
Bore Hole Near Ostroppa...64
Boston & Colorado Smelting Co...479
Boston Quicksilver M. Co...455
Brazing Band Saw Scarf...455
Bridge Erected by Electrical Machinery...34
Briquettes From Ore...175, 371
British Columbia Lead Miners...59, 370
Columbia Mining Requirements...262, 342, 426, 610
Columbia Alien Act...342
Columbia Mines...7, 39, 95, 129, 157, 185, 213, 241, 269, 296, 325, 353, 370, 381, 407, 437, 462, 488, 514, 539, 566, 592, 617, 644, 671.
*Brunton's Patent Pocket Mine Transit...41
*Bryan Quartz Mill...182
*Bucket and Crosshead in Vertical Shaft...350
Dredges...433
Buffalo Hump, Idaho, Mines...371
Built-Up Wooden Beams...531
*Bursting of Small Cast Iron Fly Wheels...117, 154
"Business," What it is...314
*Butterfield Mill, Colo...376
Butte Co., Cal., Mines...37, 67, 93, 127, 155, 183, 210, 239, 267, 323, 379, 461, 486, 538, 565, 590, 642.
*Butte, Montana, Hoisting Engine...204

C

Calaveras Co., Cal, Mines 6, 37, 67, 93, 127, 155, 183, 210, 239, 267, 295, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 670.
California Mining Bureau...639
*Ancient River Channels...285, 290
At the Paris Exposition in 1900...4, 203, 214, 370, 398, 399.
Average Annual Gold Output...3
*Built Japanese Cruiser...85, 89
Coast Range...147
Dam Built Without Mortar...343
Debris Commission...371, 663
Diamonds...586, 618
Dredge Mining...346
Features of Granite Veins...428
First Electrical Mining Plant...231, 259, 318, 346
Gold and Silver Production, '98...478
Gold Belt's Characteristic Mines...534, 560, 589, 613.
Gold Yield in '98...315, 343
*Horseless Carriage...173
*Hydraulic Mining...313, 504
Mineral Land Bill...399
Mineral Product for '98...454
Mine Inspector...202, 203
Mines...6, 37, 67, 93, 127, 155, 183, 210, 239, 267, 295, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 670.
Mines Not Fashionable in London...2
Miners Employed...62
Mining Decisions...286, 316, 370, 371, 399, 583
Mining Legislation...315, 399, 504
Redwood...564
Riparian Rights...550
Rainfall...530
Spirit Still in Evidence...58
Storage Reservoirs...530
State Miners' Association...203, 230, 343, 371
State Mining Bureau...87, 371
Calcic Carbide, How Stored...203
Calumet & Hecla Co...455, 509, 583
*Cam, Self-Locking...382
Camels in Nevada and California...287
*Cammett Concentrator...409
Canada Mineral Output for '97...87
Canal Construction...147
Canadian Geological Survey...259
Canvas and Chlorination Plant...559
How Made Waterproof...611
Canoe Trip From Pacific to Atlantic...261
Cape Nome, Alaska, Mines...530, 582
Cap Sills...611
Caps to Discharge Nitro Powders...611
Capacity of Pump in Gallons; How Found...259
Carbide Plant...512
Carbon Steel...455
Carbonic Acid...455
Carbonate of Calcium...583
Carborundum...616
Carelessness in Handling Nitro Powder...662
Cassiterite...531
Composition of...343
Casting of Copper Again Discovered...181
Castings, Weight of...399
How to Fill Holes in...295
Cast Iron, How Silvered...203
Cataract Power Co...485
Causes of Changed Conditions in Mining Industry...370
Causes of Failure...662
Ceargyrite...559
Cement for Cast Iron...287
Cemented Gravel Disintegrated...559
*Centrifugal Suction Pump...397
Central Eureka, Cal., Mine...370, 374
Changing Fashions...2
Chalcocite...531
Chalcopyrite...507
*Chart for Sunrise and Sunset...178
Chapin, Mich., Iron Mine Production...371
*Channels, Ancient California River...285
Characteristic Mines of the California Gold Belt...534, 560, 589, 613
Chalcostibite...611
Cheap Mining in Australia...206
*Ventilation in Small Mines...294
Chemistry of Coke...231
*Chimney, Largest Brick...402
Chili Mill...611
Chili's Gravel Gold Mines...559
China's Increasing Trade...561
China, Mines...129
Chlorine and Carbon Dioxide Liquefied...427
Chloride of Gold...146, 455
Of Silver...635
Zinc...589
Chlorination (Munktell's) Process...175
Cheap in Southern States...231
Tailings...286
By Electrolysis...287
Barrel Process...343
Platner Process...663
Chrysocolla...507
Cinnabar in California Coast Range...455, 482, 635
And Gold...635
Circulation, Value of...147
Claim, Care in Location of...663
Clay, Different Kinds Defined...314
Cleaning Amalgam Plates...259
Coating of Iron and Steel...583
*Coal Mines, Sand Blast in...434
Coinage of U. S...176
Coke, Chemistry of...231
Colemanite...531
Colusa Co., Cal., Mines...538
*Coloma...61
Colorado Mining Dividends in '98...59
Compliment...290
Gold Output for '98...38
Mining Bureau...557
*Mines, High Altitude of...147, 151, 372, 376
Mining Decision...174, 202, 286, 288, 343, 370, 374, 506, 583.
Mineral Yield...531
Riparian Rights...118
Situation in...664
Smelters...175
Smelting Charges...558
*Snowslides...257
State Mines...6, 38, 68, 94, 127, 155, 184, 211, 240, 267, 295, 324, 352, 380, 406, 436, 461, 487, 513, 539, 565, 590, 617, 642, 671.
Commercial Importance of a Pacific Cable...293
Commissioner of Patents...119
Compressed Air Transmission...203, 342
As a Motive Power...342, 479
Locomotives...611
Comstock Pumping Proposition...212, 214
Prices...119
Year of Largest Yield...147
Concentrating Machines...611
*Concentrator, The Cammett...409
Concrete for Retaining Walls...479
Condition of Affairs Between South African Republic and England...662
Conglomerates in Honduras...237
Conservatism in Mining...286
Contact Vein, What Is It?...398
Contiguity to Famous Producer...86
Continuous Bucket Dredge...433
Contraction of Brooklyn Bridge...174
Co-operation in Mining...206, 342
Coolgardie, Australia, Pipe Line...59
Copper in La Sal District, Colorado...564
Anaconda, Interests Sold...663
And Butte, Montana...31
Appreciation of...2, 177, 226, 286
Average Price of...286, 398, 583
Belt at Butte, Montana...531, 585
Cartridges...662
Casting Again Discovered...181
Combine...483, 484, 485
Cost of Production...314, 370, 399, 479
Deposited in Iron...203
Deposits, Seven Devils, Idaho...125
Deposit of Lake Superior Region...663
Mining, Not Alone...30, 398
Ores, How Determined...403
Percentage of in Ore...663
Production Since '50...147, 314
Refining by Electrolysis...287
Sulphides in California...287
Shares, Advance in...31, 342, 398, 662
Stocks in Boston...147, 174, 342
Steel...455
Trusts, Standard Oil...122
Values With Depth...370
Water of Butte...62
Copper Salts on Amalgamated Copper Plates...616
Corundum...87
Costa Rica Mines...213
Cost Per Ton of Stoping Ore...287
Of Steam Power...343
Train Mile...404
Gold Production Decreasing...634
Cost of Mining...610
County Mining Bureaus...3
Cracks in Tools, How Made Visible...315, 399
Cretaceous Slates...635
Crowned King Mine, Arizona...175
Cripple Creek, Colo., Dividends...269
*Crosshead and Bucket in Vertical Shaft...350, 481
And Trip Rope...346
Crushing, Wet and Dry...585
Rolls...261
Cryolite...531
Cuprite...507
Curvature of the Earth...455
Curve in Flume Line...559
Cyanite or Disthene...455
Cyanide Slimes, Glass Flux Therefor...287
And Comstock Tailings...62
Modifications of...89
MacArthur-Forrest...616
Process...582, 609
Plant, First in British Columbia...583
Plants in Cold Climates...663
Poisoning, Antidote for...147
*Cyaniding Slimy Ores and Tailings, 584, 612, 636, 665.
Base Ores...125

D

Danaite...507
Daniell's Cell...147
Day, David T...88
Debris Appropriation...174
Debris Commission...371, 663
Declaring False Dividends...582
Decisions of State Supreme Court...203
Deep Level Mining in the Transvaal...634, 639
Deepest Artesian Well...343
Deleterious Substances in Boiler Water...147
Delinquent Co-owner...87
Del Norte, Cal., Co., Mines...210, 267, 295, 323, 351, 379, 405, 435.
Delta Metal...175
Denver, Colo., Branch Mint Receipts in '98...3
Denver Imported Silver Lead Ore in '98...31
Department of Mining and Mineralogy...119, 427
Depositing Metals Direct From Ore...427
Depth and Values of Mines...258
Desert Mines, Geological Features...232, 341
*Determining Quantity of Water in Crude Petroleum...484
Determination of Rocks, How Made...635
Of Zinc...345
Development of Mines, Needed Aid to...89
Development and Equipment of New Mines...369
Of Submarine Telegraphy...404
*Dewey, A. T...586
Diameter of Pump Cylinder, How to Find...259
Of Sheaves...203
Diamond and Gold Mining in Brazil...640, 668
*Drill in Prospecting...508
Drill Carbons...315
In California...586, 613
In South Africa...479
Mining in Brazil...287
Searching for...609
Diorite, What it is...315
Dissolving Powers of Gold Solvent Solutions...119
Disbelief in the Ancient River Theory...126
Dividends, Mining...11, 40, 69, 132
Division of Mines...30
Dokimastic Test...119
*Double Drum Hoist and Electric Motor...62
*Dow Engine...148
*Dredge, Young's...42
Mining in California...346
Continuous Bucket...433
Dredging for Gold...484
*Drift Mining at Magalia Cal...372, 400
Bolts, What They Are...583
Sets Renewal...611
*Drilling Machine for Gold Prospectors...329
In Sandstone...479
Drills, How Tempered...259
Bit Straight Edged...479
Drop in Stamp Battery...231
Drouth in California...314
Drum and Pulley Speed...479
*"Dry Washing" of Gold in Australia...238, 266
Dry Crushing...585
Dyke, What it is...398
Dynamo, How Best Manufactured...399

E

Earthquakes, Cause of...635
Eastern Estimate of the Mineral Production of the U. S. in '98...31
Eating Snow in the Klondike...342
Economy of Electric Motor...427
Effect of the Eight-Hour Law...634
In the Use of Water...432
Efficiency of Boilers and Engines...87
Eight-Hour Mine Law...342, 343, 610, 614, 634, 662
El Dorado Co., Cal., Mines...6, 37, 67, 93, 155, 183, 211, 239, 295, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 671.
Electric Belts...147
Classification of...175
Dynamo, to Prevent Railroad Collisions...403
In Mining...99, 174, 259, 318
Incandescent Lighting...202
Lighting, Cheap...286
Machinery, Increase in Tonnage...58
Mine Signals...64, 341
*Motors for Mine Haulage...92
*Motor, C. E...177
Motor, Economy of...427
Push Button...398
Power Transmission...174
*Power Station at Boston, Mass...260
Power Near Helena, Mont...62
Rock Drills, Successful...59
Rock Drill...318
Street Lighting...430
Signal Bells...343
Storage Batteries...150, 180
Storage Batteries, Latest Progress...180
Ventilating Fan...485
Electrical Accumulator...559
Bookkeeper...262
Lamp, Nernst...348
Short Circuit...583
Smelting...399
Transformers...4, 583
Thawing of Frozen Pipes...235
Transmission from Blue Lakes, Cal., to Oakland...231
Electricity, Best Conductor of...399
Direct from Coal...118
In Metallurgy...58
Mine Plant First Used in California...239, 255, 318, 346.
Seasoning Timber...581
Sources of Atmospheric...510
Space at Paris Exposition...91
Use Advancing Price of Zinc...567

* Illustration.

PAGE.

Electrolytic Chlorination....283
Analysis....119
Assay in Refined Copper....110
Copper Refining....287
Corrosion....582
Corrosion of Metals....641
*Extraction of Gold....319
Production of Zinc in '98....305
Electroplon Fluid....343
Electro-Zinc Process....484
Electro-Zinc Process, and Experimental Researches Therin....178, 308
Electrolysis in San Francisco....259
Of Water Pipes....427
Electricity's First Use in California and Colorado Mining....231, 259, 318, 346
*Electrically Driven Mine Pumps....41
Elephant Boilers....470
Empire Mine, Grass Valley, Cal....31
Embolite....507
Engine, Feed Water Requirements....531
Steam, Automatic, Non-Condensing....531
*Engines of the Wisconsin....453
Engineer's Union, Cripple Creek....456
Eophone, The....458
Epidote....583
Equipment and Development of New Mines....369
Erosion of Sedimentary Strata....635
Etching in Silver....333
Exhaust of Gas Engine....427
Experiences of a Working Miner. 34, 66, 177, 205, 233, 260, 290, 345, 375, 429, 459, 482, 508, 537, 560, 585, 612, 639, 664.
Express Charges on Gold Shipments....31
Experimental Metallurgy, Notes on....181, 209
Mining....558
Explosive, Improved Safety....180
Explosion, Horizontal Tubular Boiler....427
Export Increase in Manufactures....610
"Experts," Opinions of....258
Exposition Projects Under Way....322, 426, 427
*Extraction of Gold by Electrolysis....319
Extralateral Rights....507

F

Failure, Cause of....662
Fastest Boat....351
Fatalities from Powder Explosions....286
Fatigue of a Stamp Stem....4
"Fathom" of Copper Ore....455
Federal Mining Law....315, 343, 399, 427, 635
Feedwater of Stamp Mills....264
Felsite....611, 663
Field, S. J....398
Filter Process for Gold Ore Slimes....641
Fine Dust, Valuable....91, 399
Fine Gold Saving in Sluices....346, 433
Fineness of Gold, Value of....119
Fireproof Fabrics, How Made....369
Mortars....483
Firedamp in Metal Mines....259
Fitch, C. H....232
Fissure Vein, What it is....398, 635
Flashlight Powder, How Made....231, 427
Flies in Sulphurets at Keswick, Cal....343
Flouring of Quicksilver....147, 343
Fluorite....531
Flume, Proper Grade for....635
Flumes and Ditches....559
Flux for Ores....371
*Fly Wheels, Bursting of....117, 120, 121
Foaming in Boilers....531
Force, The New....118
Forfeiture of Unpatented Claims....31
Formalin....119
Formation of Ore Deposits....635
*Forests of the Sierra Nevada....378
Forestry in California....66, 241, 378, 427
Fountain, Donahoe....663
Franklin Institute....147, 202
*Fraser & Chalmers' Stamp Mills....322
Fraudulent Mining Companies, Arizona....662
Free Air....87
Freezing Dynamite....427
Quicksand....399
Fresno County, Cal., Petroleum....59
Mines....6, 93, 239, 351, 379
Fuller's Earth....611
*Furnace, The Garretson....57
Futures, Dealing in....146

G

Galvanized Iron and Steel Rope....531
*Garretson Furnace....57
Gas Engine, Difficulty in Starting....31, 399
Engine Exhaust....427
*Hoist....529
Gasoline Engine Consumption....531
Gash Vein, What It Is....398
Gases in Mines....31
*Genesis of Petroleum and Asphaltum in California....124, 149, 182, 205, 236, 264, 289, 320, 344, 377, 401, 432, 460, 478.
Of the Mother Lode, Cal....371
Geology of Leadville, Colo....536
Geological Survey of Canada....259
Features of Some Desert Mines....233
Notes on the Rand, S. A....432
Georgia Mines....184
Giant Powder, Thawing....427
Gilsonite in Utah....4
Glacial Agency in Lake Formation....265
Glass as a Flux for Cyanide Slimes....287
Glaucophane Schist....455
Gold, Grain, Worth of....231
And Silver Coinage of U. S....176
Distribution of....582
Does Not Volatilize....41
*Dredge, Young's....42
Extraction by Electrolysis....319
Fever....530
First Discoveries of....60
Fine, Saved in Sluices....346, 433
From Sea Water....633
In Pot Holes....559
In Different California Formations....315
In Fine Tailings; When Amalgamable....175
In Granite....455
In $20 Piece....287
*King, Colo., Mill....376
Loss of....346
Loss of by Absorption in Cupellation....429
Melting Point....583
Mining and Milling in South Africa....102
Mining Industry, Census of....113
Mine Trust....426
Mining in Brazil....640, 668
Nuggets, Do They Grow?....558
Output and Commercial Activity....146
Output of the World....203
Product U. S. for '98....12
Production of Klondike....485, 584
Precipitated from Bromine Solutions....259
*Prospecting for....329
Received at Denver, Colo., Mint in '98....31
*Site Where First Discovered by Marshall....61
Slimes: Filter Press Process....641
Specimens, Value, How Determined....315
Worth of a Ton....175
Yield of South Africa for '97....147, 287
Yield of Bolivia....559
Yield in California....58, 287, 315
*Golden Gate Mill, Mercur, Utah....483
Goldless Pyrites....635
Government Geological Museum....146
Grade of Flume....635
Grams and Grains Compared....259
Grantor and Surety, Distinction Between....399
Granitite....531
Granite, Constituents of....531
How Distinguished From Syenite....315
Veins in California, Features of....428, 455
Grand Canyon of the Colorado as a Mining Field....512
Granulite....531
Ground Sluicing in California....531, 559
Graphite....87, 427, 584
Gray Copper....507
Greisen....531
*Growth of Trees in Denuded Areas....425
Grub Stake Contract....87
Guggenheim Smelting Works....87
Gutta Percha, Substitute for....34

H

Haldane, J....31
*Hammer, Power....233
Hanging Bolts in Shafts....635
Hardwood Veneers....350
*Harvard Electric Power Station....260
Hazard of Mining Ventures....582
Headwaters Lewis River....65
Heydon, A. T....65, 265
Height of Discharge from Stamp Battery....231
Highest Gold Dredging....371
Highest Point in the United States....119
*Hoisting Engine at Bell Mine, Montana....204
*Hoist, Pneumatic Auxiliary....661
Holes for Feather and Plug Work....479
Homes for Miners....343
Homestake Mine's Mortar Dimensions....315
Mining Co....616
Honduras, Conglomerates in....237
Horn Silver....559
Horsepower, Nominal....531, 611
*Horseless Carriages....173
Horsepower Required to Raise Water....175
Required for Dredge....175
*How to Build and Operate an Arrastra....32, 97
*How to Build a Rocker....409
Hubnerite....3, 531
Humboldt Co., Cal., Mines....379
Hungarian Riffles....343, 455
Hydrants, S. F. Proposes Making....662
*Hydraulic Mining Enterprise in Idaho....201
Ejector, C. & C. Shaft....286
Giant Dimensions....399
*Mining in California....313, 505
*Mining in Northern California....504
*Mining in Colorado....376
Statistics....287
Separator Overflow....531
Sizers....611
Hydrogen, Liquefied....91
Hydrous Mica....507

I

Ice Storms....176
Idaho Mining Troubles....506, 511, 530
State Mines....7, 39, 68, 94, 128, 156, 184, 212, 240, 268, 296, 324, 352, 380, 406, 437, 462, 487, 513, 539, 566, 590, 617, 642, 671.
*Hydraulic Mining Enterprise....201
Identification of California Mining Claims....457
Illustrated Enterprising Newspapers....2
*Illinois, Battleship, Engines....460
Incandescent Lamps, Cost of....59
Lighting, Types of Distribution....203
Incorporations, Mining....11, 54, 69, 129, 157, 186, 270, 326, 353, 382.
Increase in Price of Zinc....509
Independence Mine, Cripple Creek, Colo. 31, 455, 582
Index to Volume LXXVII....8
To Volume LXXVIII....662, 686, 687, 688
Indicated Power of Steam Engine....147
Industrial Notes....Every Issue
Insignificance of Mankind....348
Insulating Action of Various Materials....287
Interest Rates and Railroads....174
Inventor, If He Forgets or Abandons His Invention....31
Inventors' Profits....146
Investors in Mining Stocks....582
*Inverted Siphon in Idaho....201
Inyo Co., Cal., Mines. 6, 38, 155, 183, 295, 323, 351, 379, 405, 435, 461, 486, 513, 590, 617, 670.
Iron, Copper Deposition on....203
And Steel Market....206
And Steel, New Hardening Process....234
And Steel, Prices Advancing....662
How Separated From Zinc Ore....231
Manufacture on the Pacific Coast....635
Or Steel, How Colored....231
*Rod, Montana, Mill....581
*Irrigation in Wyoming....293, 348, 433
*Irrigating Pumping Plant....397
Italian Miners in Colorado....371

J

*Japanese Cruiser Chitose....85, 89
Mining Statistics....3
Gold Mining....530
*Jeanesville Mine Pump....322
*Jeffrey Electric Motor Car for Mine Haulage....92
Joint Location of Placer Ground....322
Junior Locator on a Cross Lode....531

K

Kansas Mines....184, 212
Kaolin....399, 531
Kallenite....482
Keely Motor....58
Kennedy-Argonaut Decision....286, 316
Kern Co., Cal., Mines....6, 38, 67, 93, 127, 155, 183, 211, 239, 267, 323, 351, 379, 405, 461, 486, 513, 538, 565, 590, 617, 642, 670.
Keswick, Cal., Townsite Jumped....506
Kinney, Abbot....66
Klondike, Existing Conditions in....90
Gold Nuggets, etc., from....662
Gold Production of....485, 584
Mines....185, 213, 326, 463
Kootenay Ore Smelting....261

L

Lake Co., Cal., Mines....295, 435
Formation by Glacial Agency....265
Superior Mining Towns....560
Land Commissioners' Decision....343
Laplander Reindeer Scheme....427
Largest Steamship....178
Piece Silver Ore....34
*Brick Chimney....402
Lassen Co., Cal., Mines....295, 351, 405
*Latest Mining and Metallurgical Patents....35, 63, 90, 123, 151, 179, 207, 235, 263, 291, 319, 347, 375, 402, 403, 431, 458, 483, 510, 535, 562, 587, 613, 638, 667.
Progress in the Application of Storage Batteries....180, 210
Lava Flows on the Sierra Nevada....59
Lead Miners' and Smelters' Rates....202
Advance in, an Advantage to Silver....117
Interests in U. S. and Canada....176, 202
Mines of Missouri....561
Ore, Weight of Cubic Foot....31
Ore, Duty, Etc....202
Pipe, Weight Per Foot....175
Leadville and Black Hills Ore Deposits....234, 588
Miners....506
Ore Deposits....663
Leather Belting Tests of....31
Leucite Rock....479
*Lick School....668
Light Railways in a Mining Region....426
Concentrated on One Point....458
Lighted Candle Test for Air....343
Lindgren, Waldemar....125
Liquid Air, Cost of....59, 343, 427, 479, 512
Air and Its Possibilities....534
Sensationally Treated....662
Liquefied Hydrogen....91, 663
Locomotive Going a Mile a Minute....348
Locating Mining Claims, Amendment to State Law....58, 202, 399
Location Work, Legality of....31, 399
Of Lode and Placer Claims....259, 478, 558
Joint, Placer....322
Notices ,Official....610
Lockout in Colorado Not an Unmixed Evil....663
"Lode," Definition of....531
And Placer Decision....174, 259
Lodge, Professor and the Telephone....60
*Logging Engine....558
Longest Electrical Transmission....231
Longitudinal Riffles....455
Longest Tunnel in the World....343
Long Distance Telephone....427
Loring, W. J....12, 36, 60
Los Angeles Co., Cal., Mines....93, 183, 211, 239, 323, 351, 379, 405, 435, 461, 590, 617.
Loss of Gold....346, 429
Low Temperature Solder, How Made....119
Lower California Mines....7, 69, 95, 213. 381, 407, 488, 540, 559, 566, 592, 671.

M

MacArthur-Forrest Cyanide Process....616
Machine Work....176
Machinery, How Cleaned....559
Madera County, Cal., Mines....6, 38, 67, 155, 211, 239, 295, 323, 405, 435, 461, 565, 617.
*Magalia, Cal. Drift Mine....372, 400
Magnetizing and Tempering Steel Rods....399, 427
*Mait Dry Gold Saver....463
Malleable Cast Iron....583
Malachite....507
Man and Steam Strength Compared....371
Mankind's Insignificance....348
Manganese in Cast Iron....583
Ore, Largest Deposit....59
In Steel....399
Mansfield Copper M. Co....64
Manjak....236
Manufacturing Industries, to Build Up....662
Map of Mine Workings....479
Marin County, Cal., Mines....323, 379, 405
Markets....Every issue
Market Values of Ores....86
Mariposite....371
*Marshall Monument....61
Mariposa Co., Cal., Mines....6, 67, 93, 127, 295, 323, 351, 435, 461, 486, 513, 538, 565, 617.
*Marconi Wireless Telegraphy....429
*Marine Enclosed Arc Lamp....5
Massachusetts Institute of Technology....342, 511
Mastodon Fossils in the Klondike....176
Maximum Power of Water Wheels....234
Mechanics in the U. S. Navy....348
Mechanical Draft in Place of Chimney Draft....58
Stokers....455
Melville, Commodore G. W....121
Melaconite....507
Merced G. M. Co. vs. Dorward et al....30, 582
Co., Cal., Mines....486
Mercury Flouring, How Cleaned....147
And Battery Plates, Treatment of....5
Metacinnabarite....507
Metal Statistics....258
Output of the West in '98....87
Metallurgy, Experimental, Notes on....181, 209
Metallic Alloys in Japan....147
Metallizing Wood....203
Metallurgic Standards....484
Metallurgists and Geologists....87
Methods of Testing and Sampling Placer Deposits....637, 666
Metre French, What it is....231
Metric System Equivalents....343, 507
Mexican Sulphur Sale....259
Mines....7, 39, 69, 96, 129, 157, 185, 213, 269, 297, 325, 353, 407, 437, 463, 488, 514, 566.
Mining Methods....456
Mining Industry....508
Mexico, Product of Gold and Silver....37
*Mexican Mineral Resources....1
Mexican Gold Output....145
Mica....343, 531, 635
Oregon....203
Michigan State Mines....94, 268, 296, 324, 406, 437, 462, 487, 513, 539, 591.
Microscopical Examination of Rock....635
Milling Arsenical Gold Ore....611
Mile a Minute....348
Mill Site Selection....559
Tailings at Alaska-Treadwell....427
Practice Utica Mill, Calaveras Co., Cal..12, 36, 60.
Mines, Why Sold....315
"Boomers"....530, 634
Booming vs. Actual Work....634
Claim Surveys....611
Exploration and Exploitation....635
Liens on....663
Management, etc....153, 230, 236, 342
Ore Output....314
Placer, Size of....663
Products, Tax on....146
*Pumps Electrically Driven....41
*Sampling....633, 636
Timbering....559, 635
*Ventilation, Cheap....294
Mining Towns in the Lake Superior Region....560
A Business....314
A Basic Industry....428
And Gambling....178
And Smelting, Rates of Lead....202
*And Metallurgical Patents....35, 62, 91, 123, 157, 179, 207, 235, 263, 291, 319, 347, 375, 402, 403, 431, 458, 483, 510, 535, 562, 587, 613, 638, 667.
As a Legitimate Business....120, 314, 342
Alluvial in New Zealand....208, 238
Blanks....401
Beyond the Arctic Circle....262
Boundaries Readily Traced....683
Co-operation in....206, 342
Cost of....610
Congress, 3rd Session....203
Congress, Milwaukee....663
Claim, Careful to Locate....663
Claim Must Include Apex....507
Claim, Unpatented, Not Taxable....663
Corporation Stock....558
Dividends, 11, 40, 69, 130, 157, 186, 214, 241, 282, 326, 353, 382, 526, 540, 562, 615, 658, 669.
Depths and Values....258
Districts Revived....427
Enterprises, Growth of....558
*Hydraulic in California....313
Industry's Contribution to Prosperity....146
Industry in Mexico....508
Incorporations....11, 54, 69, 129, 157, 186, 270, 326, 353, 382, 511, 540, 562, 615, 644, 669.
In One Spot....31
Law....259, 315, 343, 374, 427, 485, 531, 559, 635, 663
Leases....399
Legislation....174, 250, 343, 374, 455
Litigation, Clark-Campbell, Decision....663
Location Blanks....454
Machinery Admitted Free in Russia....203
New Era in....558
Over Old Ground....61
Railways....426
Relative Cost of....667
Requirements of British Columbia....262
Schemes....426
Stocks, Relative Values....231
Theoretical and Practical....203
When Successful....203, 342
Work Done on Ditch Previous to Location....663
Miner Follows the Soldier....530
Miners' Union in the Philippines....342
Inch a Variable Quantity....231
Inch for 5-Stamp Battery....203
Inch....479
Lien Bill....87
Union in British Columbia....147
Miners in Diving Suits....287
Mineral Crystallization....203
Equipment and Development....369
Methods in Mexico....456
Oil, if Mixed with Other Lubricating Oils, How to Detect....119
Produced in the World....126
*Resources of Mexico....1
Right to Purchase Restricted to Citizens of the U. S....663
Tar....583
Workings, Map of....479
Wool....583
Minerals in San Francisco Co....663
Minnesota Mines....268, 296
Minting Gold and Silver....122, 153
Mining and Scientific Press....31, 150, 287, 290, 343, 346, 371.
Product of California for '98....454
Missouri Mines....406, 437, 513, 561
"Missed Holes"....583
Modern Frankenstein, The....118
Moffitt System of Ore Reduction....479
Moisture in Dynamite....31
*Mojave Desert Project....581
Molybdenite....479
Monazite....531
Money Spent in British Columbia Hydraulic Work....58
Mono-Railway Between Liverpool and Manchester, Eng....236
Mono Co., Cal., Mines....93, 155, 183, 211, 267, 323, 435, 642.
Montana Mining Decisions....202, 583, 611
Miners' Tools....208
State Mines....7, 39, 68, 94, 128, 156, 184, 212, 240, 268, 296, 324, 352, 380, 406, 437, 462, 487, 513, 539, 566, 590, 617.
Mortar-Block Construction....258
Mortars, Narrow in Stamp Mill....531
Most Noticeable Feature in Metals in '99....86
Mother Lode, Cal., Genesis of....371
Motor Car for Handling Slag Cars....92
Motors in Mines....485
Mountain Copper Co., Cal....371
Leather....583
Mountain's Height, How Determined....315
Moving a Mining Town....287
Mt. Rosa vs. Palmer, Colorado, Decision....288
Mules Must Go....348
"Mundic," What it is....175
Munktell's Chlorination Process....175
Museum of Practical Geology....146
*Mysteries of the Ancient Rivers of the Forest Hill Divide, Placer Co., Cal....385, 290

N

Napa Co., Cal., Mines....93, 155, 267, 435, 48
Native Gold in Various Rocks....507
Gold in California....455
Iron Works in Africa....564
Lead....611
Naval Repair Ship....263
Nernst Electric Lamp....348
Nevada Co., Cal., Mines, 6, 38, 67, 127, 155, 183, 211, 239, 267, 295, 323, 351, 379, 405, 435, 461, 486, 513, 538, 565, 590, 617, 642, 670.
Nevada State Mines, 7, 39, 68, 95, 128, 156, 185, 212, 240, 268, 296, 324, 351, 352, 380, 406, 437, 462, 487, 513, 539, 591, 617, 643, 671.
New Old Mines....633
Things That Are Old....150
Building Material in Germany....615
Newest Process of Coating Iron and Steel....87
New Zealand's Alluvial Mines....208
Mines....269, 407, 437, 514, 617
Gold Dredging....59
New Mexico Mines, 7, 39, 68, 95, 128, 156, 185, 212, 240, 268, 296, 325, 352, 380, 406, 437, 462, 487, 513, 539, 591, 617, 643, 671.
Nickel Iron Alloys....261
And Cobalt....614
Nitro-Powder, How Thawed....343
Carelessness in Handling....662
Nitro-Glycerine is Best Let Alone....119
Nobel's A., Will....350
Not Alone Copper Mining....30
A New Discovery....2
Subject to Relocation....34
Notes on Mine Sampling....636
On the Geology of Leadville, Colo....536
On Petroleum Deposits of California....539
On Experimental Metallurgy....181, 209
*On Steam and Other Stamps....232
Normal Fault....635
*North Bloomfield, Cal., Mine....313
North Star Mines Co....427
Novices in Mining....582
Nuggets Do Not Grow....663

(Continued on Next Page)

INDEX TO VOLUME LXXIII.

(Continued from Preceding Page.)

PAGE.

O

Obsidian 531
Occurrence and Origin of Diamonds in California 586, 613
Official Location Notice 610
Ohmic Resistance in Motor 455
Ohm, What it is 611
Oil Fuel for Boilers, How Best Used 399
Olympia, Flagship 427
Ontario Mines 7, 96, 129, 213, 297
Onyx 559
Opal Quartz 559
Operating to Great Depth by Relays 664
Orange Co., Cal., Mines 323, 351, 538, 565
Ore Briquettes, How Made 175
Containing Native Gold 531
Cost per Ton to Stope 287
Deposits, How Formed 635
Smelting in the Kootenays 261
Treatment at Custom Smelters 583
Treatment at Bingham, Utah, Mine 315
Ores, Market Value of 86
of Telluride 320
Oregon State Mines..7, 39, 68, 95, 128, 157, 185, 212, 240, 268, 296, 325, 352, 380, 406, 437, 462, 488, 513, 539, 566, 592, 644, 671.
Battleship 174
Mica 203
New Mining Law 455
Original Locator 530
Osmium 343
Output Daily of a 650-Pound Stamp 87

P

Pacific Coast Smelting Companies 427
Pan Prospect, Value of 482
*Panuco M. Co.'s Plant 1
*Pandora, Colo 376
Paper Factory at Niagara Falls 122
Parallel Telephone Wires 561
Paris Exposition in 1900 ..... 4, 370, 398, 399, 427
*Paragon Mine, Calaveras Co., Cal 564
Patent on Placer Claim 479
Office Requirements 123, 287, 371
Office Business 634
Office Statistics 181
On Mineral Claim, How to Secure 87, 175
*Patents, Latest Mining and Metallurgical..35, 63, 90, 123, 151, 179, 207, 235, 263, 291, 319, 347, 375, 403, 431, 458, 483, 510, 535, 562, 587, 614, 638, 667.
Notices of..11, 40, 70, 96, 130, 158, 186, 213, 242, 276, 298, 326, 354, 382, 408, 438, 459, 493, 511, 540, 563, 592, 615, 649, 669.
Patio Process 147
Percentage of Liquid in Wood 287
Permanence of Veins 230
*Petroleum and Asphaltum in California, Genesis of..124, 149, 182, 205, 236, 264, 289, 320, 344, 377, 401, 432, 460, 478.
World's Yield 635
Deposits of California 533
And Its Derivatives 3
"Petrified Man" 634
Philippines 129, 407
Philippine Mines 157, 353
Phœnix, Ariz., Mines 101
Phonolite, What it is 315, 479, 663
Pig Iron Production in U. S 558
Pipe Lines, Resistance of 31
Piston Speed in Engines 479
Pitchstone 531
*Placer and Quartz Mining in Colorado 376
County, Cal., Mines..6, 38, 67, 93, 127, 155, 183, 211, 239, 267, 295, 323, 351, 379, 405, 435, 461, 486, 538, 565, 590, 617, 642, 670.
Claim, Legal Locator has Exclusive Rights 3
Deposits, Testing and Sampling 637
Mining, Future Possibilities, Etc 480
Ground, Joint Location of 332
Plate Dressing and Amalgam Collection 175
Platinum 2, 88, 287, 343
Found in California 3
Plattner Chlorination Process 663
Plumas Co., Cal., Mines..6, 38, 93, 239, 267, 323, 379, 405, 435, 486, 538, 590, 617, 670.
*Pneumatic Cyanide Process 457
*Hoist 661
Porphyry, What it is 315
Portland Cement 583
Postlethwaite, R. H 229, 438
Pound Troy and Avoirdupois 371
Powder Explosion Fatalities 286
For Flashlight Photos, How Made 231, 455
Powdered Coal for Steam 427
*Power Hammer 333
Power of Attorney to Locate 663
Precious Metals Product for '98 37
Prehistoric Mammoths in the Klondike 315
Pretoria, S. A. R., Diamond Fields 558
Principal Losses in Pyritic Smelters 119
Protoxide of Calcium 583
Prophyllite 611
Process for Extracting Nickel 59
Man, The 434
Proposed Mining Legislation 58
Protoxide of Antimony 399
*Prospecting for Gold With a Drilling Machine 229, 610
The Science of 265
*With Diamond Drill 508
Prospectors' Best Efforts 611
Books 314
In Lower California 634
Psilomelane 531
Pulp Sizing From Batteries 231
Pumice 371, 455, 507
Pump Capacity in Gallons, How Found 259
*Pumping Plant 397
Pyrosulite (Manganese Ore) 507, 531

Q

Quartzite not a Dyke Rock 635
Quartz Mills on Flat Surfaces 531
How Weighed and Measured 231
Gold Mine, Stages in 3
How Measured 203
Value per Ton 231
*Mill, Ten Stamp, Improved 29
Quebec Commission 58
Questions Answered in "Concentrates" ..... Every Issue
Questionable Mining Schemes 426
Quicksilver, Where Obtained 635
Flouring of 147, 343
Loss of, in Milling 231
Specific Gravity of 259

R

Railroads in China 511
And Interest Rates 174
Railways and the Mining Industry 314, 426
*Railroad Construction in California 85
Rainmaking, Crank Methods 230
Ranchito Mine, Misstatement Corrected 12
Randsburg, Cal., Mining Activity 315, 341
Rand, South Africa, Stamps in '97 87
South Africa, Stamps of California Pattern. 87
Ratio of Gold and Silver in U. S. Coinage 176
*Reardon Air Hose Coupling 301
Recalescence 455
Reciprocity, Canada and United States 90
Recording Mining Claims 230
Recession of Cliffs 635
Refractory Clays 583
Relation of Depth and Values of Mines 258
Relative Cost of Mining 667
Relays, Operating to Great Depth by 664
Reservoir Site; How Located 147
Results to Advertisers 346
Resistance of Belts 479
Reverberatory Furnace Smelting of Ores 65
Furnace for Smelting Gold Slimes 480
Reynolds, W. J 36
Riffles, Hungarian and Longitudinal 455
In Sluices 611
*Rights of Tunnel Claimants 374
Right to Use of Running Water 507
Rio Tinto Copper Co 460
Riparian Rights 30, 507, 583
Rights in Colorado 118
Riverside Co., Cal., Mines..6, 38, 67, 93, 127, 183, 211, 239, 267, 295, 351, 379, 405, 435, 461, 486, 513, 538, 642, 670.
Rivet Heating Furnace 64
Roasted Sulphides, How Best Treated 231
Rocks, How Determined 635
*Rocker, How to Build 409
Roller Mills and Stamp Mills 427
Ropes, How Measured 233
Rope Transmission of Power 479
Rotary Engines 318
Ruling, An Official 122
Ruby Silver 559
Rubber Belts, How to Use 259
Running Water, Use of 59
"Rushing" to New Fields 610

S

Sacramento Co., Cal., Mines 93, 155, 183, 436
Safety Explosive, Improved 180
"Salting" an Oregon Mine 259, 343
Salt Lands Mineral 531
Manufacture in Alameda Co 663
Salts of Gold 146
Sampling Lead Bar Bullion 119
Mines 582, 633, 636
San Benito Co., Cal., Mines 486
San Bernardino Co., Cal., Mines, 6, 67, 155, 183, 323, 351, 379, 405, 436, 461, 486, 513, 538, 565, 590, 617, 642, 670.
*Sand Blast in Coal Mines 434
San Diego Co., Cal., Mines, 6, 38, 67, 93, 127, 155, 183, 239, 267, 323, 351, 379, 405, 436, 461, 487, 538, 565, 617, 642, 670.
San Francisco, Imported Pig Iron in '98 3
Mint Coinage in '98 3
Mint Established, Gold Output Since 3
Hydrants, Proposes Making 662
S. F. & S. J. V. R. R 353
San Luis Obispo Co., Cal., Mines 239, 405 565, 670
*Santa Rosa, Cal., Mine 581
*Savage Basin, Colorado 100
Saving Gold from Tailings 639
Fine Gold in Sluices 346
Science of Prospecting 265
Screens, Number of Meshes to the Inch 231
Searching for Diamonds 609
Seattle's Ship Canal 63
Secret of Casting Copper Again Discovered 181
"Process" in Court 430
Secret of Swansea Process 662
*Self Locking Cam 382
Serpentine 507
Sequence of Dropping Stamps 611
Seven Devils, Idaho, Copper Deposit 125
Shaft Sinking Under Water 431
Degrees of Inclination 231
Sinking Record 374
Timbers 635
Shasta Co., Cal., Mines, 6, 38, 67, 93, 127, 155, 183, 211, 239, 267, 295, 323, 351, 379, 405, 436, 461, 487, 513, 538, 565, 590, 617, 642, 670.
Sheaves, Diameters of 203
Sheelite Ores 41, 559
Sheet Copper, Price of 507
Lead, How Joined 455
Shipping Ore from Maine to Colorado 534
Siberian Railroad 353
Sierra, Cal., Railway 230
Sierra Co., Cal., Mines, 6, 38, 93, 127, 155, 183, 211, 239, 295, 351, 379, 405, 436, 487, 513, 565, 590, 642, 670.
Sierra Grande Mine, Mexico 34
*Sierra Nevada Forests 378
Signals, Electric Mine 64
Silicification in Ore Deposits 64
Silvering Cast Iron 203
Silver Ore, Largest Piece 34
Cyanide 611
Highest London Quotation of 147
In Michigan 315
Price of 478, 482
Production in California 203
Sulphide Chloridized 531
*Silver Pick Basin, Colorado 100
Simmer & Jack Mine, S. A 399
Sinking Shaft Under Water 434
Siskiyou Co., Cal., Mines, 6, 38, 67, 93, 127, 183, 211, 239, 267, 295, 323, 351, 379, 405, 436, 461, 513, 538, 565, 590, 617, 642, 670.
Situation in Colorado 664
Slimes Treated by Filter Press Process 641
Slimes, How Settled 559
Slimy Ores and Tailings Cyanided..584, 612, 636, 665
Sluice Saving of Fine Gold 346, 433
Head in Placer Mining 231
Smelters' and Miners' Rates for Lead..202, 261, 262
Smelting Ore in the Kootenays 261
Combine of 203, 259, 287, 297, 315, 371, 427
Smokeless Blasting Powder 231, 234, 431
Snowfall in Colorado and Utah 202, 315, 427
*Snowslide in Colorado 257
Snow Eating in the Klondike 342
Weight of Cubic Foot 427
Snow, Weight of Freshly Fallen 231
Soldering Joints in Copper Wire 531

PAGE.

Solano Co., Cal., Mines 487, 565
Soot, Percentage of, in Coal Burned 315
Sound, Speed of 427
Source of Placer Gold in Alaska 36
South Africa's Gold Yield for '97 147
South Africa, Stamps, Operating in '97 87
South African Mines, 269, 325, 370, 408, 437, 463, 566, 592, 644.
Republic, Strained Relations with England .662
South Dakota Mines, 7, 69, 95, 128, 157, 185, 213, 269, 296, 325, 352, 380, 407, 437, 462, 488, 513, 566, 592, 644, 671.
South Dakota's Mining Law 397, 398
*Southern California Gold Mines 529
Southern California Miners' Association..343, 478
Spanish Mines 353
Specific Gravity of a Liquid or Solid 31
Gravity of the Earth 64
Gravity: What it is and How Determined. 231
Spectroscope, The 635
Sphalerite 531
Sprag, What it is 611
Stages in Gold Quartz Mines 3
Stamps, Speed of Slow-Drop 559
Battery, Height of Discharge From 231
Drop in Battery 231
Duty in California 371
Duty of South African 455
Mills, Feed Water of 294
* Milling, New Feature in 29
Mills; Adjustment and Control of 532
* Notes on 232
Rapid and Slow-Drop in Colorado 147
H. P. Necessary for Battery of 147, 479
Stem, Fatigue of 4
Standard Oil Copper Trust 122
People and Copper 58
Stannite 583
Stanislaus Co., Cal., Mines 211, 267
Statistics of Metals 258
Of Patent Office 181
Steam Engine, Indicated Power of 147
High Pressure 559
Required to Heat Water 175
*Stamps, Notes on 232
Steam, Cost of H. P 343
From Powdered Coal 427
Steel Cars in a Collision 60
Affinity of, for Carbon 583
And Iron, New Process for Hardening 234
And Iron, Prices Advancing 662
And Hempen Rope Cores 259
Consumption of 4
Cast in a Vacuum 634
Gallows-Frames 558
Or Iron, How Colored 231
Rods Tempered and Magnetized 427
Rusty, How Cleaned 559
Stoping in Mines 286, 287
Ore, Cost Per Ton 287
Veins to the Surface 455
Storage Battery Development 34, 180, 210
Of Calcic Carbide 203
Stream, How to Measure 507
Strike and Dip 478
Strike of Miners at Keswick, Cal 634
Of Miners in B. C 634
Stucco, What it is 399
Studdle 611
Substances Deleterious to Boiler 147
Submarine Telegraphy Development 404
Successful Mining, What it is 203
Suggestion Never to Be Despised 60
Sulphur, Pure 31, 175
Sulphide Ores 427
Of Molybdenum 611
Sulphureted Quartz 479
*Sulphate of Copper, Manufacture of 480
Sulphur in Carbonate Ore 559
* Sunrise and Sunset Chart 178
Surety and Grantor; Distinction Between 369
Swansea Process, Secret of 662
Swelling Ground, How Best Held 559
Syenite, How Distinguished 315, 531, 611

T

Tailings, Abandonment of 663
Tamarack Dividends 612
Tamping Bar of Wood 583
Tasmanian Mines 269, 566
Taxing Mine Products 146, 174
Tax on Copper Output 610
Telegraph Mine, Utah 588
Telegraphy, Submarine Development of 404
Telegram, Route of, Manila to San Francisco 234
Telephones in Use in the World 62
And Telegraph Over One Wire 399
Line, Longest in the World 31
Of Barbed Wire 512
Telluride Ores 320, 377
In the Black Hills 377
* Colorado, and Surroundings 100, 101, 376
* Mines 100, 152
In South Dakota 203, 230
Treatment 315, 377
Tellurium 119, 320, 455
Temperature of Battery Waters..41, 58, 62, 202, 206
Surrounding Electrical Apparatus 59
Temperizing and Magnetizing Steel Rods..399, 427
Tempering Steel 583
Tennessee Mines 514
Tension in Electricity 583
Testing and Sampling Placer Deposits 637, 666
Tetrahedrite 507
* Texas Mine 145
Thawing Frozen Ground 511
Thawing Nitro Powder 343
Timbering Shafts 635
Drifts 635
Tunnels 258
Timbers, Large, in Square Sets 611
Tin Mine at the Straits 287
* Tinplate Battery Screens 176
Tinstone, Composition of 343
Tin, Price of 427
Oxidation 583
Tools of a Montana Miner 208
Touchstone 559
Townsite Entries 147
On Mineral Lands 663
* Transit, Patent Pocket Mine 41
Transmississippi Congress 455
Transporting Power of the Wind 561
Transmission of Power for Underground Pumping 512
Train Mile, Cost of 404
Treatment of Battery Plates 62
Of Mercury and Battery Plates 5
* Tree Growth in Denuded Areas 425
Trinity Co., Cal., Mines..6, 38, 94, 127, 155, 183, 211, 239, 324, 351, 379, 405, 436, 461, 513, 538, 565, 642, 670.
Trip Rope and Crosshead 346
* Tropenas Steel Process 30
Troy Pound 479
Trusts and Trade Combines 314, 398
Tungsten and Its Uses 509
Tunnel Timbering 258
Decision 370, 374, 635
* Claimants' Rights 374
Rights 635
Site Selection 559

PAGE

Tuolumne Co., Cal., Mines..6, 38, 67, 94, 127, 155, 183, 211, 239, 267, 295, 324, 351, 379, 405, 436, 461, 487, 513, 565, 590, 617, 642, 670.
Mining Convention 507
Tulare Co., Cal., Mines ..... 295, 351, 436, 487, 565, 590, 642.
Twenty-Dollar Gold Pieces, Demand for 203
Twentieth Century, When It Begins 230
* Twin Springs, Idaho, Placer Working 201

U

Undercurrents in Sluices 559
Union Iron Works 29, 454
*Gas Engine Hoist 529
Unpatented Mining Claim, Patent Not Issued on Divided Interest 119
Unwatering the Comstock Levels 119, 582
Uranium, Value in Ore 3, 371
Mica in South Dakota 455
U. S. Debris Commission 1
Consular Reports 634
Geological Places, Amount of Lead Produced in the U. S 3
Geological Survey Maps 34
Gold Import for '98 59
Patent, First in Cyanide 119
Supreme Court Decisions 371
Utah Con., Utah, Mine 231
Metal Output for '98 3
Mine Dividends 455
State Mines ..7, 39, 67, 95, 128, 157, 185, 213, 241, 269, 296, 325, 352, 380, 407, 437, 462, 488, 514, 539, 566, 592, 644, 671.
Ute Indian Reservation 390
Utica Mills, Calaveras Co., Cal 12, 36, 69

V

Valuable Flue Dust 91
Value of Comparisons 633
Of a Water Power 3
Of Stock in Mining Enterprises 582
Values of Prospects 582
And Depth of Mines, Relation of 258
Vaporization, Latent Heat of 31
Veins at Rossland, B. C 610
Granite in California, Features of 428
Permanence of 230
Velocity and Discharge of Flume 611
Of Flowing Fluids 147, 611
Of Streams 611
Of Water in a 9-Inch Pipe 87
*Ventilation, Cheap, in Small Mines 294
In Mines 611
Ventura Co., Cal., Mines 240
Vibrations, Wave 260
Vulcan Iron Works, San Francisco, Cal 158, 297
Vulcan Iron Works, Seattle, Wash 157

W

Water, Pressure of 611
*As a Road Maker 536
Amount for Concentrators 479
Boiler Evaporation of 458
Chemically Pure, Poisonous 395
Development 588
Economy in Use of 432
Flooding a Mine 479
Gauge of Glass 559
How Measured 531
In a Pipe; To Find Weight of 175
In a Pipe; To Find Volume of 315
Power Required for Stamps 479
Right, Original Locator 663
Sinking Shaft Under 434
Surface Velocity 611
Weight of Cubic Foot 231
Wheel, The California 124
Washington State Mining Law 634
State Mines ..7, 36, 69, 95, 129, 157, 185, 213, 241, 269, 296, 325, 353, 380, 407, 437, 462, 488, 514, 539, 566, 592, 617, 644, 671.
Watt; What it is 583
Wave Vibrations 260
Weight of Cubic Foot of Various Metals 175
Of Rain on Square Mile 399
West Australia's Gold Product in '98 87
Wet Crushing 585
White Rock Silver Mine 640
Lead, Process for Making 119
Wholesale Locators 634
When is an Undertaking Feasible? 615
Why Mines and Prospects Are Offered for Sale. 315
Wind, Transporting Power of 561
Wilmerding School 58
Will of A. Nobel 350
Wire Fencing 63
Rope Preservative 479
Function of in Electricity 56
Wireless Telegraphy..237, 342, 348, 371, 426, 429, 509
Wisconsin Mines 514
Witwatersrand Gold Output for '98 119
Wolframite 427
Ores 41, 203, 531
Wood for Mining Purposes 507
How Metallized 203
Percentage of Liquid in 287
World's Gold Output 203
Worth of Gold and Silver in U. S. Coinage 176
Wrought Iron's Tensile Strain 147
*Wyoming, Irrigation in 348, 433
Mines, 7, 69, 95, 129, 185, 213, 241, 269, 296, 325, 353, 380, 407, 488, 566, 644, 671.
State Engineer's Report 118

Y

Yak Tunnel at Leadville, Colo 258
* Yellow Aster Mine, Randsburg, Cal 341
* Youngs' Gold Dredge 42
Yuba Co., Cal., Mines 240, 324
Yucca 611
Yukon Decision 91
Mines 185, 213, 326

Z

Zinc Chloride 589
"Boom" in 314
Electrolytic Production of in '98 206
Future of 535
High Price of 175, 184, 314
Increase in Price 509, 561
Lead Ores Not Difficult of Treatment 87
Lead Sulphide Ores 455
New Method for Determination 345
Ore Containing Iron; How Separated 231
Spelter, How Made 479
Zinciferous Ores at Leadville, Colo 5, 88
Zone of Oxidation 635

Mining Summary.

ALASKA.

On Gravina Island a copper ledge is being developed by Boston capitalists. There are four claims and a 21-foot ledge of ore. Assays from the discovery show copper and $5 gold. Mgr. White says the main body of ore is within a few hundred yards of the seashore and near it runs a creek carrying water to develop 100 H. P.

The Sea Level M. & M. Co.'s property is on Thorn Arm, sixteen miles from Ketchican. The company has a 50-foot ledge.

Victoria *Times*: Miners who, under E. S. Ingraham of Seattle, were sent north by Prince Luigi, nephew of the king of Italy, report having struck it rich near Port Clarence. A letter received from C. E. Chard says the find has been made on an unmapped creek near Port Clarence, one of the United States government reindeer stations. Fourteen claims have been staked. In five hours Chard and two others took out $20 from the discovery claim with a rocker. At Golovin bay 1500 people are said to have reached that district, many of whom have gone to Port Clarence, where they purchased all of the fur clothing to be had at that station.

ARIZONA.

The Phœnix G. M. Co. has arranged to reopen the Phœnix gold mine, eighteen miles north of Phœnix. The ore is low grade, but the veins are large. The development is superficial. There is a 70-stamp mill on the property and a small cyanide plant, which will be used. W. Christy of Phœnix is Pres. of the company which controls the mine.

A fire, originating in the reverberatory furnace building of the United Verde copper mine at Jerome, Ariz., communicated to a pile of 800 tons of coke in bins near the works, and, it is reported, spread to the upper works of the mine, when it was finally gotten under control. The country is hot and dry and water scarce. The fire is said to have resulted from friction of a belt on a pressure blower.

It is reported that the Old Dominion smelter will be shut down for the reason that the fluxing ore of the Continental mine, recently acquired, is not yet available for smelting purposes, and that pending the time when the Old Dominion can use this ore as a flux the smelter will be closed. There is said to be a loss of 2 to 3% of copper under present method of treatment.

A strike is reported in the Quijotoas, where it is claimed a large mass of rock crops boldly for two miles, which all contains gold.

Yuma *Sun*: M. Winsor has gone to the Copper Mountain country to investigate mining claims in that section.——The King of Arizona Co. will soon have the pipe line from the new well to the mine complete. The machinery at the mine is being placed and will be ready for the ore by July 20th.——G. H. Miles and F. O'Brien have gone to the Tule Wells district to do development work on copper prospects they have discovered. —— Marcus Daly of Butte, Montana, has a bond on a group of mines in the northeastern portion of Yuma county on which his agent is doing development work.——A group of mines in the Castle Dome mountains, twenty-two miles north of Gila City, belonging to Modesti & Avila, has been worked in a small way for the past four years and is developing into a good lead mine. Two shafts have been sunk 110 and 50 feet with a tunnel connecting from the bottom of the 50-foot shaft. The ledge is 2 feet wide. The ore is solid and runs 50% lead with a small amount of silver. Returns from two carloads of ore shipped to Pueblo show a profit of $2,623.99. Two carloads are being sacked and will be shipped. As soon as the 200 level is reached a steam hoist will be put in.

Arizona *Star*: A strike was made recently at the Blue Jay mine. A new shaft has been sunk farther up the hill, and in this a vein of ore was found. A sample was assayed and found to run 170 ounces in silver.——J. R. Holmes has located five miles west of Kirkland three gold prospects. The ledge he describes as an ore body carrying shipping ore from the grass roots down. Mr. Holmes recently sold the Monarch mine to A. W. Fisher. The Monarch adjoins the Monte Cristo.

CALIFORNIA.

Alpine.

Winnemucca *Silver State*: Dr. Loope of Bessemer, Mich., will put men to work on the old Lincoln mine at Boulder hill under the superintendency of P. Curtz. With an extension of 300 feet they expect to tap the ledge on which Musser & Lewis made the recent strike.

Amador.

Sutter Creek *Record*: At the Central Eureka mine, near Sutter Creek, the vein has been reached in the north drift on the 1350 level, 25 feet from the shaft.——A strike has been made in the Baltimore mine, formerly the Tripp mine, near Blue Lakes City, on the Mokelumne.——The Tellurium at Pine Grove has been shut down. It is reported that operations will be resumed in July.——M. Tangerman, who bought the Boyrie property at Clinton, is ready to start hydraulicking. ——The McPherson Bros. at Pine Grove have men at work on the gravel claim they are operating there.——The Spagnoli shaft is down 115 feet. The station at the 100 level has been cut and sinking resumed.

Amador *Ledger*: At the Bay State, four miles north of Plymouth, operations are being pushed. Thirty men are on the payroll. At 700 feet in the shaft a crosscut is being run to the vein, and the sump, 50 feet below, is being cleaned out that sinking may be resumed, the objective point being 1100 feet. A bulkhead has been put in at the 300-foot level to hold the water.——L. A. Gross, who went East a few months ago to organize a company to operate the Centennial mine near Drytown, telegraphed to Mr. McWayne at Drytown to have the water taken out. This was accomplished when Mr. Gross returned this week. New York and Boston capitalists have been interested and when the shaft is repaired sinking will be commenced to develop to 1000 feet.——Col. Ranlett at the Newton mine is reopening the property rapidly. The shaft has been repaired and they are taking out ore. On the surface tracks are being laid and preparations made for the erection of the 80-ton smelter.——Supt. S K. Thornton of the Shenandoah mine near Plymouth has the shaft down 125 feet in a body of white quartz which is 9 feet thick and prospects. This is the property formerly known as the Easton mine.——The Tellurium mine was closed down on June 10th.

Amador *Dispatch*: Supt. Marsh of the Butte Mountain mine near Clinton reports the tunnel in 384 feet, and that he does not know the width of the vein at that point, as there are no walls visible. Where the ledge was encountered it was 8 feet thick and has grown wider as the tunnel advanced. An upraise has been finished and shows a body of ore 200 feet high that assays $6.40 a ton. The ore in the breast of the tunnel assays $7.60 a ton. There is a 10-stamp mill at the mine, five stamps of which are dropping. Mr. Marsh will have the other battery in operation in a few days. —— The shaft at the Spagnoli mine, Clinton, is now down 120 feet and still sinking. It is expected the shaft will tap the ledge at 200 feet.

Amador *Republican*: It is reported that the Amelia G. M. Co. near Jackson will resume work at the Amelia mine within sixty days. ——A new strike is reported in the Central Eureka mine near Sutter Creek.——The Eureka mine, owned by Mr. Steele of San Francisco, which is near Pine Grove, will be started up to prospect the property.——The MacPherson Bros. are running their gravel mine near Pine Grove with a full force. It is said the former operators could not pay expenses.——M. Tangermann has the preliminary work finished and will start hydraulicking on the gravel mine purchased from Mrs. Boyrie at Clinton.

Butte.

A new 4-stamp mill is being built on the Lawton quartz mine near Hurleton.

Calaveras.

The extensive work of the Melones M. Co. at Robinson's Ferry is causing considerable activity there, and increase in the population.

At the Shuman gravel mine, three miles from Mokelumne Hill, a tunnel is being run 1100 feet from Old Woman's gulch towards Happy Valley to drain the mine.

Burton, Maxoli & Co. are operating a hydraulic mine in Chili gulch. The company owns the Green Mountain mine, famous for its quartz crystals. The company also owns a gravel claim at Camanche, where they will operate this season.

Three years ago J. Crannis and M. Hultodo, while prospecting on the Vorlander ranch near the Calaveras river, struck quartz that assayed $20 per ton. They sunk 45 feet, and sold out to G. W. Provard and Dr. Lewis. Dr. Lewis recently secured control and during the last six months has been sinking a shaft on the ledge. A contract for an additional 100 feet has been let to Wm. Fuller for $1000. Ninety acres of the Vorlander ranch has been purchased for mill site, etc.

The Lamphear mine is one and a half miles southeast of Mokelumne Hill on Spring gulch. A shaft has been sunk 250 feet in the footwall, from which a crosscut 35 feet reached a vein of quartz 8 feet thick with 4-foot gouge. The fissure is found at contact of granodiorite with slates of the Calaveras formation. Mr. Harris, manager and part owner, reports the mine paying. This mine was discovered in working the gravels overlying by hydraulicking.

At the Esperanza, 2½ miles east of Mokelumne Hill, which has been shut down for a short time, a drift on the north side of the shaft at the 950-foot level has reached a 6-foot vein of quartz. Heretofore all the prospecting has been done south of the shaft and results were unsatisfactory. A force will continue the drift and test the ore while a new hoist is being erected, and if developments warrant an addition will be made to the mill.

A number of gold specimens, ranging in value from $1 to $50, have recently been found in the southern part of the county by C. Schroebel.

It is reported that operations are to be resumed at the El Encino gravel mine, near the Junction, in Chili gulch, two miles from Mokelumne Hill.

Calaveras *Citizen*: It is reported that C. D. Fontana has sold the copper property owned by C. Braids to the Ames family for $27,000. The Braids property divided the lands of the Union Copper Co., owned by Ames, which has been shut down since '93. It is reported the mines are to be reopened.

Colusa.

The Mammoth Copper M. Co. has been incorporated to operate copper mines in the Coast Range in this county.

El Dorado.

The electric power plant of the Boulder M. Co., which furnished power for mines near Kelsey, was destroyed by fire recently.

Georgetown *Gazette*: Work on tunnel No. 5 of the Josephine mine is being pushed.——It is reported that work will be resumed on the Two Channel mine at Kentucky Flat.——Five men are at work on the Gentle Zephyr mine, near Josephine.

Placerville *Nugget*: A strike has been made in the Bluebird mine, near Placerville. The property, owned by Mr. Morey, is being worked by Mr. Niedecker.

Placerville *Republican*: The Balmacedo, near Nashville, under Supt. R. Smith, is showing good prospects. He is developing a pay chute which has not disclosed its full proportions.——It is said that the Richmond, near Nashville, which has been idle for some time past, will resume operations.——T. Higgins' Yellow Pine mine, near Nashville, continues to pay. A new mill is being considered.——An addition has been made to the force at the Montezuma this week.

Inyo.

Randsburg *Miner*: Gordon Bros. have a mine in the Slate range, where they are putting up a 2-stamp mill. They had been shipping ore. They have water at Borax lake, a mile and a half from the mine. Their ledge is flat.

Kern.

Randsburg *Miner*: The Little Butte Co. has shut down. The reason is not given.—— The Stanford mine, owned by Kuffell, Nixon, Mann & Wilson, has had 125 tons of ore crushed at the Red Dog mill, which returned a brick worth over $2800.——The Kinyon mill is running on twenty tons of ore which is estimated to turn out between $200 and $300 to the ton.——At the Yellow Aster work is going forward steadily. The Hercules crosscut is connected with the west drift on the Trilby on the same level. The working force has been reduced by twenty-five men, the development making it posible to keep the mill running with a smaller working force. Development work at the wells will be suspended as soon as connection is made between the shaft now being sunk 300 feet distant from the first well and the tunnel. The water supply is now abundant and the mill could be run without pumping back from the reservoir.

Los Angeles.

(Special Correspondence).—A cyanide plant has been built on Mount Gleason, several miles southwest of Acton, at an altitude of 6000 feet.

The King of the West shaft at the side of the track of the Southern Pacific Railroad, half a mile west of Acton, is to be reopened by English people. The work is in charge of Mr. Woodside.

The Esperanza mine at the head of Acton valley has opened a 2-foot vein of rock which runs $30 per ton.

It is reported that a vein of gold rock has been found in Aliso canyon, southeast of Acton.

The Old Padre mine on Mount Gleason is once more being cleared out by Mr. Jones. The vein occurs in a peculiar felspathic rock and varies in width from a seam to 8 feet of solid quartz, which appears in a succession of lenses. The rock carries free gold and auriferous iron sulphide, but it has never had a fair trial in experienced hands.

Acton, June 26th, '99.

Madera.

It is reported Madera will have the smelter to be erected by the California Copper Co. on the north bank of the Fresno river. It is to be of 100-ton capacity and to be in operation Oct. 1st, '99.

Nevada.

The Supt. of the North Star Mines Co. reports a shipment of bullion for the first half of June, the estimated value of which is $16,400. They have struck rich ore in Stockbridge No. 15 and ore is reported improving in the Central.

Otto Woehler is opening the McKillican copper mine near North Bloomfield; 100 tons of ore have been taken out which will be shipped.

Placer.

Attention is being given to the porphyry dike four and one-half miles southeast of Colfax. The Nisson and Wise & Partridge claims produce well when water can be secured. The width of this dike is from 50 to 100 feet and it can be traced from near Colfax to Butcher Ranch, ten miles.

H. J. Wise, J. H. Butts and G. Thompson are developing a group of claims across the American river from Colfax, embracing the Adelaide, Alma, Gladys and Bassil. Water will be brought 4000 feet from Owl creek; 2000 feet of the ditch has been graded and 1600 feet of flume will be built.

Supt. J. J. Sullivan reports that he has forty-four men on the payroll at the Pioneer mine, near Damascus, and says miners are scarce. Main No. 5 tunnel is in 4369 feet, running west 2569 and bearing south 1800 feet. Sinking on the ledge from the No. 4 tunnel is in progress, down 250 feet, and is 1250 feet from the surface.

Auburn *Herald*: The ore at the Grass Ravine mine is improving. It is rich in galena sulphurets.——The Polar Star is paying, the returns being larger than expected.——The Morning Star and the Big Dipper mines near Iowa Hill are working the usual number of men and paying the usual dividends.——The Red Point mine near Damascus is paying.—— The Marguerite mill will be started up again. ——Three shifts are working at the Jupiter Con. The machinery is in place. Sinking the slope is in progress.

Sacramento.

Folsom *Telegraph*: Another gold dredging machine will be built in the vicinity of Folsom. The Boston Exploration Co. last week closed a deal for 100 acres of Sailor bar, which was very closely prospected for the precious metal recently. The style of dredge to be used has not been decided upon. The company has under bond and is prospecting several other properties in the vicinity.

San Bernardino.

A. G. Campbell, Supt. and owner St. George and Gold Bar mines at Vanderbilt, says they have improved rapidly and that the output is limited by the supply of water, for which he is compelled to depend on the mines themselves. The flow has increased with depth, and during the past season he has handled twenty tons daily with gratifying results. He confirms the report that he was offered $300,000 for his property at Vanderbilt.

A new hoist is to be placed on the Sidewinder mine, ten miles east of Oro Grande station. This mine contains an auriferous ore which has proven rich enough to ship. It is several miles from water and timber.

A strike is reported from the Winchester mine in Providence mountains, north of Fenner station. The old Bonanza King is in these hills. The Hidden Hill mine is a small vein of high-grade gold rock.

San Diego.

It is reported that I. Trumbo will get the Golden Cross mine, near Ogilby, and that as soon as the receivers can wind up their accounts possession will be restored to him.

The Donohue mine near Dulzura is being worked after a long idleness. The veins of this district occur in felsite, along zones of fracture and crushing. The ores are oxidized near the surface. In depth sulphides appear, notably arsenical sulphide.

Shasta.

(Special Correspondence).—M. A. Hearne has given to a Boston company, through C. D. Galvin, a working bond on seven copper claims seven miles south of Kennet. The transaction was closed last week and ten men put to work. Three development tunnels have been run by the owner aggregating 300 feet—the longest, 120 feet, all in ore. The vein matter is 65 feet wide. The ore assays $3.25 gold, two to five ounces silver and 5% (average) in copper.

Some encouraging indications were found last week in the Golinsky properties, being developed by Lewishown Bros.

A. G. Myers has secured an option on fourteen copper claims near Kennet from G. Graves and is doing prospect work.

Kennet, June 26th, '99.

(Special Correspondence).—C. D. Galvin of Montana and J. Fillus of Denver, Colo., have bonded the Shasta King group, lying north of the Balakalala property on Squaw creek. The capital comes from Boston and the company will erect its own smelting plant. The property consists of eleven claims on the south fork of Squaw creek, and this creek will be utilized for power when a compressor plant is put in.

Redding, June 27th, '99.

Redding again reports that another smelter is to be built on Sillwater creek, twenty miles from Redding, in Shasta county, by a German company.

Supt. S. F. Sheppard of the Old Spanish mine is sinking a double compartment shaft in new ground of the Old Spanish.

B. Swasey, who has a lease on the Thompson mine near Shasta, is finding good ore. The first shipment of rock to the Keswick smelter went $14.60 to the ton. There is another lot of fifty tons at the smelter.

Redding *Searchlight*: C. D. Galvin and F. Grotefend are developing three copper properties. Twele men are employed at the King Copper above Copley, eight at what is known as the Galvin group and ten at a new camp started on the Heorne, Stevenson & Schneider property. At these mines day and night shifts are being worked.

Sierra.

The Thistle Shaft Co. has a boring machine at work locating the gravel channel and determining the distance to bedrock, along the ridge, below the works, within the boundary lines of the company.

Spencer & Gould are credited with a big cleanup on the head of Hopkins creek.

Corbett & Carmichael are piping with a fair head of water at Sawpit, where they have goodground and expect a satisfactory cleanup.

Downieville *Messenger*: At the York mine at the mouth of Slug Canyon nine men are at work driving the main tunnel. The shaft near the mouth of the tunnel is down 75 feet. The mill is running daytimes. A self-feeder has been put in.

Sonoma.

Cloverdale *Reveille*: The work of reopening the Cloverdale quicksilver mine is going on. C. B. & H. B. Lawley are at the head of the enterprise. At present one furnace will be operated, but later a large one will be put in. Two of the old tunnels have been cleaned out. Twelve men are now employed; the number will be increased.

Siskiyou.

Yreka *Journal*: A man named Lewis of Oro Fino has found a ledge above the Sheba mine on Patterson creek, from which he took out thirteen tons, and sold the claim for $5000. He then had the ore crushed, which realized $2000.——The Sheba mine continues to yield $10,000 a month, with a 10-stamp mill.——G. M. Foote has made a strike in the Merrimac mine on Humbug, the quartz showing much gold. Mr. Foote is one of the principal stockholders of the Golden Star mine.——C. Gentry and R. O'Neill are mining near the head of Greenhorn creek, and find good prospects.—— The old Campbell mine, in Quartz valley, is being worked under supervision of A. C. Brokaw. He is piping a 60-foot bank in Felty gulch, and expects to run until the last of July.——Page & Co. are working at the Abe Erno mine in Quartz valley, and have sunk a shaft 70 feet. They are troubled with water, but have pumps and engine. They will have a new boiler to furnish more steam.——Morrison & Carlock are running their mill in Quartz valley day and night, employing twenty men. The quartz is paying.——Thornton & Co., having a bond on the Dave Jones mine at Quartz valley, made an $8000 cleanup for past month and have thirty men employed. ——The superintendent of the Siskiyou hydraulic mine on Klammath river, sixteen miles below Happy Camp, had a $6000 cleanup last month. Twelve to sixteen men are working.——The Minetta B mine, above Happy Camp, Klamath river, is working with two giants. Ten men are employed, with S. Gardner of Oro Fino as Supt.——The Gumboot mine at Scott Bar, bonded by Baker & Co., has sixteen men employed.——F. D. Fraser is operating the old Golden Eagle mine at Indian Creek, with twenty-five men in the mine and six at work putting up a new mill.

Four hundred tons of quartz are on the dump. ——The Grider mine at Selad has been fitted with a new elevator, which has been started. ——Harris & Co., an Oakland company, are wingdamming and sinking a pit at Hamburg Bar, Klamath river, with twenty men.—— Several China claims at Hamburg and several other points along Klamath river are being worked.

Trinity.

Weaverville *Journal*: Fifty flasks of quicksilver constitute the first shipment of the season from the Altoona mines, near Cinnabar. The mines have a normal production of 350 flasks per month.——The Unity M. Co. of New Jersey, Pennsylvania and New York have begun operations on quartz property in the Bullychoop district.

Tuolumne.

Supt. W. R. Dorr of the Boston & Tuolumne G. M. Co., reports that one shaft is down 200 feet on the foot wall of the vein. The other is down 75 feet, in pay ore all the way. A drift has been run from this shaft 50 feet on a vein 7 feet wide, which averages $6 to $8 per ton. A stamp mill is to be erected.

At the Hihapoo mine, on the Stanislaus river near Columbia, Messrs. Reed, Ponce and Day took out a $1000 pocket a few days ago with prospects for more.

Another strike is reported at the head of Deadman's gulch.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The Nancy M. & M. Co. have completed the new shaft house and have the hoist in place on the Gillard shaft, and will start men sinking Monday. They are putting in a compressor and boiler at the mouth of the Hastings tunnel and have let a contract to drive the tunnel 600 feet or more to the intersection of the Gillard vein, and are putting in a hoist on the Tom Boy. These properties are located at Wall Street.

Wall Street, June 23d, '99.

The Cold Spring M. Co. have bought an eight-drill compressor for work on the tunnel now being driven on the company's property at Gold Hill.

CHAFFEE COUNTY.

The mines of Granite district mostly contain free milling ores, and rich bodies recently opened in several of them have had the effect of increasing operations. The mills are all at work.

CLEAR CREEK COUNTY.

Copper discoveries on Bear creek, near Morrison, and near the Governor Evans ranch, are attracting attention. For years indications of copper have been known, but no effort made to open up the veins. S. E. Roberts of Denver is opening the Boston claim and has a showing of copper. The pay streak is 18 inches wide, having increased from a few inches at the surface. The first tests of the vein matter gave 40% copper. The new belt runs through the lower corner of Clear Creek county, Jefferson and over into Park. A Central City man is working a force on another discovery and has good mineral. A shaft is being sunk. Several men are opening veins near Mount Evans which carry copper and gold. The Bear Creek section is thirty miles from Denver—the nearest mining camp to the capital of the State.

CUSTER COUNTY.

The Bassick mine, at Silver Cliff, is working steadily with ten-hour shifts.

EAGLE COUNTY.

The Iron Mask mine, at Red Cliff, has been equipped with a 22 H. P. gasoline engine and hoist. A small force is working on the mine, shipments having been stopped on account of the closing down of the smelters.

Battle Mountain district shipped fourteen cars of smelting ore recently. The total shipments since Jan. 1st is 138 cars, amounting to 4147 tons.

EL PASO COUNTY.

C. H. MacNeill, vice-president and general manager of the Colorado-Philadelphia Reduction Works at Colorado City, announces that the company has purchased a gas plant which will cost $30,000, and that the company will make its own gas for use as fuel, in place of coal and oil, heretofore used. Other improvements in the reduction plant will bring the total cost up to $50,000. The gas plant will consist of four generators, with a capacity of 50,000 cubic feet per day. The work of putting in the plant will commence in a month. The generators will be placed in a brick addition 50x75 feet, to be built on the south side of the furnace room. The change from coal to gas will save expenses through the fact that thirty-five tons of coal per day will be required to generate the gas which is to be used as fuel, whereas when coal is used for fuel direct, as at present, the daily consumption is fifty tons. This will be the second time that gas will have been utilized as fuel in Colorado, the first time being in the Union mills at Aspen, which have been closed for several years, owing to the drop in silver. Twenty new concentrating tables have also been contracted for.

GILPIN COUNTY.

The water in the California mine has been lowered to the 1500-foot level and is going down at the rate of 3 feet per day. As soon as it reaches the 1700-foot level connection will be made with the Hidden Treasure. The shaft is 2200 feet deep.

During May the Cook mine produced 3400 tons of milling ore, yielding 675 tons of concentrates and 133 tons of smelting ore. The mine is the second producer of the county, the Kansas-Burroughs being the first.

GUNNISON COUNTY.

G. Farnham has made a strike in the Songbird, at Ohio City. He has driven a crosscut tunnel 110 feet and cutting an ore body running $190 to the ton, mostly copper, with some silver and gold.

The Eureka No. 2, in the Quartz Creek district, has opened a vein of decomposed quartz 3 feet wide, carrying values in silver and gold. The tunnel is in 175 feet in porphyry.

The Jessie mine, in the Gold Brick district, is a sample of a grass roots mine. The vein in the breast of a 20-foot tunnel is 10 inches wide, the ore is honeycombed quartz, carrying free gold of an average value of $200 to the ton.

Crystal *Silver Lance*: The machinery for the Cramer concentrator has been taken to Scofield and the treatment of ores will begin in July. Several mines of that section have ore ready for the mill.——The Laura tunnel, which contractors Ford & Kline are driving, is in 380 feet, working two shifts, accomplishing good work.——At the La Plata mine there is a large amount of ore on the dump to be shipped. The first shipment will be made next week. The La Plata is located in Paradise gulch.——At the Black Queen the two pumps have been started to unwater the mine, which will require several weeks.

HINSDALE COUNTY.

Lake City *Times*: Mgr. D. A. Farrell of the Lellie mine, near Lake City, has let a contract for 50 feet of work on the lower tunnel, preparatory to erecting a power plant. ——W. A. Byal, working the Varden Belle under a bond and lease, has three carloads of ore to ship. Assays run in silver and copper. ——G. D. Bardwell, owner and operator of the J. J. Crook mine, Copper mountain, reports the outlook promising. He has copper ore ready for shipment.

LAKE COUNTY.

The first shipment has been made from the new discovery in the Lillian mine on Printer Boy hill, Leadville district. The shipment was thirty tons, running 30% excess iron, seven ounces silver and two-tenths ounce gold. The ore body is 3 feet thick.

The company interested in the Golden Rose mine of Leadville is endeavoring to form a combination with the Matchless, Robert E. Lee and Dunkin mines on Fryer hill. The Robert E. Lee holds the record for the heaviest production ever made in one day from a Colorado mine—$117,000 in seventeen hours, and the Dunkin was one of the big shippers of early days. They will sink for the second contact.

The Home M. Co. of Leadville, was started a year ago with no property of value, but to furnish capital for unwatering the down town mines. The discoveries made in its leases are so rich that the stock now has a market value of $1.75 per share.

The Castle View on Carbonate hill, Leadville, is still shipping ore. It sends thirty tons per day to the Philadelphia smelter, averaging $4.50 per ton.

Leadville *Miner*: The output of ores from Leadville district during the strike was 600 tons per day, including the steel iron shipped to South Chicago, Ill., and the zinc ores sent to Upland, Ind., and to the Vieille Montagne Zinc Co. at Antwerp, Belgium. The ores are from the Moyer shaft. Mr. Colley, Mgr. for Colley & Golob, expects to ship zinc concentrates to Rotterdam, Holland. Trial lots shipped as an experiment have given satisfactory returns.

MONTROSE COUNTY.

It is reported that high-grade silver ore has been found in the Huntsman copper mine in La Sal mountains.

At the Pinto King and Pinto Mammoth, recently bonded to P. McCourt, E. G. Miller and A. L. Searles, located twenty-five miles from Blake, ores have been found that show 10% to 30% copper, sixty ounces silver and $1 to $3 in gold.

MINERAL COUNTY.

The drills from the Last Chance shaft have reached the Amethyst ninth level. The work was done from the eighth level of the Last Chance, and had been going on for five days. It is thought that the mine will be drained completely within four days, excepting about 100 feet, which it is said will be tapped when the water is down to the ninth level.

OURAY COUNTY.

The Calliope mine at Ouray has been shut down pending settlement of the smelter difficulty. During the temporary stoppage, an addition of ten stamps and two tables is to be made to the mill. The old shaft will be pumped out and repaired and work commenced on two veins. A new shaft will be sunk 500 feet from the tunnel and a drift run to the old shaft. When the smelters resume operations, the force will be doubled and work resumed on workings abandoned three years ago.

The richest find ever made in the Bachelor mine at Ouray was made recently. The new shaft has been sunk 100 feet and a drift run 8 feet from the bottom, cutting a body of silver-bearing galena that averages 200 ounces silver to the ton.

PARK COUNTY.

H. Weber, operating the Weber tunnel at Puma City, reports that little has been done in Puma during the last year, but a number of properties are now working and several will be shipping before the close of the season. The Weber tunnel is in 165 feet. Mr. Weber has taken a lease and bond on the Barnaby tunnel, which he will work during the season.

The June, which has been idle for some time, has 75 feet of water in the shaft. Mr. Williams of Oklahoma, the principal owner, has equipped the property with a steam plant and will commence working when the mine is drained, two shifts to be put on development.

The Boomer, which has also been idle, is working two shifts.

PITKIN COUNTY.

Glenwood parties have taken a lease and bond on the Munn tunnel, on Snow Mass, twelve miles west of Aspen. This property carries gold, copper and silver.

A report comes of a rich discovery of copper ten miles north west of Aspen, on the range skirting the north bank of the Roaring Fork. Samples of the ore assayed 45% copper.

SAGUACHE COUNTY.

The Biedell mill at Bonanza is running full time, concentrating five tons of ore into one, with abundance of ore in sight, principally from the Bonanza mine.

SUMMIT COUNTY.

Breckenridge *Journal*: Eighteen months ago Fair & Ferris secured a lease on the Gold Dust, on Little mountain. At first they were compelled to do considerable dead work, but have been shipping ever since the lease was secured. They have the property in shape to produce seventy-five tons per month, with a force of seven men. They have sunk a 150-foot shaft and extended the tunnel on the vein 125 feet. In making this extension of the tunnel, they were following the vein and had some ore, but were 4 feet beneath the large body of ore, which extends along the entire distance, and from which they are now shipping.

TELLER COUNTY.

A strike of shipping ore was made Tuesday by the Princess Alice G. M. Co., when they found 8 feet of gold ore that runs high. The find was made on the Lafayette claim, which is leased and bonded to the Princess Alice Co. for $30,000.

Fifteen different companies in the Cripple Creek district have within a few months installed electric hoists ranging in capacity from 5 to 30 H. P. The Matoa Co. has put in large electric hoists. There will be several other electric hoists put in shortly. Among them will be a 15 H. P. hoist on the O. W. Blackenstaff lease on the Little Pearl; S R. Bartlett will put a 5 H. P. hoist on the Manitou, and F. O. Woods will install a 5 H. P. hoist on the Hendrie. On the Deadwood claim the Con. G. M. Co. will change the 5 H. P. to a 15 H. P. electric hoist. The Anaconda G. M. Co. has purchased a 30 H. P. electric hoist, which has been placed on the Excelsior of that company.

A rich strike on the 600 level of the Moon-Anchor at Cripple Creek is reported.

V. Hemert, leasing on the Ironclad, has opened what is supposed to be a new shoot of ore on that property. From the sixth level at 450 feet he put down a winze 80 feet, crosscut a short distance and found 5 feet of mineral, from which a shipment was settled for at three ounces. A crosscut at the sixth level reached it again.

Victor *Record*: The Pueblo syndicate that recently acquired the Reardon, Hight & Simms lease on the Lonaconing of the Kimberly Co., will make a 20-ton shipment from the drift at the 225-foot level of the mine, which will be marketed in two grades, of which two-thirds will average an ounce and the remainder from $40 to $50 a ton.——On the Old Hickory claim Miliken and others of the Arequa mill, holding the lease, are cutting a station at 200 feet, from which they will drift to the old Bruner workings.

Denver *Republican*: A strike is reported to have been made in the Grace Greenwood, on Gold hill. The property is being operated under lease by the Jerseyville Leasing Co. of Jerseyville, Ill., under direction of J. Birch. The strike was made in the 185-foot level, where an ore body has been cut. The Jerseyville Co. operated a profitable lease on the Mary McKinney and distributed a large sum in dividends. At the expiration of this lease their manager secured a three years' lease on the Grace Greenwood. Part of the old plant was removed from the Mary McKinney and improvements were made at the mine. A shaft and ore house were erected, a force was employed and mineral left by the former lessee was hoisted and shipped; but the returns were unsatisfactory. Mr. Birch decided he was on top of the shoot and commenced sinking.——E. Templeton and associates, subleasing from the Iowa capitalists who are operating the Pride of Cripple Creek, are sinking a shaft on a good lead. The vein has been followed a depth of 27 feet and is 2½ feet wide. Nine tons of quartz, good for 1¼ ounces to the ton, have been saved.——Lessee Selbach will ship forty tons from the Trachyte. The mineral is from the main drift, estimated at two ounces to the ton.——Returns on a carload shipment recently made by the Alert Leasing Co., operating the Diamond, of the Damon Co., give ten ounces to the ton.——The Lexington Co., at Cripple Creek, have commenced work on the Clara D. for the first time in the history of the corporation. The property has until recently been operated on a lease by Horner & Black, who have succeeded in developing a mine and making profits by their investment. The lease has a few months to run and has been acquired for the company, which commenced operations with twenty men. The lessees in May produced ore of a gross value of $8206.——On the Jack Pot the leasing company is curtailing the production of high grade and increasing that of the lower grade ore.——The Los Angeles mine of Cripple Creek has been leased to a company of Montana men, represented by D. P. Glidden. The lease is for two years, the lessees stipulating to sink the shaft 400 feet and expend $25,000 on development during the first year.——A sample taken across 5 feet of mineral in the breast of the drift at the second level on the Lansing, of the Pinnacle Co., at Cripple Creek, assayed 32 ounces to the ton. The ore body in this level is showing up better than above, often being 7 feet in width. A full force is working, numbering thirty men, distributed between the old and new workings. At the new workings a steam hoist has been installed and a shaft house erected. Work resumed in the new shaft with three shifts to connect with the first level run from the old shaft; 40 feet of sinking will have to be done before this connection can be made. A two-story ore house is in course of erection, which will have a capacity of seventy-five tons. Since ore was found in the second level the lessees have marketed six carloads—part from the first level.——Work is to be resumed at the Half Moon. It is understood that the ground opened has been well stoped out and that new lifts will have to be sunk before production on a large scale can be attempted. The shaft is down 580 feet.——Chicago parties have purchased the Bell interest in the Scott & Bell lease on the Teutonic. The shaft has been sunk 60 feet on a promising lease. The first shipment will be made soon.——The Raven G. M. Co. has shipped 125 tons, graded from two to six ounces to the ton. This is the heaviest shipment marketed by this company in some time.——Development work only is under way at the Lillie mine. The force has to be reduced one-half, and no ore is being broken. The mine is on the broad gauge road, and it is understood the management could not arrange for marketing of the product at the mills on this road. The narrow gauge line is now building a switch to the property. The shaft will be put down 200 feet.

IDAHO.

The Moose creek placers, owned by C. P. Richardson, have been mined for thirty-five years. There are 21 miles of ditch with the property. There is a 2½-foot flume, with a 6-inch grade per box. The two giant nozzles are 4 and 2½ inches respectively, washing 40 to 65 feet of old channel gravel. Fifteen men are employed, working eight months per year.

Ten miles from the Moose creek placers are the Montana placers, owned by R. G. Huston of Spokane. He is running a 2-inch and a 4-inch nozzle with a 3-foot flume of 9-inch grade in 12 feet. He has 200 feet of gravel bank.

In the Elk City district, on the borders of the Newsome district, is the Buffalo Hill placer, owned by R. Leggett of Butte. E. L. Dickey is Supt. Near by is the American Hill property, which is under the management of H. Pope. Work is going on day and night. The flume is 3 feet with a 7-inch grade. The work consists of stripping 4 feet of top gravel and the balance is run through a hydraulic elevator.

Spokesman-Review: J. M. Klotz, one of the owners of the Griffith claim on Snake river, reports samples from it to assay $8.26 on the surface. The ledge is 9 feet wide.——D. C. Stevens, operating in the same section, has on the Myrtle on Johns creek a ledge 12 feet wide.——Work is being done on the Crackerjack on the Hump, which is under bond to Clark & Sweeny of Spokane. It is reported that a body of good ore has been struck in that property 30 feet from the mouth of the tunnel.——High-grade copper ore has been found near the Salmon river by J. R. Adkinson. It is a green carbonate of copper, running into a copper glance. The claim is nine miles below White Bird and three miles from Shorty's Bar, on the Salmon.

Boise *Statesman*: Johnson & Summercamp of Weiser have bonded a mine near Banner. A good ledge has been opened and the ore is rich. ——The Idaho Democrat mine, near Hailey, is showing up well. The mine is owned by Watt & Brennan. There is a large body of silver-lead ore which runs high. It has recently been opened. The ore runs 140 to 400 ounces of silver a ton and carries from 40% to 60% lead.

MICHIGAN.

The management of the Franklin M. Co. expects to have the new stamp mill at Grosse Point in operation by July 15th. The mill will have three stamps, each of which, it is estimated, will have a capacity of 400 tons rock per day.

MISSOURI.

A Joplin dispatch says that as a result of the edict issued by the Missouri-Kansas Zinc Miners' Association, about 90% of the mines have stopped work for two weeks. This is the Zinc Miners' Association's method of forcing the smelters to terms. The smelters have refused to pay schedule prices. The miners' association arranged to export 5000 tons of high-grade zinc ore as soon as it can be sacked. This will remove the surplus of unsold ore, and, with a two weeks' shut-down, the miners think they can bring the smelters to time. The smelters have advanced the prices of ore to schedule rates—$43 per ton for 60% ore in the bin.

MONTANA.

Helena *Independent*: There are 300 sacks of ore on the dump at Copperopolis awaiting transportation. The principal portion of this came from the 150-foot level last winter from tunnel work, no stoping having been done.—— J. Devlin and wife and M. E. Reilly have conveyed a five-eighths interest in the Minnie Healey mine to F. A. Heinze for $76,000.—— A new concentrator is being built at Garnet. ——The Bonanza Leasing Co. shipped a carload of ore recently to the East Helena smelters which netted $580.——Butte men have bonded several of the ranches on Gold creek, with a view of putting in steam dredges. It is estimated that the ground and dredge will cost about $80,000.—— Sansberry & Dashley are working a lease on the Shamrock waste dump and producing second-class ore which milled at the Mussigbrod mill $15 per ton, and first-class ore $100 in gold. They have a large box full of water, in the top of which is a screen. The waste is shoveled into the screen and agitated a moment, the fine stuff going to the bottom and the coarse rock is washed and sorted. The leasers are working three men besides themselves, and are making money.

Hamilton *News*: Placer diggings have been discovered on the south fork of the Burnt Fork, across the range and northeast of Hamilton, within Ravalli county. Forty locations have been made. J. Condon made the discovery four months ago. The diggings can be reached from Hamilton by way of the Willow Creek trail. W. H. Brennan, H. W. Johnson, W. P. O'Brien, B. Ferrel, E. A. Chilson and others of Hamilton have taken claims.

Deer Lodge *Silver State*: R. W. Dunlap of Colorado has a bond and lease on a group of placer claims at the head of Dry Cottonwood, fourteen or fifteen miles southeast of Deer

Lodge. The claims are the property of L. Grand Pre, and carry gold and sapphires. The bond is for $5000 and runs till 1900. Mr. Dunlap has gone to the property with supplies. Mr. Grand Pre some months ago leased his upper claim to Gilchrist & Co. of Oregon, who are working the property and have made two satisfactory clean-ups of coarse gold and sapphires.

NEVADA.

In the Con. California mine the work of following the ore in the upraise above the 1750-foot level was suspended Monday in order to enlarge the openings for more extended operations. The objective point in the Con. California mine is the 1800-foot level. The work of reopening that level, through the winze from the 1750-foot level, has been commenced. There has been some delay in pumping operations the past week, owing to irregularity of water for power supplied at the surface.

A 100-ton copper smelting plant is to be installed at Sodaville, Esmeralda Co.

Copper veins are being prospected on Granite creek, twenty-two miles from Golconda. There are fifty men at work there, the Colossus Copper Development Co. of Chicago employing thirty.

C. A. Hitchcock of San Francisco has a bond on the iron mines near Lovelock for ninety days for $55,000.

The new compressor at the Dexter mine, Tuscarora, is to be in operation next week.

White Pine *News*: At the Robust mine another cave has been discovered. It was found in the main drift on the 70-foot level, 80 feet from the shaft, and extends almost to the surface. The cave is 200 feet long and 75 feet wide in the widest place. Its walls are covered with white lime crystals, lined with ore of a high grade.——The mill upon the Star group, near White Pine, has started up and is in full operation. The plant has a capacity of 100 tons of ore daily and is four miles from the mines, the concentrates going to the smelter at Golconda. The company has a steam wagon to transport ores.——It is reported that tests at the Chainman mill are proving satisfactory. The rock will be crushed dry instead of wet, as heretofore. The company has secured the rotary dryer formerly used in the Martin White mill at Ward, and is placing it is position.

NEW MEXICO.

Elizabethtown *Miner*: Good ore has been found in the Tom Boy near Elizabethtown. ——M. & W. Walsh are sinking on a 6-foot vein on their Denver lode.——W. Wells is taking ore from the Little Wonder, on the head of Willow creek.——The new Confidence mill at Elizabethtown will start up. —— S. Mathews has stopped work at the Uraca placer on account of the scarcity of water.

OREGON.

The Wong Back Fawn mines, at the mouth of Sailor creek, have been sold to the Canadian Co., Ltd., of London, Eng., for $16,000. The land includes several bars on the Illinois river, twelve miles south of Kerbey. The Illinois river bars have never been mined, though the tributary streams have been dug over for forty years. The dredge to be used will excavate to a depth of 60 feet and is said to have a capacity of 3000 yards of gravel per day. The sale was made through S. N. Butters, who is interested in placer ground in the vicinity, known as the Hanseth property.

The dredge operating at Weatherby is said to be in successful operation, hoisting 4000 cubic yards daily.

Monroe & Morgan of Seattle, Wash., have bought the Grand Applegate ditch near Medford. It is 12 feet wide at the top, 6 at the bottom, 6 feet deep, 7 miles long. A part of the Squaw Lake mine is to be worked from it this summer.

In Bohemia district it is expected that 300 men will be employed this season.

SOUTH DAKOTA.

Terry *News*: The Buxton Co. is sorting the Big Bonanza dump, shipping two cars a week. ——It is reported that H. O. Alexander and J. Lundberg will work the Big Bonanza under lease.——M. Schnitzel is working the Little Tornado under lease, making three mines he is operating successfully.——The Golden Reward has commenced shipping from the Little Bonanza, the first ore that has been sent from this mine for several months. The Golden Reward Co. has taken charge of the Deadwood & Delaware Co.'s mines and smelter, and the entire business is under the management of the former company, the D. & D. having dissolved. Mr. Blatchford is Gen. Mgr. of the mines.

Custer *Chronicle*: G. L. Millhouse, R. Lewis and M. Daly have discovered a gold-bearing vein three miles northeast of Custer and have located six claims. They are sinking a shaft. The principal claim is known as the Wild Rose. W. Peterson also made a strike near Calamity Peak, on the same belt as the Wild Rose.——The Holy Terror and Keystone mills have started up again, after being idle for two weeks on account of a shortage of wood. ——The Golden Slipper mine, near Hill City, has been bonded to M. E. Pinney. The gold taken from the development work has paid all expenses thus far. —— A group of twelve claims seven miles north of Hill City and two miles south of the Bullion mine, it is reported, are to be sold for $60,000. Development has opened a ledge of free-milling quartz that assays well. The ground has been held for fifteen years by a man named Kimball. It is the intention of the owners to erect a mill.

UTAH.

(Special Correspondence).—The main shaft at the Star Con., near Silver City, is at a depth of 600 feet. At this level a 75-foot drift is being made to cut the ore body which was opened at the 400 level. Since May 24th sixteen cars of ore have been shipped. It is stated this ran from $12 to $15 gold, fifteen ounces silver and 9% to 15% lead. A strike was made by lessees in the old tunnel workings recently which was 15 feet wide, samples of which ran eighty-nine ounces silver, $4 gold and 16% lead.

The Tesora mine, located on Treasure hill, managed by J. T. Hodson, is now equipped with a modern hoist and pumping facilities. The shaft is down 150 feet and sinking is to be continued. This is in a portion of the district containing wet mines. The ores from the Tesora run well in gold and copper.

Silver City, June 22nd, '99. WASCOTT.

(Special Correspondence).—The New Mammoth, near Bingham canyon, in charge of Supt. J. E. Beveridge, is being developed through a shaft and tunnel. The shaft sinks on the vein to the depth of 400 feet from the top of the ridge. From a point on the slope of the hill the tunnel is driving between two parallel veins to connect with the shaft at 550 feet depth. The tunnel is in 600 feet, with 300 feet yet to go. The veins here are from 4 to 8 feet wide, being oxidized quartz, carrying gold values which are to be extracted by cyanide solutions. The company's new cyanide mill is about complete, being equipped with crushers, rolls, eight solution vats, eighty tons capacity each, and is to be operated by electric power from the Jordan Narrows plant. It is expected the mill will start up by July 1st.

The Fortune group, situate near the New Mammoth, is under the management of E. Hill, and has enlarged its development considerably since last year. Its two main tunnels, 64 feet apart vertically, go in 1600 and 1300 feet respectively on the vein, which stands between porphyry and quartzite walls, carrying silver and copper in iron and copper sulphides. One car shipped recently ran 15% copper and fifty-eight ounces silver.

The Highland Boy is producing from 250 to 500 tons of ore per day, delivering same to the railroad over their 12,500-foot wire rope tramway. This company's smelting plant, built near the Jordan river, is operating, though not at its full capacity as yet.

WASCOTT.

Bingham, Utah, June 26th, '99.

Salt Lake men have sold to a Denver syndicate a large tract of placer ground on the San Juan river in southeastern Utah. The consideration was about $250,000. The Denver company intends to work 5000 yards per day.

The Swansea M. Co. during the past fiscal year showed net earnings of $94,451.41, distributed dividends aggregating $65,000 and has a cash surplus of $27,286.11.

R. J. Evans has bought the Ophir claims at Stateline and will organize a company.

W. H. McIntyre has sold his holdings in the Mammoth mine to his brother Samuel for $250,000.

Eureka *Miner*: P. Ryan has arranged to resume work on the Mountain View. Sinking will be resumed, the shaft being down 270 feet.——J. Knight is reported to have purchased for $45,000 of D. Evans a half interest in the South Mammoth, West Mammoth, Black Jack and Trail claims. They are surrounded by producers and traversed by a strong ledge.——It is reported that the Centennial-Eureka property will change hands for $3,000,000. It has paid over $3,000,000 in dividends. Recently deposits of copper and gold ores have been uncovered in virgin ground between the 400 and 600-foot levels, and throughout the mine are bodies of milling ore. A concentrating plant has been considered by the management for several months, but no definite action was taken.

WASHINGTON.

A copper strike is reported on Palmer mountain, Okanogan county. Outcropping copper ledges were discovered there several years ago. The tunnel being driven into the mountain has cut eleven veins. Drifts have been run along five of these and in all of them copper and gold ores were found.

W. M. Darling of Oakland, Cal., is preparing to put men at work on thirty-two copper claims which he and associates have purchased, in the Carbon River district, eighty miles southeast of Tacoma. They have croppings which run in gold and copper. One ledge has a 12-foot vein exposed for 2000 feet.

Spokesman-Review: On the south half of the Colville reservation the tunnel being run on the properties of the Byrne M. & M. Co. on Jackass creek, three and a half miles from Keller, is in 50 feet, and making an average of 3½ feet per day. The lead has the same appearance as where it cropped on the surface, carrying silver, lead and pyrites of copper. The tunnel will be run 400 feet. The company is negotiating for a small smelter. ——The Lloyd properties, adjoining the Byrne group, have an incline shaft down 65 feet. The owners intend to crosscut at the 75-foot level to the footwall, where the best values are found.——Major Gwyder of Spokane, accompanied by F. L. Smith of Riverside, Ill., and G. W. Bentley of Michigan, have been looking over mining property in the Palmer mountain district.——Work has been resumed on the Admiral Dewey at Republic under the management of D. A. Mills. A shaft is to be sunk on the ledge some distance from the old shaft, the new superintendent having uncovered a different strata of quartz.

WYOMING.

Grand Encampment *Herald*: Two discoveries have been made the past week near Grand Encampment, one by the Fleming Bros., the other by Peterson and Tenant. The Fleming property, the Bonanza, is located near the Cushman ranch. The lead does not show at any place above the surface, being covered with soil. At a depth of 2 feet they struck copper sulphide ore. The ore is scattered through jasper 4 feet in width. The Peterson and Tenant discovery is in the same locality, farther west, bordering on the North Fork. The vein is as large as in the Bonanza, with quartz gangue.——Mr. Walters is developing a gold prospect on Cow creek. He has a shaft down 20 feet on a quartz vein carrying sulphide gold ore. It is located on the level prairie four miles north of Grand Encampment.——J. A. Fairchilds has struck copper in the O. K. on North Fork. He has a 20 inch vein carrying copper sulphides.——At the J. Smith discovery, on the plains west of town, the shaft shows the vein widened to 4 feet, carrying copper glance.——Ten men working night and day shifts are working on the Home Fraction shaft. The lead has widened to 7 feet and the rock is stained with copper.——The Copper Glance on Miner creek, owned by G. Garoutte, is beginning to show copper at the end of a 200-foot tunnel.

FOREIGN.

BRITISH COLUMBIA.

The Blackcock Mines, Ltd., a company capitalized at $1,000,000, has been formed to operate the Blackcock mine at Ymir. The directors are: A. J. McMillan, Pres.; A. Julien, Vice-Pres.; C. O. Lalonde, A. Audet, J. L. G. Abbott. No. 1 shaft has been sunk to a depth of 55 feet; the main shaft is down 110 feet. Twenty-five tons of ore went $14.18 per ton, twenty-four tons went $17.88, twenty-one tons went $45.50. Altogether 238 tons have been shipped from the mine with an average yield of $17 per ton.

The Granite and Royal Canadian groups have been incorporated under the name of the Granite Gold Mines. The two groups are among the richest free-milling propositions in the Nelson district. On the Granite three shafts have been sunk. Seventy-one sacks of ore from the Granite vein sent to London assayed an average of $70 to the ton. The average assays taken in the mine show $39.45 per ton. The Royal Canadian group is being developed by three tunnels. No. 1 is in 278 feet, No. 2 is 370 feet and No. 3 is 234 feet. The assays have averaged $16.63 per ton. Sixty-one sacks of ore sent to London returned $58 per ton. It is proposed to erect a 20-stamp mill, for which water power and millsite have already been secured.

Victoria *Times*: A piece of rock which had been lying on a dust-covered shelf in the cabin of Mr. Hawkins, on Cormorant island, was recently assayed, returning $6300 gold and $150 in silver per ton. The rock was taken from a quartz vein discovered by an Indian on Hyde creek, a feeder of the Nimpkish river, six miles from its source. An effort will be made to find the ledge. Prospectors in that vicinity are getting good results from Kingcombe inlet. Assays of ore sent from there went as high as $65 per ton. Numbers of prospectors are searching the shores of the inlets and bays of the northern coast—the majority in small sloops—for ore.

SOUTH AFRICA.

Johannesburg *Mining Journal*: There are rumors in circulation concerning the deep-level farms Diepkloof, Misgund and Olifants Vlei. Inquiry from some of the peggers points to the possibility of mining at a depth of 8000 feet. Another is a belief in the occurrence of reverse faulting on the southern edge of the Klipriviersberg mass of amygdaloidal diabase. A number of claim holders on the northern portion of Olifants Vlei have been offered £1000 apiece for claims.

The Robinson Central Deep shaft is now over 300 feet deep and is estimated to cut the reef between 1500 and 1600 feet. Many of the buildings are nearly ready. Construction work is progressing in every direction, and much of the machinery not immediately essential—such as the battery and the crusher-engine—is arriving. The 100 heads of stamps of this company are to be erected at the Crown Deep battery.

At the Village Deep the west shaft is down over 530 feet and the east shaft 770 feet. The tramline connecting them is complete.

At the Geldenhuis estate operations for the month of April show: Working cost per ton, 17s 4.933d; value of yield per ton, 46s 9.584d; profit per ton, 29s 4.651d; profit for month, £27,308 8s 11d; mine development for month, 103 feet. The Mill—120 stamps ran 29 days 12 hours, crushing 18,585 tons; tons crushed per stamp per twenty-four hours, 5.25; bullion yield, 7199.93 ounces; bullion yield per ton, 7.74 dwts. Cyanide Works—Tons of tailings treated, 12,223; bullion yield, 3191.15 ounces; bullion yield per ton, 5.22 dwts.; working cost per ton treated, 2s 8.97d; concentrates treated, 1400 tons; bullion yield, 930 ounces; bullion yield per ton, 13.28 dwts.; working cost per ton treated, 3s 3.47d per ton. Slimes Plant—Tons treated (current), 4343; bullion yield, 540.81 ounces; bullion yield per ton, 2.49 dwts.; working cost per ton treated, 2s 8.97d; tons accumulated slimes treated, 867 tons; bullion yield, 107.95 ounces; bullion yield per ton, 2.49 dwts.; working cost per ton treated, 3s 4.43d. The small tonnage of accumulated slimes treated is due to bad settling and alterations being made to the treatment vats.

The Crown Reef report for April shows: Number of feet driven, sunk and risen, exclusive of stopes, 461 feet; quartz mined, 21,296 tons; quartz on hand at surface, April 30th, 2980 tons. Mill—Number of days (twenty-four hours) working 120 stamps, 29 2 24; tons crushed, 17,041; tons crushed per stamp per twenty-four hours, 4.874; yield in smelted gold, 8131 ozs. 11 dwts.; equivalent in fine gold, 6985.948 ozs.; yield per ton in fine gold, 8.198 dwts. Cyanide Works—Tons sands and concentrates treated, 14,162; yield in smelted gold, 4244 ozs. 6 dwts.; equivalent in fine gold, 3460.771 ozs.; yield per ton in fine gold, 4.887 dwts; working cost per ton, 3s 2.460d. Slimes Works.—Tons slimes treated, 2689; yield in smelted gold, 491 ozs. 2 dwts.; equivalent in fine gold, 400.258 ozs.; yield per ton in fine gold, 2.977 dwts.; working cost per ton, 3s 5.644d. Profit for month, £25,284 4s 7d. Total working cost, 23s 7.739d per ton; value of yield, 53s 3.833d per ton. Profit per ton, 29s 8.094d. During the month 4113 tons of waste rock were sorted out from the tonnage mined. The waste rock was of an average assay value of 27 grs. per ton. The rock sorted was equivalent to 19.313% of the total rock handled.

Industrial Notes.

—Serious drouth continues in New Mexico and southern Colorado.

—Vladivostock, Siberia, is being superseded in business importance by Port Arthur.

—The San Francisco Mechanics' Institute fair opens Sept. 2nd and closes Oct. 7th, '99.

—Fresno, Cal., papers claim a higher temperature for that town than that of Yuma, Ariz.

—C. Garff of Ogden, Utah, has a municipal lighting contract and will put in an electric light plant.

—A circuit from Mercur to Tintic is the latest plan of the Provo, Utah, Power Transmission Co.

—Tramps are begging for dimes in San Francisco. California farmers are unable to get men to harvest the crops.

—Los Angeles, Cal., has abandoned its project of municipal light distributing, but proposes to issue $2,000,000 water bonds.

—Chicago capitalists are declared to be behind a proposition looking to the formation of a trust in redwood lumber on the Pacific coast.

—Last week the Port Angeles, Wash., Eastern Railway disbursed $12,000 to employes. Work on the line is expected to be completed to Olympia in 1900.

—Electrical engineers and motormen are going from San Francisco to Seoul, Corea, to work on the electrical railroad now being completed in the capital of the hermit kingdom.

—The Alaska-Treadwell Co., Douglas Island, Alaska, will carry its own coal in steel barges and is also credited with intention to establish a home foundry and there make shoes and dies.

—Chicago men are figuring on buying the Colton, Cal., cement works. It has a monthly capacity of 8000 bbls., the wholesale price of which is $2.85 per bbl; eighty men are employed.

—During May the Canadian Pacific Railway sold 39,400 acres of land for $124,800. The Canadian Northwest Land Co.'s sales for the same month aggregated 52,000 acres for $28,500.

—The regular summer rumors of Vanderbilt railroad extension to the Pacific coast now take the form of alleged consolidation of the Chicago & Northwestern, the Union Pacific and the Oregon Short Line.

—Beginning to-day West Australia admits duty free, asbestos covering composition for steam pipes, boilers, etc., gauges and screens for mining and machinery, and appliances for lubricating and cleaning wire ropes.

—A new $400,000 mill is to be erected at Colorado City, Colo. Evidently the trust is not going to have everything its own way in Colorado and Utah. The Pacific coast smelters never were in the trust combine and never will be.

—The Canadian Pacific and Great Northern Railways are reported to have agreed that a joint line shall be laid to connect the Boundary Creek mining camps of British Columbia with the Republic district in Washington, to be thirty-five miles long.

—The South African Customs Union has announced that ad valorem imports which have already paid duty at one port of entry, shall on production of a certificate to that effect from the customs house, be admitted into other parts of the union without the payment of further duty.

—The Yuba Electric Power Co. will put in a plant near Dobbins' Ranch, on the Yuba, Cal., river, capable of developing 15,000 H. P. There is a fall of 700 feet; there will be six 30-inch pipe lines, the lower sections of which will be 2 inches thick and weigh 400 pounds per foot. A. M. Hunt and Wynn Meredith have charge of the installation.

—To-day the Santa Fe system acquires the San Francisco & San Joaquin Valley Railroad, the officers in charge of the traffic of that line will be as follows: E. Chambers, general freight agent, Los Angeles, Cal.; J. J. Byrne, general passenger agent, Los Angeles, Cal.; John Moss, assistant general freight and passenger agent, San Francisco, Cal.

—Public ownership of the San Francisco water is again advocated. Several embryo propositions are made: The El Dorado, Cal., Water & Deep Gravel M. Co. offer a system delivering 35,000,000 gallons of water a day, 100 feet above the city base for $11,950,000 and 450 feet above the city base for $13,490,000—exclusive of the distributing system. A. W. Von Schmidt offers to put in 30,000,000 gallons a day from Lake Tahoe for $13,000,000.

—The News Bureau says: A "Boston concern is shipping insulators to the Pacific coast on a contract—$15,000 for porcelain insulators alone—to carry several miles of wire on one of the largest electric power transmission schemes in the West. These insulators have a heavy groove to carry a No. 2 aluminum wire which will be wholly used in this electric power transmission." In this power transmission scheme there are seventy-five miles of double pole lines, each pole line carrying six aluminum wires.

Recently Declared Mining Dividends.

Tamarack Copper Co., Michigan, $240,000; June 28.

Calumet & Hecla, Michigan, $2,000,000; June 28.

Sacramento M. Co., $5000; July 1. Total $100,000.

Mammoth M. Co., Utah, 20 cents, $80,000; July 1.

Pennsylvania M. Co., Nevada county, Cal., No. 30, 20 cents, $10,300; payable July 3.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JUNE 20, 1899.

627,451.—BICYCLE SADDLE—M. A. Baker, Los Angeles, Cal.
627,454.—PUMP VALVE—C. S. Booth, Oakland, Cal.
627,321.—BOILER—M. P. Boss, S. F.
627,007.—GAS CUT OFF—V. E. Campbell, Winnemucca, Nev.
622,250.—ARTESIAN WELLS—F. Cavallaro, San Jose, Cal.
627,251.—ARTESIAN WELLS—F. Cavallaro, San Jose, Cal.
627,101.—SEWING MACHINE TREADLE—H. Cramer, Sonora, Cal.
627,254.—FRUIT GRADER — Cunningham & Barngrover, San Jose, Cal.
627,257.—ELEVATOR CAGE ESCAPE — Haines & Creighton, S. F.
627,258.—ROPES AND CABLES—A. S. Hallidie, S. F.
627,131.—HOPPLE — T. J. F. Miller, Portland, Or.
627,270.—RAISIN SEEDER—J. B. Rice, Fresno, Cal.
627,209.—BEET PLOW — W. F. Schmidt, Salinas, Cal.
627,276.—BOX—D. F. Sherman, Newcastle, Cal.
627,277.—LETTER FILE—W. Shyvers, Santa Barbara, Cal.
627,270.—PENCIL SHARPENER—J. D. Stassart, Portland, Or.
627,214.—APPLYING INSECTICIDES — J. B. Steele, National City, Cal.
627,360.—TALLYING APPARATUS — C. L. Sturges, Escondido, Cal.
627,282.—MOTOR CARRIAGE—W. E. Twichell, St. Helena, Cal.
627,284.—HAND TRUCK—L. B. Walker, Glendora, Cal.
627,166.—TEA BALL—Caroline A. White, Redondo, Cal.
627,373.—HEATER—C. T. Wise, Sr., New Bridge, Or.
627,315.—PUMP—W. C. Woodward, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SAFETY SUCTION VALVE FOR PUMPS.—Charles S. Booth, Oakland, Cal., assignor to the Oakland Iron Works. No. 627,454. Dated June 20, 1899. This invention is designed to provide a safety device by which the inlet valves are prevented from dropping into the pump by reason of its disconnection or breakage of parts, and is applicable to that class of pumps designed to compress air, ammonia, or other gases, or like fluids. It consists of inlet valves having shanks with surrounding collars intermediate of their length; cages centrally bored to guide the valve shanks or stems having annular chambers corresponding with the chambers, these chambers having a length sufficient to admit the movement of the valve in opening and closing. The cages are formed in two segments so that they may be separated by the introduction of the valves and bolts by which they are held after the valves are in place. Suitable springs serve to close the valves after they have been opened by the inwash of air.

ATTACHMENT FOR ARTESIAN WELLS.—Francisco Cavallaro, San Jose, Cal.; one-third assigned to Ignazio Trapani of San Francisco, Cal. Nos. 627,250 and 627,251. Dated June 20, 1899. This invention relates to attachments which are especially designed for use in connection with artesian wells, and particularly that class of wells in which the water does not rise to the surface. It enables the operator to attach devices by which air under pressure can be applied to raise the water within the suction pipe to a point near to or above the top of the well. Interior to the casing of the well is a concentric suction tube with an expansible gasket surrounding it. An annular chamber loosely fits within the well casing and the gasket is mounted upon its upper side. A conical expander fits within the gasket, and mechanism is applied by which to move the expander to force it into the gasket or withdraw it therefrom. By means of air pipes extending down exterior to the suction pipe and through the closure into the space below, the pressure of air can be applied which will cause the water to rise by displacement until it stands high enough to be reached by the pump.

MACHINE FOR MANUFACTURING ROPES OR CABLES.—A. S. Hallidie, San Francisco, Cal. No. 627,258. Dated June 20, 1899. This invention relates to the manufacture of wire ropes and cables and a means for shaping the individual strands so as to present a larger surface to the parts with which they come in contact such as the grooves of pulleys or wheels over which they may pass. It consists principally in the employment of compressing rolls by which the individual strands are compressed and flattened into shape in spiral lines and then laid up to form the rope without being themselves twisted. The spiral formation coinciding with the lay or twist of the rope, the drawing-off mechanism controls the operation of the compressing mechanism so that they act in unison, and when the cable or rope thus made is laid up, the outer surface will have a curvature dependent upon the diameter of the rope with a very small proportion of interstices such as are found where the ordinarily formed strands are laid up into the rope without other treatment.

ELEVATOR CAGE ESCAPE.—Byron W. Haines and Wm. D. Creighton, San Francisco, Cal. No. 627,257. Dated June 20, 1899. This invention relates to an elevator attachment which is designed to facilitate the escape of inmates therefrom if the elevator should become fixed at points intermediate between the regular floors or landings and in other positions of peril. It consists of a ladder section pivoted with relation to a track which is formed in the upper part of the cage and so disposed that in case of necessity the trap may be closed and the ladder connection availably placed so that the inmates of the cage can escape at the top, and in connection with this may be a supplemental ladder from the top of the cage which will reach to a point of escape from the elevator shaft or well. These devices are so arranged that under ordinary conditions the cage will be normal without any special appearance of these attachments, but they can be instantly brought into use when needed.

MOTOR CARRIAGE DRIVING MECHANISM.—Walter E. Twichell, St. Helena, Cal. No. 627,282. Dated June 20, 1899. This invention comprises an improved means for transmitting power from the main driving shaft of a motor to a supplemental or countershaft and a means for transmitting the power from this countershaft directly to the wheels to be driven, also mechanism for reversing the apparatus when required. The vehicle wheels are turnable upon their axles, the rear axle being fixed and the front one having short spindles hinged to it so that the front wheels are turnable with these spindles. Power is transmitted from the countershaft to sprocket wheels on the forward wheel hubs and the chains pass over grooved direction pulleys so that the direction of the chains from the countershaft sprockets to the wheel shafts is changed without the interposition of any other mechanism or wheels. A peculiar arrangement of sinuous curved yokes is employed with connecting pitmen reciprocated thereby and arms diverging from the pitmen ends, links with which the opposite ends connect, and rack bars connected with and reciprocated by the arms. The movement of the rack bars is transmitted through pinions and a pawl and ratchet mechanism which converts the reciprocating into a continuous rotary motion.

FRUIT GRADER.—L. Cunningham and H. M. Barngrover, Los Gatos, Cal. No. 627,254. Dated June 20, 1899. This invention is designed for grading of fruits of various kinds, such as prune plums and other drying fruits. It consists in the combination of a plurality of separable frames disposed in line and provided with chutes. Independent shaking screens are fixed above the frames with openings of progressively increasing size. Hangers serve to pivotally suspend the outer ends of the frames, and means are constructed by which the connection between the frames and the power devices can be made or broken. Suitable grading compartments are arranged with relation to the screens so that the various sizes can be collected therein, and means by which the operation of grading can be readily inspected. The screen frames can be detachably connected with each other without disturbing the action of either and by means of turnable direction boards the product can be directed to any desired point.

Personal.

W. LAWSON is now analytical chemist for the Alameda, Cal., Sugar Co.

W. F. JOHNS, Supt. Plumas-Eureka mine, has returned from Reno, Nev.

CAPT. WM. JAMES left Johannesburg, S. A., June 5th, en route to Redding, Cal.

A. M. HUNT is now Gen. Mgr. Independent Light & Power Co. of San Francisco, Cal.

COL. D. H. JACKSON has begun development work at the Darling mine, Placerville, Cal.

FRANK JONES is now Supt. of the reduction works of the Anaconda Copper Co., Montana.

GEO. D. BURTON of the Electric Mining & Reduction Co. is still experimenting at Oreana, Nev.

W. N. HESKEY of San Francisco, Cal., is in Arizona making examinations of Copper Mountain property.

DR. MOLENGRAAF, State Geologist of the South African Republic, is investigating glacial phenomena in that region.

A. G. CAMPBELL, owner of the St. George and other mines at Vanderbilt, Cal., has gone to Deer Lodge, Mont., where he has mining interests.

LIEUT. G. W. MCELROY comes from Washington, D. C., to the Union Iron Works, San Francisco, in connection with the construction of the battleship Wisconsin.

CONGRESSMAN DEVRIES of Stockton, Cal., is part owner in the Lucas mine, Mokelumne Hill, Cal., in which has recently developed some remarkably rich ore.

GEORGE MITCHELL, formerly smelter Supt. at the United Verde mines at Jerome, Ariz., is interested in a company which is erecting a smelting plant eighteen miles south of Bisbee, Ariz.

MESSRS. TAYLOR AND O'DONNELL of Denver, Colo., are looking for nickel in Nevada and Utah, and are locally credited with intention to enlist Boston capital in the development of the Lovelock, Nev., nickel deposit.

CAPTAIN PETER H. SCOTT and Mr. Conrad Hansen, both well-known master millwrights, left Denver for the sunny South last week, to superintend the erection of plants built by the Edward P. Allis Co. Captain Scott has gone to Dahlonega, Georgia, to put up a 120-stamp mill, and Mr. Hansen to southeastern North Carolina, to put up a similar plant, though of a smaller size.

RICHARD A. PARKER of San Francisco, Cal., consulting engineer of the United States M. Co., and Bert Holden, the managing director, are at Bingham in conference with Supt. J. W. Neill regarding equipment. A large power plant in the Jordan canal is contemplated. It has now been determined that reduction works will not be built this season. Mr. Parker is expected to return to San Francisco, Cal., next week.

Commercial Paragraphs.

CHAS. H. FIELD of the Risdon Iron Works, San Francisco, Cal., will build a 10-stamp mill at the Maiden's Dream mine, Granite district, Baker Co., Oregon.

GEO. O. BRADLEY, Salt Lake manager for the Gates Iron Works, reports the shipment of crushers, rolls and jigs to Anaconda, Mont., for the concentration mill of the Anaconda Copper Co. The old steam stamps are to be taken out of one section of the mill and supplanted by the machinery named.

THE Pacific Tank Co., 35 Beale St., S. F., and 348 E. 2nd St., Los Angeles, Cal., recently furnished a twenty-five-ton cyanide plant to the Warrington mine, Havilah, Cal., a plant of fifty tons capacity to the Jackson & Lake View M. Co. at Lundy, Mono Co., Cal., and a ten-ton plant to Six-Mile canyon, Virginia City, Nev., the latter operated by Messrs. Moore & Fisher.

AMONG recent shipments made by the Union Gas Engine Co. was one Union hoist and one stationary engine to Progresso M. Co., Mexico; two 15 H. P. Union hoists to M. P. Boss, City of Mexico; one 40 H. P. hoist to the Tenabo M. & M. Co., Nevada; one 10 H. P. hoist to the Sidewinder mine, San Bernardino Co., Cal. There will soon be shipped by this company to the Yellow Aster M. & M. Co. at Randsburg, Cal., a 130 H. P. Union hoist, believed to be the highest power gas engine plant for mine hoisting so far put out.

THE Westinghouse Type "C" electric motor has an established reputation as a standard machine. It is employed extensively in the U. S. government navy and in naval yards. This motor is absolutely sparkless, and can be safely operated in powder mills, grain elevators, paper mills, and wherever inflammable and explosive material is present. At the Indian Head proving grounds, in the U. S. government factories for smokeless powder, Westinghouse Type "C" motors are largely used. The Silver Spring Bleaching & Dyeing Co., Providence, R. I., have recently ordered several Westinghouse Type "C" motors as an addition to their plant, which already uses a considerable number. The Kia Ora Gold Dredging Co., Oroville, Cal., have ordered a number of Westinghouse motors; one of 50 H. P. will operate the dredge, others will be used for centrifugal pumps and rocking the washing trays. The electric current to operate the motors at Oroville is transmitted from Butte creek, twenty-three miles distant. Water turbines generate the current. The Bedrock Dredging Co., Boise, Idaho, are extensive users of Westinghouse electric apparatus for generating current and carrying on the dredging and gold washing processes. The Marigold Dredging Co. are also largely using Westinghouse electric apparatus for dredging; a 75 H. P. and a 50 H. P. Westinghouse Type "C" motor are employed to operate dredges and pumps. A further order for several motors for the Marigold Dredging Co. has recently been received by the Westinghouse Electric Manufacturing Co. Nikola Tesla has ordered a small Westinghouse Type "C" motor to be dispatched to Denver, Colo., for use in his laboratory. The Telluride Power Transmission Co., Colo., have ordered a 75 H. P. Westinghouse Type "C" motor to operate part of their plant. The Continental Tobacco Co. have added to recent large orders for electric apparatus five more Type "C" motors for their Danville, Va., factory. The American Tobacco Co. have contracted for four more motors to be dispatched to their Durham, N. C., factory.

Catalogues Received.

"Roasting, Smelting, Refining Methods, Machinery," 4th edition Catalogue No. 3; Fraser & Chalmers, Chicago and London; 168 pages, heavy plate paper, artistic halftones and line engravings, descriptive matter; everything up to date; worth reading. Send to Fraser & Chalmers, Fulton and Union Sts., Chicago, Ill., and get a copy.

School of Engineering Graduates.

The Van der Naillen School of Engineering, 933 Market St., San Francisco, recently completed its thirty-fifth year. Following is a list of the graduates:

Mining—A. R. Gurrey, Shasta, Cal.; E. Matteson, Nevada, Cal.; F. J. Kellett, St. Helena, Cal.; H. G. Moss, Orange, Cal.; J. L. Stubbs, Lower Lake, Cal.; J. F. Williamson, Seattle, Wash.; I. L. Ryder, San Jose, Cal.; R. P. Turney, Campbell, Cal.; C. P. Christensen, Randsburg, Cal.; O. R. Lawson, Gold Hill, Nev.

Surveying — H. Koenig, Oakland, Cal.; George B. Kearney, Santa Barbara, Cal.; Paul E. Lepoids, Los Angeles, Cal.; E. H. Bushong, George Colbert, San Francisco, Cal.; E. W. Nolan, Callahans, Cal.; G. Winter, Yolo, Cal.; F. W. Saunders, Empire City, Or.; E. B. Olney, Chico, Cal.; C. S. Winter, Berkeley, Cal.; J. R. Myers, Honolulu, H. I.; C. A. Call, Fort Bragg, Cal.; Carl G. Bell, Colfax, Cal.

Assaying—W. S. Lauritzen, San Jose, Cal.; H. T. Ledgley, Siskiyou, Cal.; A. M. Thompson, E. L. Howard, A. Campbell, S. T. Parks, H. F. Lyon, E. M. McNaught, San Francisco, Cal; W. H. Irwin, Oakland, Cal.; A. C Turney, Virginia City, Nevada; M. Jones, Paris, Ill.; G. M. Rolph, Grass Valley, Cal.; J. M. Landis, Callahans, Cal.; R. C. Hicks, Corning, Cal.; W. S. Pascoe, Mexico; George J. Probasco, Baker City, Or.; G. H. Call, Fort Bragg, Cal.; C. B. Volkert, Dyea, Alaska; H. G. Siskron, Lower California.

Electrical Department—D. M. McVean, A. Gilmartin, C. E. Severeen, G. H. Wadman, Charles R. Forge, J. G. Finley, W. J. Shea, J. F. Galvin, M. Johnson, William Mullan, Martin Johnson, C. Brown, P. J. Concannon, A. E. Daniels, A. Thomas, C. M. McIntyre, C. F. Nelson, F. A. Brenner, P. Norton, J. Peacock, J. Fuite, F. J. Walsh, Roy H. Craig, Enos Woods, C. P. Hunt, San Francisco, Cal.; William Bulson, Stockton, Cal.; R. E. McDanil, Cresswell, Or.; E. H. Lowe, Knights Ferry, Cal.; E. M. Cleary, Oakland, Cal.; R. H. Cunningham, Arizona; A. McLukie, New Zealand; H. W. Riblet, Sonoma, Cal.; H. C. Hasselbach, Biggs, Cal.; G. B. Von Boden, San Jose, Cal.; H. Bernhardt, Oakland, Cal.; P. Donelon, Sacramento, Cal.; J. Ponnott, Seattle, Wash.; J. W. Reay, New Zealand.

Recent Mining Incorporations.

Cherokee Gravel & G. M. Co., Soulsbyville; capital stock, $300,000; W. K. Fletcher, J. H. West, J. W. White, E. G. Dell, H. K. Fletcher.

Illinois & Josephine M. Co., San Francisco; capital stock, $20,000; B. F. Gilman, J. J. Scrivner, H. A. Griffin, D. B. Richards, J. C. Sullivan.

Placer Oak South Extension M. Co., San Francisco; capital stock, $100,000; W. E. Mies, R. S. Moore, D. J. Staples, J. Mason, J. J. Mason.

Herron Hill Oil Co., Los Angeles, Cal.; capital stock, $50,000; R. H. Herron, G. C. Orr, F. S. Herron, R. E. Sinell, C. H. Farland.

Mercy Oil Co., Fresno, Cal.; capital stock, $200,000; J. J. Mercy, G. Herminghous, G. L. Hoxie, S. McKay, M. K. Harris.

San Joaquin Oil Co., Hanford, Cal.; capital stock, $50,000; W. J. Garner, G. E. Garner, J. E. Garner, R. F. Covert, J. G. Covert.

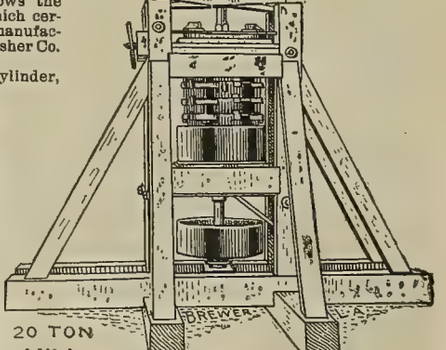
Eureka Oil & Gas Co., Hanford, Cal.; capital stock $500,000; subscribed $100; A. R. Orr, D. S. Fish, W. W. Parlin, M. J. Newport, W. B. Charles.

Southern California Marble & Lime Co., San Bernardino, Cal.; capital stock $100,000; subscribed $500; B. H. de Jersey, F. W. Armitage, H. Ingram, H. O. Maynard, H. F. Bradburn.

Stanley Oil Co., Fresno, Cal.; capital stock $200,000; subscribed $110,000; E. R. Snyder, E. Vogelsang, E. Kreyenhagen, H. Kreyenhagen, H. L. Chadwick, J. M. Hendrickson, R. H. Herron.

Mystic Rotary Quartz Crusher.

The accompanying illustration shows the Mystic rotary quartz crusher, for which certain advantages are claimed by the manufacturers, the Mystic Rotary Quartz Crusher Co. of Los Angeles, Cal.



This crusher consists of a cone and cylinder, mounted on a ball-bearing, and revolved by a square shaft passing through the cone loosely. The power is applied directly to this shaft. The outside and inside of the mill revolve in the same direction, at the same rate of speed, thereby avoiding any friction or grinding—reducing the wear to a minimum. The cone is slidably mounted on the shaft, which permits the wearing parts to approach each other, thereby taking up the wear automatically.

There are a number of these mills at present in operation at various points in California, both for cyanide and for dry concentrating; also wet for amalgamating. All are giving great satisfaction, and the owners are speaking in the highest terms of them and could not be induced to adopt any other system of crushing.

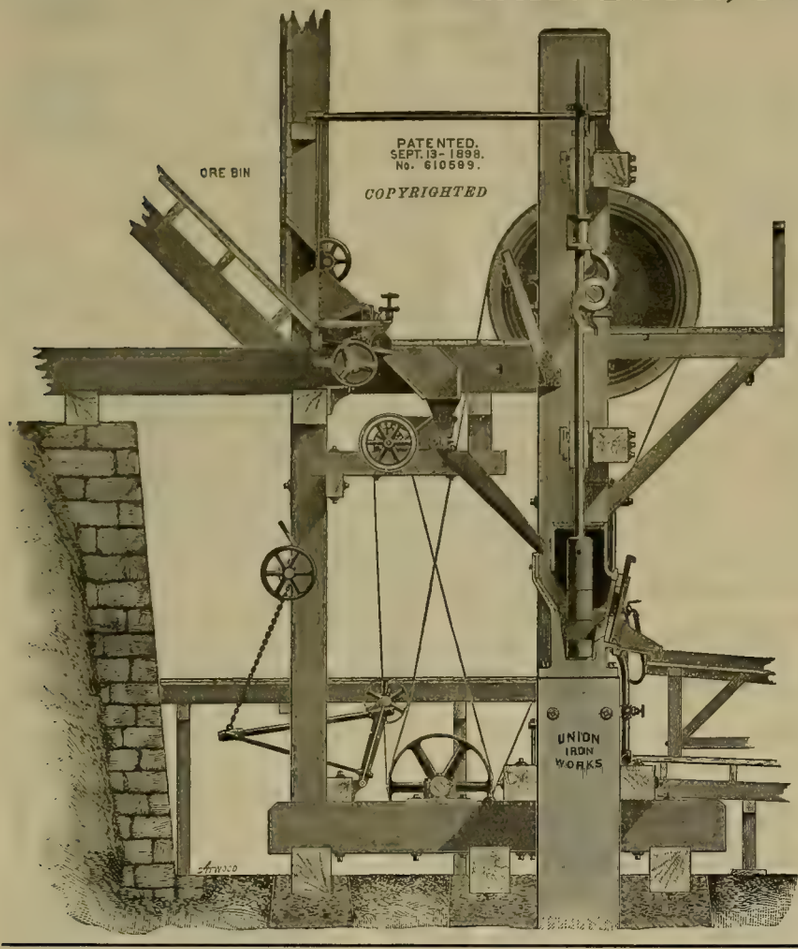
The ore can be fed to the mills right from the mine, without going through a rock breaker, the mill taking the rock as large as an ordinary rock breaker and reducing it to pulp instantly.

The cost of crushing ore by this mill is much less than of any other known process, the wear and tear being nominal. The pulp is taken from the mill by an elevator and carried to screens on top, the coarser material returning to the mill, and the pulp going by gravity to whatever point desired. The mill is well balanced, runs smoothly and makes no noise. It can be framed in with the ore bin, if desired. Pick points or broken drills will not injure the mill in any way. Mills can be framed together in battery form to any desired capacity; 100 tons, or 50-stamp size, occupying a space of about 4x20 feet. The actual horse-power consumed will not exceed one-half H. P. per ton of ore crushed, and when a number of mills are running the power required will be much less.

This mill is put up in Los Angeles, Cal., by the Mystic Rotary Quartz Crusher Co., with main office at No. 132 South Broadway. *

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.



THIS ILLUSTRATION

Shows our patent Improved Stamp Mill, with Secondary Crusher, which increases the capacity of the ordinary stamp battery from 25 to 30 per cent.

We respectfully invite the attention of those contemplating the erection of new mills to this practical improvement.

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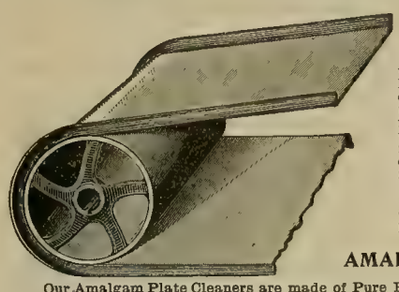
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The name WESTINGHOUSE is a guarantee.

15C-2

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PATENTED.



This illustration shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

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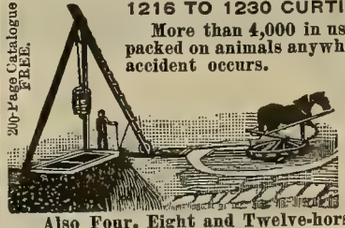
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Tenders for Placer Mining Claims on Dominion Creek, in the Yukon Territory.

SEALED Tenders addressed to the undersigned and marked on the envelope "Tender for a placer mining claim" will be received at this Department until noon on Friday, the 1st day of September, 1899, for placer claims and fractions of claims on Dominion Creek reserved for the Crown.

The following is a list of the numbers of the claims and fractions and the approximate frontage thereof as surveyed by Messrs. James Gibson and R. W. Cautley, Dominion Land Surveyors:

BELOW UPPER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	5	10A	33.3
2A	19	15A	42.25
3A	30.5	31A	43
8A	87.4		

ABOVE LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	13	6A	35.00
2A	59.1	10A	143.25
4A	1.25		

BELOW LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	56.3	75A	24.7
2A	7.2	76	500.
2C	20.3	77	449.8
8A	34.00	16C	033.3
9A	39.25	18A	164.7
11A	98.4	78A	3.6
13A	68.5	80	451.3
16A	40.25	81A	15.3
20	202.1	83	500.
21A	71.9	84	500.
22	500.	85	500.
22A	60.7	86	500.
23	446.2	87	500.
25	500.	87A	500.
26	120.66	87B	387.9
31	350.5	89A	35.1
33	500.	91	500.
34	500.	92	500.
36	500.	93	500.
37	500.	94	500.
38	352.	95	500.
68A	94.7	96	500.
69A	40.5	97	500.
70A	72.6	98	500.
71	414.4	99	500.
73A	12.3	100	478.7
74A	21.3	101	119.

Each tender shall specify the numbers of the claims and fractions tendered for and also the amount of bonus offered for each claim and fraction. The tender may be for the whole lot or any one or more of the claims and fractions and must be accompanied by an accepted cheque in favour of the Minister of the Interior for ten per cent of the amount offered, one-half of the remainder to be paid into the Department of the Interior at Ottawa or to the Commissioner of the Yukon Territory at Dawson within thirty days from notice of acceptance of tender, and the balance within six months thereafter with interest at the rate of four per cent per annum.

Entries for the claims and fractions will be granted in accordance with the Placer Mining Regulations on acceptance of tender.

The entries will be subject to the usual royalty and the provisions of the said Regulations from time to time in force, except as to representation provided for by Clause 39, which will not be required.

The claims and fractional claims for which entries may be granted shall not include any portion of the beach or hill claims for which entry may have been previously granted.

The highest or any tender not necessarily accepted. JOHN R. HALL, Secretary.

Department of the Interior,
Ottawa, 27th May, 1899.

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FOR SALE.

One 150 H. P. Corliss engine, in first-class condition; size of cylinder, 18x48. Also, one Buckley condenser. For particulars, apply O. N. B. & C., P. O. Box 2096, San Francisco.

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Address PUMP, Box A, care of this office.

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For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

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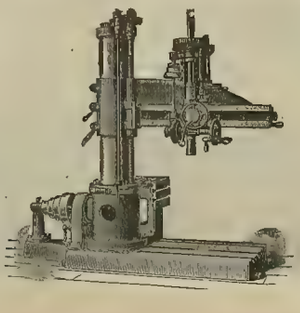
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For May and June, 1899, only, **Drs. Mansfield & Porterfield,** at **338 Market St., San Francisco** are issuing certificates entitling the holder to free examination for **Rupture** or **Piles,** with treatment till cured, for $30. Send for one.



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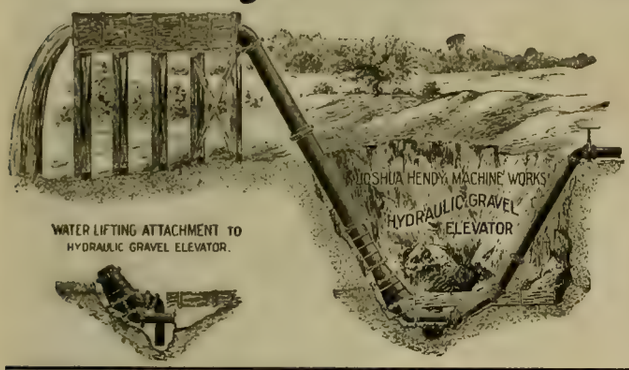


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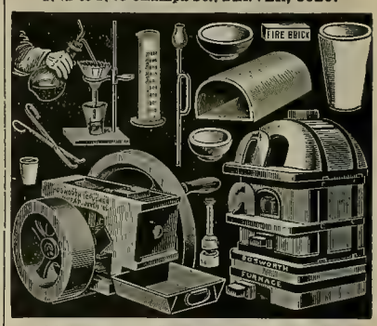
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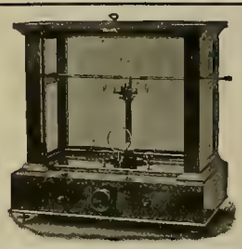

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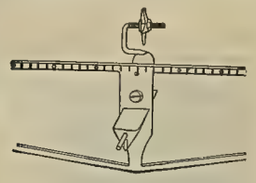
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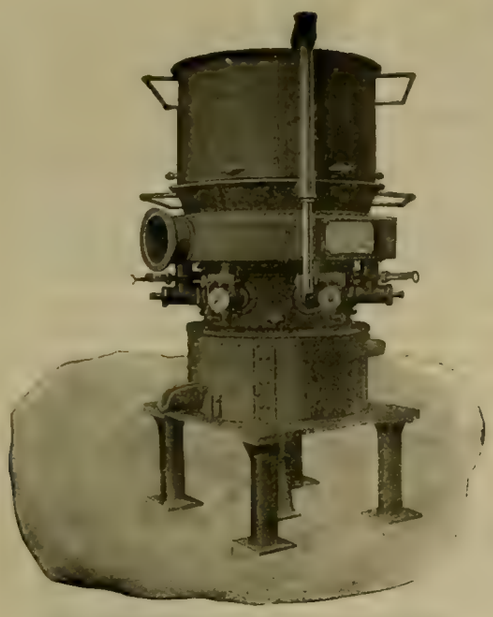
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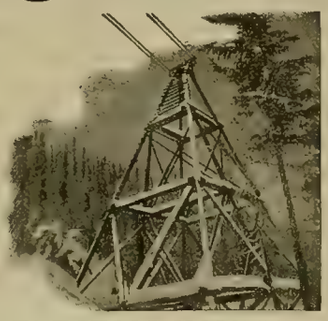
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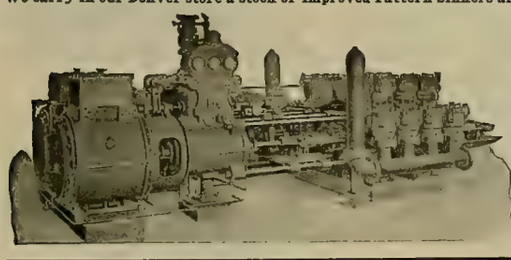
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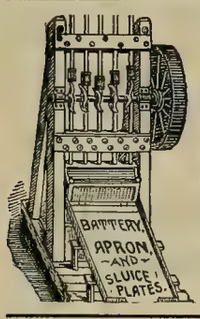
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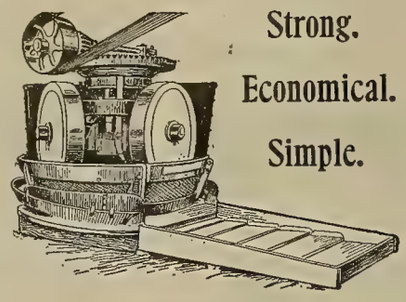
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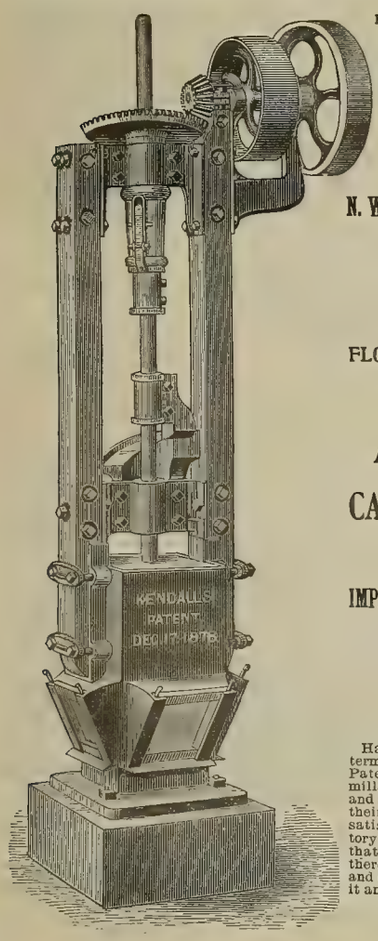
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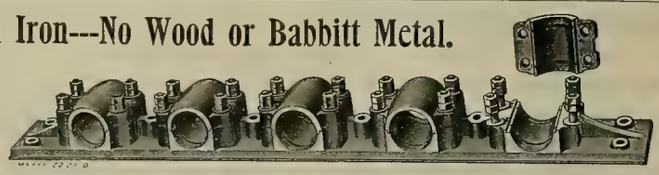
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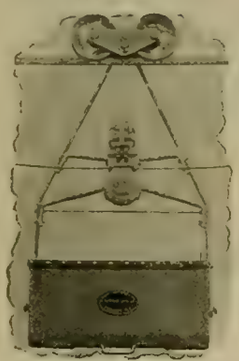
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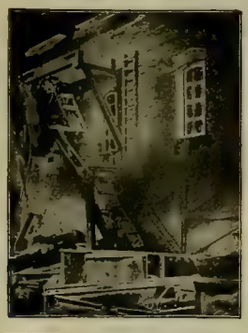
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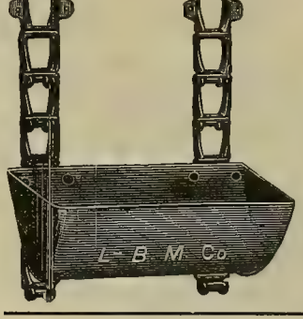
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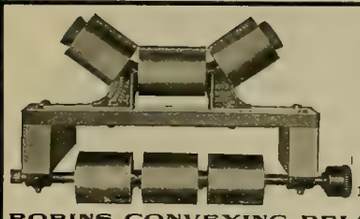


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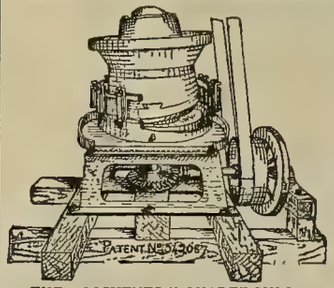
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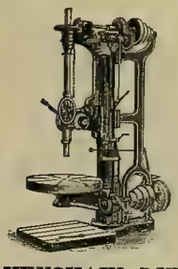
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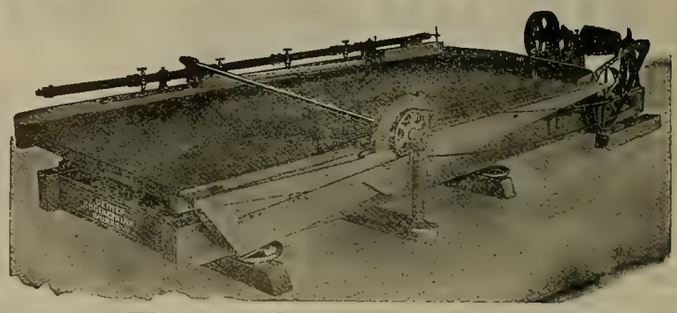
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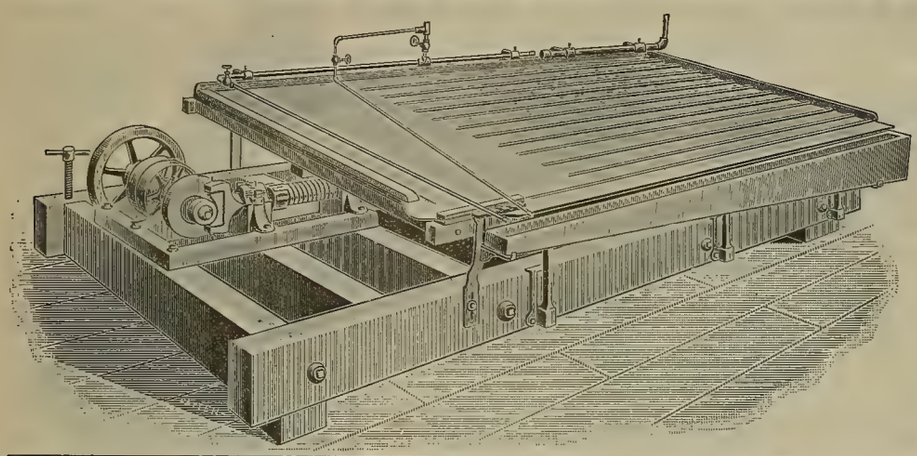
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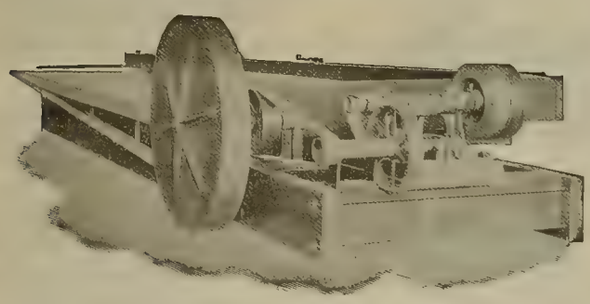
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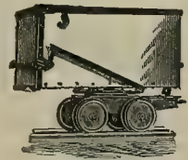
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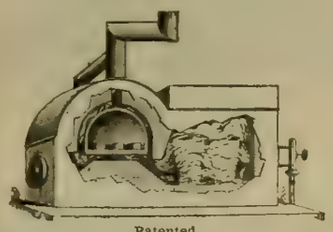

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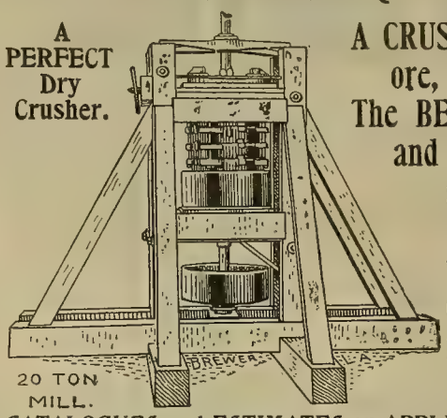
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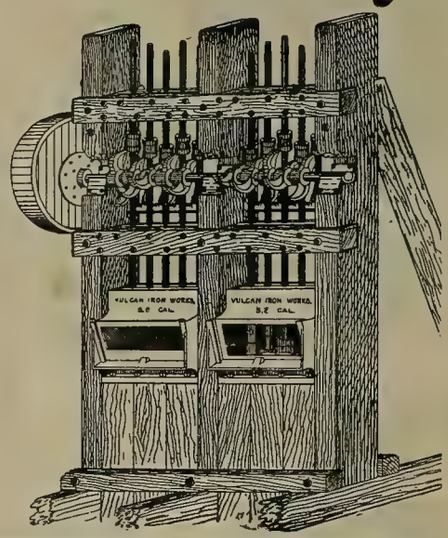
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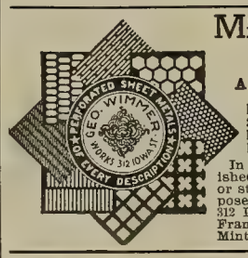
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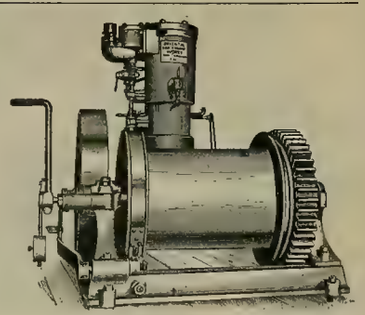


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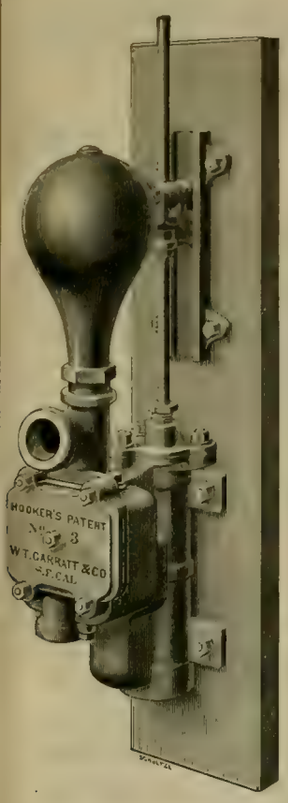
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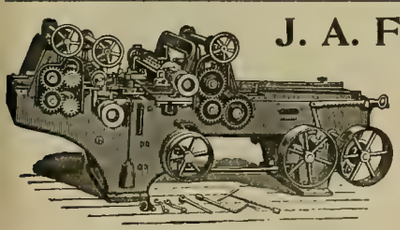
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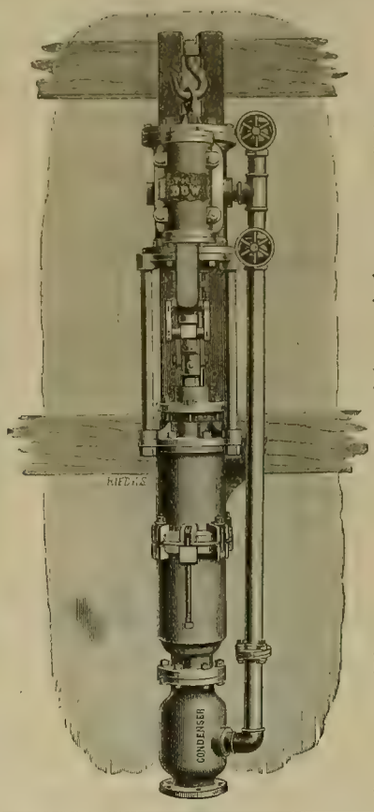
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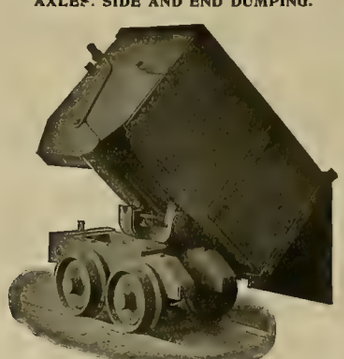
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Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

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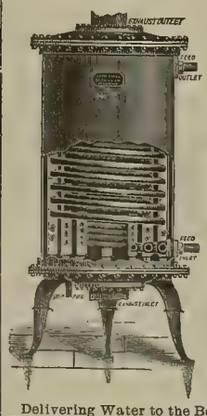
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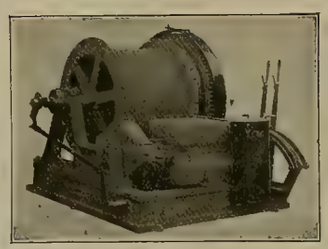
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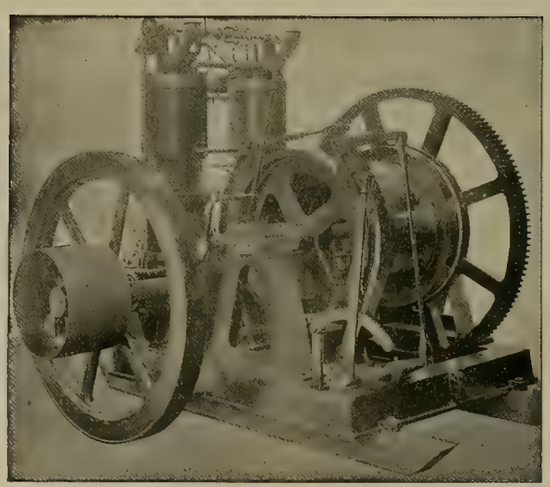
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Will Raise More Ore at Less Cost Than Any Other.

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Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

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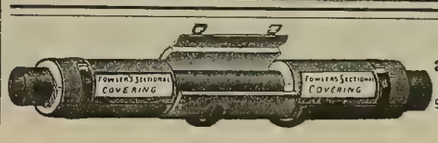
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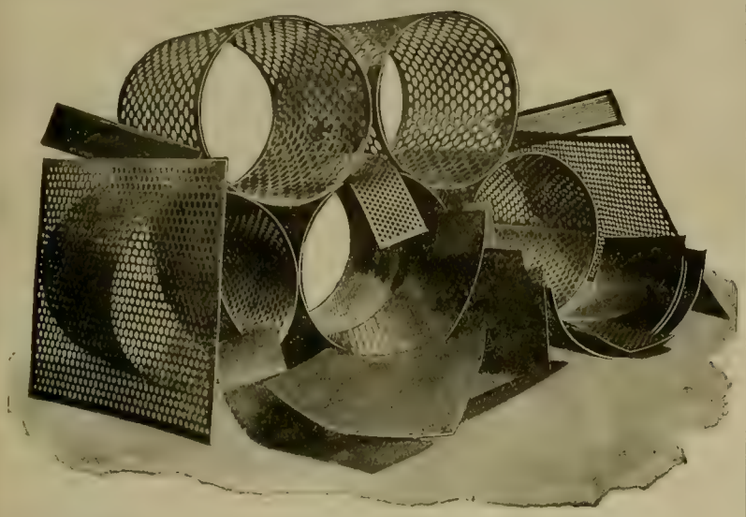
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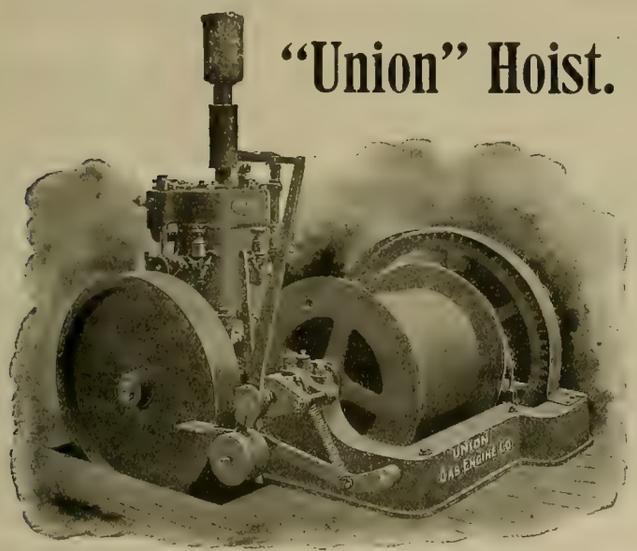
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The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
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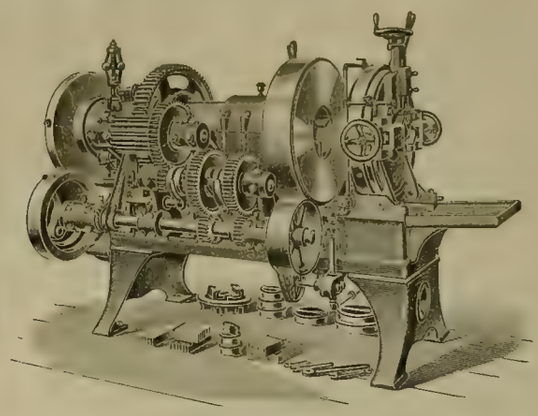
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Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the LEVIATHAN BELT has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

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SEND FOR PRICE LISTS AND SAMPLE.

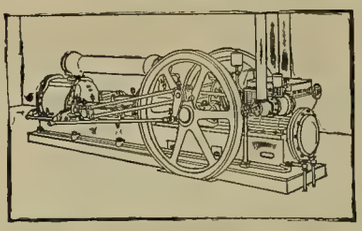


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THE NORWALK Air and Gas Compressor.

In use in every State in the Union, Central and South America, Great Britain, etc. Also by the U. S. Army and Navy.

ESPECIALLY DESIGNED FOR DRIVING
Rock Drills,
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Cyanide Potassium—99% pure, Beckton brand.
Chloride Lime—Best English in casks and drums.
Zinc Dust—Best heavy quality.
Potash Permanganate—Pure quality.
AND ALL OTHER CHEMICALS.

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Telephone: No. 1130 South.

Market Reports.

SAN FRANCISCO, June 29, 1899.

SILVER.—London, 27 11-16d; New York, 60¼; San Francisco, 60¼; Mexican Dollars, 49¾@50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports very quiet, $4.45 bid, $4.50 asked; brokers' price, $4.25.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6.50c.

COPPER.—New York reports Lake unchanged at $18 bid, $18.50 asked; brokers' price, $18.25; mill copper plates, 23½c.

Copper remains dull and practically unchanged. The demand for the metal is maintained regardless of high price, and the output has not shown large increase.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Quiet, $26 bid, $26.15 asked; pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43; export, $39.00 @39.50; carload lots, special rates.

The steady and profitable production of quicksilver in California has had the effect of reopening several old mines which for years had been idle. The universal interest in metal m ning has also stimulated the industry somewhat, no doubt.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¾c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$7 50	Cumberland	$9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1½c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16¼c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ....)	11¾	12½
6 and 9 thread (½ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (3, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 29, 1899.

9:30 A. M. SESSION.

200 Andes	20c	700 Ophir	$1 15
850 Best & Belcher	56c	200 Overman	17c
350 Caledonia	75c	400 Potosi	50c
100 Challenge	34c	200 Savage	29c
1150 Con. Cal. & Va.	$2 10	500 Sierra Nevada	75c
200 Gould & Curry	31c	500 Silver Hill	02c
1000 H. & N.	40c	250 Union Con	44c
600 Mexican	63c	100 Utah	15c

2:30 P. M. SESSION.

500 Mexican	58c	100 Confidence	1 00
300 Best & Belcher	51c	100 Sierra Nevada	69c
700 Con. Cal. & Va.	$1 95	100 Utah	16c
600 Potosi	48c	100 Union Con	39c
100 Crown Point	28c	150 Occidental	26c
300 Yellow Jacket	36c	100 Andes	17c

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EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbre. Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. **U. S. A.**

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

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MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

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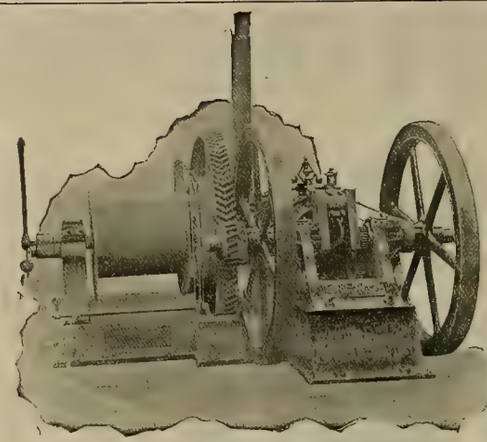
WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

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FRESNO, June 25, 1898.

Hercules Gas Engine Works.
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DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

Hercules Gas Engine Works,

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Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

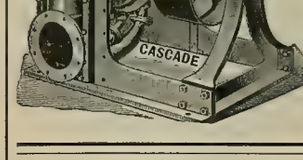
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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.



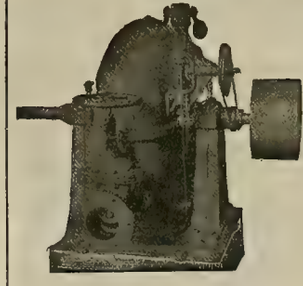
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Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of June, 1899, an assessment (No. 10) of one-half of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels' Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 29th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—No. 1209 Claus Spreckels' Building, San Francisco, Cal.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of May, 1899, an assessment (No. 12) of two cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3d day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of May, 1899, an assessment (No. 2) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post street, San Francisco, California.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, roome 15 and 17, San Francisco, California.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

S. M. SMITH. E. LUNDQUIST, Mgr.

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DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 19) levied on the 13th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
G. A. Hinckelbein	2	10	50
G. A. Hinckelbein, Trustee	9	1000	50 00
G. A. Hinckelbein, Trustee	10	1000	50 00
G. A. Hinckelbein, Trustee	11	1000	50 00
G. A. Hinckelbein, Trustee	12	1000	50 00
G. A. Hinckelbein, Trustee	13	80	4 00
G. A. Hinckelbein, Trustee	20	500	25 00
G. A. Hinckelbein, Trustee	21	500	25 00
G. A. Hinckelbein, Trustee	22	500	25 00
G. A. Hinckelbein, Trustee	23	500	25 00
G. A. Hinckelbein, Trustee	24	200	10 00
G. A. Hinckelbein, Trustee	25	200	10 00
G. A. Hinckelbein, Trustee	26	200	10 00
G. A. Hinckelbein, Trustee	27	200	10 00
G. A. Hinckelbein, Trustee	28	200	10 00
G. A. Hinckelbein, Trustee	29	200	10 00
G. A. Hinckelbein, Trustee	30	200	10 00
G. A. Hinckelbein, Trustee	31	200	10 00
G. A. Hinckelbein, Trustee	32	200	10 00
G. A. Hinckelbein, Trustee	33	200	10 00
G. A. Hinckelbein, Trustee	44	100	5 00
G. A. Hinckelbein, Trustee	45	100	5 00
G. A. Hinckelbein, Trustee	46	100	5 00
G. A. Hinckelbein, Trustee	47	100	5 00
G. A. Hinckelbein, Trustee	48	100	5 00
G. A. Hinckelbein, Trustee	49	100	5 00
G. A. Hinckelbein, Trustee	50	100	5 00
G. A. Hinckelbein, Trustee	51	100	5 00
G. A. Hinckelbein, Trustee	52	100	5 00
P. A. Wagner	53	10	50
P. A. Wagner, Trustee	90	980	49 00
P. A. Wagner, Trustee	91	1000	50 00
P. A. Wagner, Trustee	92	1000	50 00
P. A. Wagner, Trustee	93	1000	50 00
F. X. La Bonte	75	10	50
Louis Audet	89	10	50

And in accordance with law, and an order from the Board of Directors, made on the 13th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento street, San Francisco, California, on MONDAY, the 3rd day of July, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary

Office—217 Sacramento street, San Francisco, California.

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DELINQUENT SALE NOTICE.

THE MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 18) levied on the 9th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Marcus Schwab	64	500	$50 00
Kath. Emhoff	93	500	50 00
H. Helfrich	166	250	25 00
Mrs. M. L. Faas	209	5	50
Peter Krucke)	232	62½	6 25
J. Beck	243	62½	6 25
Andreas Kruckel	251	100	10 00
John C. Lutz	265	200	20 00
Chas. Riegert	274	100	10 00
H. Helfrich	295	100	10 00
John C. Lutz	318	100	10 00
John C. Lutz	335	100	10 00
Adam Miller	350	125	12 50
C. Kayser	360	25	2 50

And in accordance with law, and an order from the Board of Directors, made on the 9th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office, 217 Twelfth St., San Francisco, California, on MONDAY, the 10th day of July, 1899, at the hour of 5 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth St., San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 16th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
A. E. Sayre	627	4,400	$440 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of May, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 218 Jackson St., San Francisco, California, on TUESDAY, the 11th day of July, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

Office—218 Jackson St., San Francisco, California.

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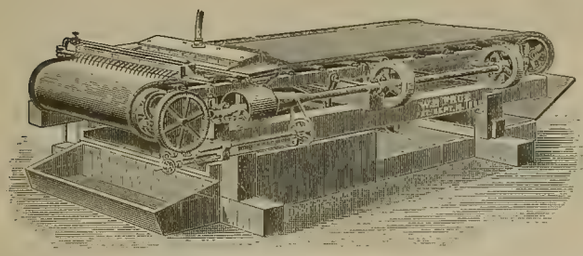
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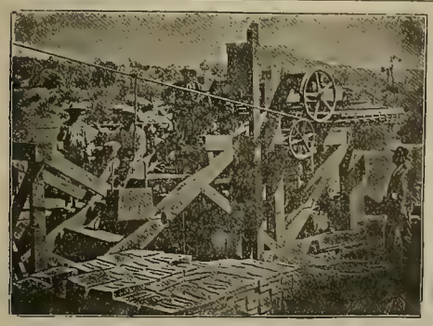
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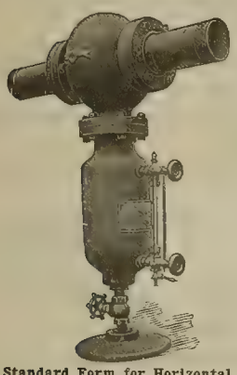
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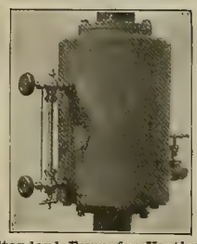
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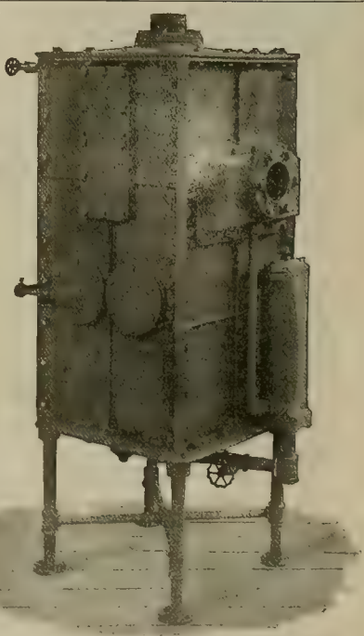
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For every 10° added to the temperature of the feed water by exhaust steam nearly 1% of fuel is saved. Therefore, every steam plant equipped with a feed water heater which delivers the feed water at a temperature of from 208° to 212°, the average temperature of the water supply being 60° F., is saving its owner **over 13%** of the fuel which would be required were no heater used.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2035.—VOLUME LXXIX. Number 2. SAN FRANCISCO, SATURDAY, JULY 8, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Dredger and Its Field.

The application of dredging machines to the recovery of gold has had a history like every other branch of the mining industry. At first it was wholly an experiment. Many changes had to be made in the mechanism of the dredgers themselves and also in the methods of operating them. The past five years has seen the most rapid strides made in building and manipulation of machines of this class, and now they are pronounced a success, though without doubt further experience with them will suggest improvements. Like every other mechanical device the construction of any one machine may be found unsuited to all conditions which may be met. The ideal field for the dredger is undoubtedly that in which the gravel is uniformly small—that is, containing no large, unwieldy boulders—and where the bedrock is soft enough to be taken up to a depth of several inches by the scoops. This condition cannot always be obtained, but ground where boulders are large and bedrock uneven and hard is being successfully dredged, looking at it from the mechanical standpoint, and, as it pays, may be considered a complete success. The illustrations on this page are those of successful dredging operations in Butte Co., Cal., and will be found more fully described on page 36.



DREDGER WORKING INTERIOR GROUND, STACKING TAILINGS 26 FEET HIGH, BUTTE CO., CAL. (See page 36.)

The success of dredging operations has opened a new and broad field for work in gold regions all over the world, from New Zealand to Siberia. The conditions obtaining in California deep gravel deposits suited to dredging are usually of a class favorable to such operations.

The large volume of deposits of this character are found occupying a position at what was at one time the lower portion of the gold-bearing streams at and near where they emptied into the great lake which then occupied the interior valley of California. The gravels lie in broad sheets, often intercalated with rhyolite tuff which was contemporaneously deposited. Some of this latter is hard and firm and affords a good bedrock for the dredger, being smooth on its upper surface, but underneath may be found a second layer of gold-bearing gravel which in some instances it may be found profitable to blast away.



GOLD DREDGING ON INTERIOR GROUND, BANK 16 FEET ABOVE WATER, BUTTE CO., CAL. (See page 36.)

THERE are in California thirty-seven counties which may be considered as mineral-producing, as the larger part of their output, with two or three exceptions, is of mineral character. These minerals include gold, silver, copper, coal, lime, asphaltum, cement, petroleum, asbestos, manganese ore, chromic iron, magnesite, quicksilver, borax, building stone, etc., besides which several counties are large producers of mineral waters of world-wide fame. There are many counties producing excellent marble, building stone, paving blocks and other mineral products of lesser value. A great number of natural resources of the State are almost wholly undeveloped. The most prominent are metal mining and the production of asphaltum and petroleum.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Dredger Working Interior Ground, Stacking Tailings 26 Feet High, Butte Co., Cal.; Gold Dredging on Interior Ground, Bank 16 Feet Above Water, Butte Co., Cal., 33. "Kia Ora" Dredging Gold in an Orchard; The Marigold Dredge and Some of its Tailings, 36. Latest Mining and Metallurgical Patents, 38.

EDITORIAL.—The Dredger and Its Field, 33. Rate and Amount of Wages; Enthusiasm in Mine Promotion; Business of the Patent Office Continues; Miscellaneous, 34.

MINING SUMMARY.—From the Various Counties of California, Nevada and Other Pacific Coast States and Territories, 41-42-43.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 54.

MISCELLANEOUS.—Concentrates, 35. Gold Dredging in California; Scarcity of Water on the Rand, 36. Diamond and Gold Mining in Minas Geraes, Brazil; Some Experiences of a Working Miner, 37. Latest Mining and Metallurgical Patents, 38. Scale of Wages in Colorado; Unlawful to Use Metal Pumping Bar; Industrial Notes; Personal; Obituary; Recent California Dividends, 39. Notes on the Alleged Shortage in Cyanide Bullion; Something About Explosives; The Source of Gold; Water Power Electric Plants in the United States, 40. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents, 41. Commercial Paragraphs; Recent Mining Incorporations, 54.

It is claimed that the recent advance in wages and the price of materials has increased the cost of producing copper at the larger Lake Superior mines 1 cent per pound, and at the smaller mines somewhat more.

Recent advances in the prices of iron and steel led to the belief that a reduction in the exports of these products would follow, but they continue to form the most important item of exports of manufactures.

The character of prospecting done the past winter and spring in the Buffalo Hump region is evidenced by the statement that location notices posted in February last when the snow was deep are now 15 to 30 feet above the ground.

Although much fault is found with those who work out the richest portions of a mineral deposit, leaving the low grade material for those who come later, there are few who would not do likewise if placed in similar position.

So rapid have been the recent strides in metallurgy that even those who have been engaged in the business in one place for a quarter of a century or more begin to wonder if they really have yet learned it all. In view of recent discoveries and improvement, it is evident there is still much to learn.

So voluminous have become the Transactions of the American Institute of Mining Engineers that it has been considered advisable by the council to issue certain of the papers submitted in the form of bulletins. These will be issued separately and will not be found in the annual volume of Transactions. Bulletin No. 1, entitled "The Progress of Metallurgy in 1898," has just been issued, and constitutes a catalogue of contributions to that science during the year 1898.

In a hope of finding a solution of the problem how to supply the needed quantity of water to the mines of the Witwatersrand, the South African *Mining Journal* reports that the larger mining concerns on the Rand have united for the purpose of putting in a pumping plant, pipe line reservoirs, etc. It is stated that the engines will be required to lift 9,000,000 gallons of water daily to a height of 900 feet. This undertaking, if carried out, will dwarf all similar undertakings elsewhere. Doubtless pumps can be made which will be able to accomplish this, though the lifting of such a large volume of water (6250 gallons per minute) to so great a height must be looked upon as an experiment. Doubtless the mechanical difficulties can be overcome if they can find this large supply of water.

Rate and Amount of Wages.

Seldom has there been more glaring an instance of unwise interference than in the recent legislation regarding the mining industry of Colorado and British Columbia. Till recently matters in that State and Province were mutually harmonious. Labor and capital were getting on profitably and pleasantly together; there was promise of a prosperous year. Deep snow, winter losses, enforced cessation of work and all the irksomeness of isolation were being forgotten and all looked forward to a busy season.

Upsetting all this came the act of some well-meaning but mistaken legislators, who had decreed that the whole was not equal to the sum of its parts. The present result is industrial chaos, great loss, inevitable setback, to be followed by gradual adjustment, getting together again and a patching up of the break, till some bull in the legislative china shop, who soils all he omits to shiver, breaks loose with some labor bill next year or the year after.

So much has appeared concerning the relations of labor and capital that anything said here new would not be good, and anything good would not be new; but it is believed that a few trite but possibly forgotten facts regarding wages in general, their rate, amount, etc., are in order.

Underlying all these surface indications lies the law of wages, the relation between their rate and amount. Whether in Colorado or China, British Columbia or Buenos Ayres, this basic principle is at the bottom of all unrest and protest—the efficiency of labor and what it produces, whether it be in mining, manufacturing, or any other industry where men work for so much or so little per day. Whenever the popular fallacy that "the rate of wages depends on supply and demand" is discarded for the right understanding of the relation between the rate and amount of wages, the question will be in a fair way to a solution mutually satisfactory. Legislators in Colorado, British Columbia and elsewhere dimly see and faintly realize this, and at best they can try to approach a fair solution of the problem; but such efforts usually produce strife, turmoil and dissatisfaction.

By "amount of wages" is meant the aggregate cost of labor in the production of anything; the rate is the daily, weekly or monthly individual stipend.

There are three things in every cost account—material, labor, and attendant expense. Whenever any one of the three increases, the other two must diminish, or the price of the product must increase, or else the production must cease and the industry die. When any one of the three decreases, either or both of the other two can increase, or the product be decreased in price.

This may be combated, but a little reflection will show that it is axiomatic. Whatever the product, it has confessedly an international value—that is, there can continue no great difference in price of anything anywhere, the tendency of modern markets being to immediately equalize values, the inevitable corollary being that dearer material or excessive expense entails low wages, and cheap material or small expense admits of high wages, the cost of labor being about the same everywhere, regardless of the rate, the rate of wages being determined by what the wages produce; for "the rate of wages" is what wages earn, the amount of wages determining the difference between skilled and unskilled labor. Whenever the assumption that "demand and supply" set the price of labor is sufficiently understood to be discarded; whenever the distinction between the rate and amount of wages can be clearly and popularly seen, there will be a long step taken toward permanent and mutually profitable agreement between "labor and capital." When that time does come there will be no such attempts at regulation as the recent well-meant but abortive efforts in the British Columbia and Colorado Legislatures.

"But how about Utah?" may be asked. The apparent acquiescence in the laws there makes no difference in the ultimate adjustment of the question in Utah or elsewhere. The point is that no legislative enactment, anywhere, ever did or ever will settle a question that is not susceptible of such effort at settlement. The number of hours there shall be in a day's work; the price that shall be paid for that labor per hour or per day, are two things that cannot be defined nor decided by any State or Federal law; those things are always set and settled outside of courts and law-making rooms. The natural law of the business world is the only tribunal that has jurisdiction in the case.

So far as Colorado is concerned, it is locally claimed that the legislative enactment that went into effect June 15th but precipitated the trouble, and that had there been no eight-hour law there would have been a strike by the smelter employes for shorter hours.

Enthusiasm in Mine Promotion.

It is not always easy to understand why so many men whose characters are above reproach, whose reputation for honesty and truthfulness are never questioned, who have the fullest confidence of their fellow-men, when they engage in mining transactions, cast aside all regard for fact and make the most extravagant statements concerning the property that they are trying to promote. It has become almost axiomatic that many men, truthful and upright in all other walks of life, will lie when talking mines, and evidently it is expected. So commonplace has this practice become that it would seem that one must greatly exaggerate his statements in order to have a small portion of the truth believed. In part, this habit or custom is no doubt due to lack of knowledge of mining affairs. When describing a vein it is so easy to give its greatest width as its average width, and the greatest value as the average value, that it is done almost inadvertently, and is not looked upon in the light of misrepresentation of facts, and is not done with a purpose to deceive, for there are facts to substantiate a portion of the statements at least. Then, too, mining is such an enticing business. Who may say that a vein 4 feet wide at the surface or near it may not widen to 40 feet in depth, and who shall dare to assert that when $100-rock has been found in the small vein, that the whole 40 feet will not be $100-ore in depth, and the promoter gives the mine the benefit of the doubt, worked up by his own enthusiasm, and states it first as a probability. After repeating the statement a few times to various people and revolving the great possibilities of the mine in his mind, the probability becomes fact and is stated as such without hesitancy, and he becomes indignant at even a suggestion that he is dealing in fancies. It must be enthusiasm that causes upright business men to misstate facts concerning the development of value in a mine; and as this peculiar human weakness is recognized, every one seems willing to overlook the unguarded statements and to make due allowance for enthusiasm, and if, after such deduction is made, there still remains a fair sort of business proposition, some mining engineer who is unenthusiastic is usually employed to ascertain the truth.

About five years ago an employe of the U. S. Patent Office at Washington, D. C., a member of the Board of Examiners, is reported to have resigned because of his expressed conviction that everything that could be patented had been brought out; that there must necessarily be a dearth of work for him, and, hence, he had best embrace a proffered opportunity to get another position. But as the years go on the business of the patent office continues increasing, and there never was so much incentive for inventive brains as at present. Pres. Glidden, of the Erie Telephone System, Cleveland, O., was authentically reported this week to have asserted that he would "pay $1,000,000 for a telephone repeater or quadruplex that could be used in connection with the telephone and would produce, telephonically speaking, the same results that the telegraph repeater and quadruplex do to-day in the workings of the telegraph." Time was when the inventor was laughed at, and, after making suitable excuses for his existence and apologizing for his presumption in remaining above ground, he had to demonstrate the absolute fitness of his device before he could get foothold or recognition. Now, he is encouraged by munificent offers to exercise his inventive faculties, and, in case of success, is sure of financial reward. It is a long cry from the era when inventors were shunned and maltreated to that now opening.

If the present large weekly output of iron ore now being made by the Lake Superior iron mines can be maintained throughout the season, it is thought the 16,000,000 tons wanted will be shipped.

Concentrates.

A SQUARE INCH equals 1.2732 circular inches.

A CIRCULAR INCH is one whose diameter is 1 inch and whose area is .7854 square inch.

ALL mine cars should be provided with false bottoms which may be replaced when worn.

THE highest price recorded for quicksilver since 1850 was £26 per flask, in London in 1874.

IT is reported that the Carnegie Steel Works at Pittsburg, Pa., are making $100,000 daily.

A HEAT UNIT is the amount of heat required to raise one pound of water 1° F. (from 39° to 40°).

STEAM WAGONS are to be employed in hauling borax from Rose Valley, Or., to Winnemucca, Nev.

A 1-FOOT POUND is the expression used to indicate a pressure of one pound exerted through a space of 1 foot.

THE use of crude petroleum on the roads of Santa Barbara Co., Cal., in place of water, has proved a success.

EQUAL parts of shellac and calophony dissolved in six parts strong spirits of wine make a recommended cement for tin.

THE De Beers diamond mine in South Africa is at present the largest dividend payer in the world. It paid in '98 $7,687,300.

THE cost of treating tailings by the cyanide process at the Standard Con. works at Bodie, Cal., is stated to be $1.20 per ton.

WHILE casually walking along a ground sluice of a mine in Sierra county, Cal., recently, a visitor picked up a nugget of gold weighing a pound.

ALL lengthy tunnels should have air shafts connecting with the surface, which will also afford a means of escape for men in case of accident.

SATIN SPAR is a variety of gypsum, calcium sulphate. It usually occurs in vein-like sheets, the fibers being perpendicular to the sides of the deposit.

WHERE buckets are dumped in proximity to shafts the shafts should be provided with a door to prevent the falling of rock or other objects into the shaft.

THE Colorado river is overflowing its banks near the mouth of New river, and a large volume of water is said to be flowing toward Salton basin as in 1892.

WHEN possible a sufficient space should be cut around a shaft for the passage of workmen on each level, that they may not be obliged to step across a compartment of the shaft.

THE best way to guard against being flooded in a mine is by supplying abundant pumping or bailing capacity. Bailing is ineffectual where large quantities of water are met with in sinking.

CALAVERITE is a telluride of gold and silver, containing tellurium 56%, gold 40.92% and silver 3.08%. It was first found in the Stanislaus mine on Carson hill, in Calaveras county, Cal., and was named by F. A. Genth.

A GEYSER in the Yellowstone National Park, Wyoming, which was supposed to be extinct has shown sudden activity and is reported to be spouting a column of water, mud and steam to a height of 250 to 300 feet.

"HYPO" as applied to metallurgy refers to the hypo-sulphite of soda and is used in dissolving the chloride of silver from its ores in mills. The silver is recovered by precipitating it from the solution by adding either calcium or sodium sulphide.

THE melting point of sulphur is 448° Centigrade; of gold, 1045°; of palladium, 1500°; of platinum, 1775°; of gray foundry iron (carbon 3.50, silicon 1.75, phosphorus 0.50), 1220°; of soft steel (carbon 0.10), 1475°; of hard steel (carbon 0.40), 1455°.

"HEMATITE OF IRON" is not a good expression. Hematite is the name given to a red iron oxide ore, and limonite to the brown oxide of iron. Hematite is sesquioxide of iron and is also known as micaceous iron, specular iron, etc. Limonite is a hydrous sesquioxide of iron and is essentially the same as hematite, but containing about 14% water.

IN large stopes which have not been filled when the overhanging ground shows signs of settling it is almost useless to attempt to hold it by introducing timber. If the stope can be quickly filled with waste run in from above, that is the proper thing to do. This condition of affairs may be avoided by filling as the ore is extracted, leaving no large excavation unsupported.

WHERE two veins converge in depth, the vein upon which the prior location was made shall have all of the vein below the point of convergence. This is the law, but if each vein preserves its identity by reason of some physical characteristic, and only separated by a clay seam, it would be a matter for the courts to determine whether or not such distinction shall be made.

EARTHQUAKES are of much more frequent occurrence than is generally supposed. The surface of the earth is almost constantly quivering from dynamic causes, as is shown by the seismograph. It is only the more pronounced shocks that are noticeable without the aid of some instrument such as that referred to. Danger from earthquakes is much greater if the vibration be prolonged than a short but more violent disturbance.

WHEREVER a shaft is sunk on a vein or in an ore body a sufficient pillar of ore should be left about the shaft to render it secure. The amount which should be left must be determined by the character of the ground, and stoping should not be permitted within the limit determined to be the proper one, until the mine or shaft is to be abandoned. In a large vein it is inadvisable to remove any portion of the vein lying between the shaft and walls.

THE first recorded labor "strike" was 2211 years ago—312 B. C.—when flute players under Numa Pompilius of Rome refused to play at a banquet unless paid what they thought their services were worth. Later on, Nero posed as a friend of labor and stirred up considerable strife. Trajan, 52 A. D., opposed the labor unions and had a stormy reign. There is nothing modern about strikes any more than about trusts. Most of what is said regarding both was said 2000 years ago. In all ages has existed a natural desire to get all possible for sale of any article, whether labor, skill or manufactured product.

GOLD is reported to have been found in the Cargo Muchacho mountains in San Diego Co., Cal., as early as 1575. The gold was obtained from dry gravel, or rather detritus, for none of it was washed gravel, by vanning in the wind. At a place called Pipendero it is asserted that in more recent years $15,000 was picked up on the surface of the ground. This place was about two miles from the Cargo Muchacho mine, in an easterly direction.

IT is understood that W. S. Stratton was the original discoverer of the Independence, Colo., mine, though it was not the first discovery in the Cripple Creek district. Prior to his Cripple Creek discovery, Mr. Stratton was a carpenter, prospector and miner. He was never a doctor so far as known. It is claimed that the Independence was sold at $11,000,000, Mr. Stratton receiving part cash and the balance in stock in the corporation taking over the property. No positive statement can be here made as to the value or amount of ore blocked out in reserve in the mine.

PICACHO BUTTE, thirty miles above Fort Yuma, in San Diego county, Cal., is a remnant of a large field of andesite which at one time covered the country in that neighborhood for miles to a depth of several hundred feet. The beds dip at about 15° and are composed of andesite in various conditions—in part tuff. The erosion has been enormous, for this huge remnant of a great flow of lava is isolated from all others, though considerable masses may be seen on the surrounding lower levels. The underlying formation, which is schistose, with many dykes, large and small, is gold-bearing.

CHROMITE is the ore from which all the salts of chromium are obtained. The ore occurs in several counties of California, and as far as known always in serpentine. It is found in irregular deposits and not in defined veins. It is used chiefly in the manufacture of chromate and bi-chromate of potash, employed in dyeing and in the manufacture of pigments. Much of the chrome ore in California is mixed to such an extent with inclusions of serpentine as to be too low grade for shipment. Often ore of this kind disintegrates on exposure, when it may be cleaned by simply sluicing and concentrating on riffles, employing only sufficient water and fall to carry away the lighter material.

WHEN figuring upon the installation of an electric transmission plant it is necessary to allow a sufficient factor for losses. An authority gives these as follows: Loss due to friction of steam engine, 10%; loss in belting between engine and generator, 3%. If direct-connected this is not figured. Loss in generator, 10%; loss in line, 10% to 20%, depending on its length, size of conductor, care in building line, etc.; loss in motors, 12% to 20%, depending on kind used and service required of them; 5% to 10% loss between the brake horse power and the machine to be driven, to which may be added the loss in the machine itself due to friction. Total efficiency, 50%, taking the lowest estimate of loss. Where the distance is short and great care is taken in making the installation the actual efficiency may be increased to 60%.

THE KNOX system of blasting is used in quarrying, and consists in drilling two holes in the rock, these holes being located along the line where a fracture is desired, and about 1 foot apart. Black powder is charged in the hole, the quantity being determined by the size of the rock mass it is desired to split off. Tamping is put in the hole, but is not placed in contact with the powder, a space of 1 to 3 feet being left between tamping and powder. This affords an air cushion, which in part receives the shock of the blast. The holes are fired and recharged several times, the result being the fracture of the rock along a line corresponding to the direction of the holes. In a thoroughly homogeneous rock this system works well, and much larger masses can be detached than by feather and plug work, and much more inexpensively.

SPODUMENE, which occurs at the Etta mine in Custer county, South Dakota, is being mined and shipped to New York. Spodumene is an aluminous silicate containing 8.4% lithia, for which mineral it is chiefly valuable. It occurs in crystals of immense size, one more than 50 feet in length and 5 feet or more in diameter having been cut in the workings. There are scores of smaller crystals in the Etta mine, having a diameter of 1 foot or more and a length of 12 to 20 feet. When originally discovered the Etta mine was worked for mica, later for tin, and now for lithia. The entire hill upon which the work has been done is an aggregate of coarse crystals of various minerals. Beside those above mentioned are white and vitreous quartz, albite feldspar, rose quartz, black tourmaline, apatite, columbite, titanite, wolframite and other more rare minerals, including emerald nickel and, it is stated, also stannite.

ALTHOUGH hydraulic mining flourished for many years in California when the business was carried on without interference or restraint, the statistics of operations during that time do not indicate any consistency in the quantity of water employed in these numerous operations as related to the amount of gravel moved per inch of water. The quantity of gravel moved, as stated by A. J. Bowie, varied all the way from 1 to 24 yards per inch. The principal factors in determining the amount of gravel moved with a given volume of water are the pressure or head employed and the character of the gravel. A light, loose gravel will wash down much more rapidly than a tight gravel containing much clay, with the same quantity of water under a given head. Another very important consideration in the duty of the miner's inch is the grade of the sluices. A heavy grade will carry away material much more rapidly than a light grade. Often there is a great difference in the amount of gravel moved in one mine under similar conditions owing to the difference in the gravel.

THERE is a current theory that dynamite, or any nitro powder, "exerts its explosive force downward, and not upward, as is the case with black powder." This is an error. Dynamite, and all compounds of nitro-glycerine, as well as black powder, exerts its explosive force equally in all directions, and will produce the greatest apparent results where there is the least resistance. When confined in a hole drilled in a rock, it fractures the rock along the lines of least resistance, and its downward force is often evidenced by the pulverized condition of the rock surrounding the bottom of the hole. If the explosive force was exerted wholly downward, that portion of the rock surrounding the upper portion of the drill hole would not be shattered and torn away. Black powder, being much less powerful than nitro powder, shows little of its explosive effect downward, simply because it lacks the necessary force. When an explosion occurs at a magazine or a powder works, a large hole in the ground generally marks the site of the disaster, and this is pointed to as indicating that the explosive force of nitro powder is downward. The fact is, as previously stated, the force is equal in all directions, but the upward force is expended upon the frail building and upon the air, and its effect in that direction cannot be measured.

THE principal source of borax in California at present is the deposits of calcium borate found in vein-like masses in the Calico district and in the beds of dry lakes in Inyo county. The colemanite vein in the Calico hills is really a dry-lake deposit, precipitated in Tertiary time, subsequently overlain by several hundred feet of later formation and then tilted and folded by dynamic forces to its present position and then exposed by erosion. The beds containing calcium borate in the mud shales near the village of Calico and in the borax fields northwest of Daggett are the result of the crystallization of calcium borate from solution saturating mud deposits which were nearly contemporaneous with the formation of the colemanite deposit. Borax has a slightly sweet taste and gives an alkaline reaction. It is soluble in twelve times its weight of cold or two times its weight of hot water. It melts at low temperature in its water of crystallization. If the heat be raised it fuses to a transparent liquid which, on cooling, becomes a vitreous mass known as borax glass.

VOLTS, in electricity, indicate the electric pressure or electro-motive force, and when compared to water power is similar to head or difference in level in feet between source of supply and discharge. Ohms indicate electric resistance, which varies with the material employed as a conductor and is directly proportional to the length of the conductor and inversely proportioned to its cross section: as compared to water, is similar to resistance of pipes, which increases with the length of the pipe and its degree of smoothness, and decreases with increase of sectional area. Amperes designate the strength of current or rate of flow. One ampere per second equals one coulomb: compared with water, is the rate of flow, as cubic feet or gallons per minute: equivalent to the "miner's inch." A coulomb is the unit of quantity and equals the rate of flow multiplied by time. In water quantity is measured by cubic feet or gallons per minute. A watt is the unit of electric power and is equal to one volt ampere; 746 watts are equal to one horse power. In water a horse power is the number of foot pounds of work done in one minute divided by 33,000.

ANSWERING several queries on the subject of the right of aliens to purchase or locate mineral lands of the United States: The United States statutes plainly state (Sec. 2319): "All valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, (from the United States), by citizens of the United States and those who have declared their intention to become such, under the regulations prescribed by law, and according to the local customs and rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States." Any State law giving aliens the right to locate, take or hold or purchase from the United States the lands of the public domain is in conflict with the United States statutes. A citizen cannot locate land for an alien corporation. The *Landowner* says concerning this: "A mineral entry made by an alien is not void, but voidable, and, while of record, the land covered thereby is segregated from the public domain. This simply means that a location made by an alien may be successfully contested by a citizen of the United States."

WHEN a State has selected certain lands in lieu of the school sections, 16 and 36, and the United States has issued a patent therefor, such patent will stand unless it can be shown conclusively that the mineral character of the land was inadvertently overlooked or that the patent was obtained by misrepresentation. Having acquired the land, the State may sell, lease or dispose of it in any manner it may choose while complying with the law, which differs somewhat in the several States. The United States does not issue a patent to the State for sections 16 and 36. When the survey has been made and has been approved, the sections in question simply gravitate to the State, unless their mineral character be established, when the State may make selections of lieu lands. In the case of lieu lands, however, it is different, and an examination into the character of the land is made, or presumed to be made, and if no mineral veins or deposits are known to exist thereon the United States issues a patent for the land. Any subsequent discovery of mineral will not affect the title of the State to the land, and if a mineral vein or deposit were known to exist on the land prior to the issuance of the patent, and no adverse claim made, it would be very difficult to have the Government set aside such patent.

NITRO POWDER and black powder may often be employed to advantage in the same hole, where large masses of rock are to be dislodged by a single series of blasts. Holes are drilled at stated distance apart, usually 10 to 16 feet, and set back from the face a similar distance, according to the character of the ground. These holes are generally started by striking the drill with a hammer, but are finished by "churning." They are made 12 to 20 feet deep, again depending on the character of the ground. When finished they are chambered—that is, a small quantity, one to three sticks, of No. 1 powder is exploded in the bottom of each for the purpose of shattering the rock about the bottom of the hole to make space for a heavier charge of powder at the bottom. Then a quantity of nitro power and sometimes a keg or more of black powder is poured into each hole, and the set of holes is discharged by the electric spark or by fuses cut to discharge as closely together as possible, though the latter loses the benefit of contemporaneous discharge of the several holes if but a second or two elapses between the explosions. The nitro powder, being a detonative compound, explodes immediately, shattering the surrounding rocks; the black powder, being a combustive compound, exerts its force more slowly and lifts the fractured rock mass, throwing it out of its position and rendering it accessible to the miner. This class of blasting is particularly suited to open-cut work, where it is not desirable to scatter the rock by the force of the blast.

Gold Dredging in California.

Like all other forms of gold mining, dredging is evolutionary and progressive. Costly New Zealand experience has evolved the present gold dredging machine, which, though not perfect, is well adapted to the purpose, and is proving itself of economic value. Results determine worth, and the net profits now being monthly produced from ground hitherto unprofitable with the rude and crude methods of earlier days, practically demonstrate how profitable this method of mining may be made. One great advantage is the readiness of operation; there are no expensive preliminaries, no opening up, sinking, drifting, timbering or developing; no building of mills or transfer of heavy machinery; when the dredge is ready the mine is open, and the dredge itself is mill, concentrator and amalgamator. Operations in California, Colorado, Idaho, Montana and Oregon confirm this.

A recent visit to the old historic Feather river, near Oroville, Cal., showed what is now being done in this new era of California mining. Where even Chinese could no longer "make wages," dredging machines are in operation, paying considerably more than expenses from the hour of starting, with the prospect of still greater profits as richer ground is reached.

The work of building and operating those dredges has largely been under the superintendency of R. H. Postlethwaite of San Francisco, who has furnished some data in connection with this interesting subject. Mr. Postlethwaite says:

The dredge built some eighteen months ago by the Risdon Iron Works of San Francisco, Cal., for the Feather River Exploration Co., has been operated continuously ever since its erection, digging about 24 feet below water level with a 16-foot bank ahead of it. Two months ago the two dredges, owned respectively by the Marigold Dredging Co. and the Kia Ora Gold Dredging Co., were started. Following is a short description of their construction and mode of operation: The pontoon is 70 feet long by 29 feet wide and 5 feet 6 inches deep with undercut stern and rounded bows, the latter being of great advantage when cutting into high ground which will not readily break down. The ladder, which is of our usual heavy girder type, projects 16 feet beyond the bow and thus enables the dredge to cut its own flotation through any ground. This ladder carries a string of heavy buckets, each of a capacity of 3¼ cubic feet, which dump onto delivery plate at the rate of thirteen buckets per minute. The material, consisting of boulders, cobbles, sand and gold, pass by gravity from the delivery plate into a perforated revolving screen, set on a slight incline. A perforated water pipe conveys water under pressure which thoroughly disintegrates and washes the material as it slowly passes down the screen, the circular motion of which tends to make the stones climb the sides and then fall back, thus causing the rubbing off and breaking up of any clay or sticky material which may be on them. The water, fine gravel, sand and gold drop through the perforations in the screen into a distributing box, from which it passes on to the different sections of gold-saving tables by means of doors in the distributing box. Any of these sections of tables can be shut off, thus enabling them to be cleaned up without stopping the dredge. The gold-saving tables are made of cast iron, so that they do not warp and leak with every change of weather. They are covered with cocoa matting and expanded metal, and experience shows that nearly all the gold is caught in the first 6 inches of table.

After leaving the tables the material passes into a flume fitted with angle-iron riffles, down which it is carried and deposited overboard astern of the dredge. By way of showing what excellent gold savers the above-described tables make, I may state that I lately cleaned up the flumes and only got $16 of gold out of them, although during the same period over $2500 had been cleaned up on the tables. While I do not claim to be able to save 100% of the values, I do claim to save such a large percentage that careful and persistent panning of the tailings will hardly ever obtain a color. The coarse material which will not go through the screen perforations is conveyed by gravity onto a stone elevator and deposited 24 feet above water level. This elevation above the natural bank level is found necessary, owing to the fact that the ground swells very much after being broken out of place, and therefore requires more space when redeposited.

The digging, stacking and pumping is now operated by a vertical compound surface condensing marine engine, indicating about 45 H. P., the fuel consumption being two and one-half cords of good wood per day of twenty-four hours. The winch, by means of which one man operates the entire boat, is driven by a pair of donkey engines and the electric light is supplied by a very neat and compact direct connected high speed engine. The electric light engine and winch engine are both connected to the condenser which, besides conducing to fuel economy, makes the necessary supplementary feed very small, which is of great importance to a dredge working in inland ground where the water gets muddy. The surface condenser is arranged in the suction of the main centrifugal pump, so that the expense of running a circulating pump is done away with.

Both the Marigold and the Kia Ora Gold Dredging Companies have signed contracts with the Yuba Water Co. for a supply of electric energy which will be installed next October and will simplify the machinery of the dredges considerably.

Though opposed by many authorities on this subject, I have long contended that it is possible to excavate a hole in the gravel down to water level and to pump the same full from an independent supply and to start a dredge therein. Some authorities were of opinion that the seepage could not be overcome; others claimed that no dredge could be designed which could take care of its own tailings, and that it would consequently get tied up and rendered useless. The matter has now been set at rest, and my contention proved correct by actual experiment, for the Kia Ora dredge which I am managing myself commenced operations in the middle of an orchard in a hole 11 feet deep. This excavation was filled and is kept filled by a supply of 250,000 gallons of water per twenty-four hours, conducted from the Feather river by means of a flume 3000 feet long. The size of the excavation was such that when the dredge started it could not turn round and was entirely enclosed by high banks. Now, however, after six weeks' run, the hole has been enlarged to such an extent that the face of gravel is 250 feet wide, or nearly three times more than it was at the start. The above conclusively proves, I think, that seepage can be overcome and that a dredge can be designed to take care of its own tailings under the conditions above considered.

By careful measurement the dredge for the first month of twenty-seven working days lifted 29,000 cubic yards, bank measurement, which means about 40,000 cubic yards bucket or tailings measurement; this is a good showing for the first month's work with a new crew. This experiment, which has proved successful, will open up a very large area of ground in California and neighboring States which previously could not by any process be worked at a profit. The actual expenses in connection with the Kia Ora's month's run were only 3¼ cents per cubic yard, bank measurement. In order to allow a large margin for future wear and tear a safe estimate would be 5 cents per cubic yard, bank measurement. This cost, as soon as electric power is installed, will be considerably reduced, as the river pump alone can be run at a saving of at least $100 per month over present, and the enlargement of the scope and possibilities of dredge work is sufficiently suggestive to need no further elaboration.

The MINING AND SCIENTIFIC PRESS has had considerable to say on this subject before, and gives place to its consideration now to give prominence to the point made by Mr. Postlethwaite, viz., that actual profitable work, tangible results, prove the feasibility of starting in wherever suitable material exists, provided that room enough can be made in the gold-bearing gravel down to water level, and water sufficient for floating and operating the dredge can be flumed or piped in. This has been done in Butte county, Cal.



"KIA ORO" DREDGING GOLD IN AN ORCHARD.

Scarcity of Water on the Rand.

At present the mines of the Witwatersrand do not supply one-fourth the amount of water required to operate the mills and cyanide works. The balance of water is obtained from the natural rainfall—a limited and always uncertain quantity. This condition of affairs precludes the material extension of the crushing capacity of the mills. Steps are being taken to secure a permanent supply of water by bringing it from a distance. Concerning this situation, the Johannesburg *Mining Journal* says:



THE MARIGOLD DREDGE AND SOME OF ITS TAILINGS.

The opinion of Rand mining authority is agreed upon one important point. A serious mistake has been hitherto made in placing so much reliance upon the rainfall in a matter which affects the vital conditions of the industry. As the shortcomings of the natural source of supply have gradually made themselves clear, it was natural that the charge should be laid against those who are responsible for the direction of the mining industry that they have failed to arrange for a general, adequate and permanent water supply for the mines. Mr. Eckstein has made an honorable and gallant admission of the mistake in his statement that the Rand directorates have all been taken by surprise by the extraordinary failure of the supplies from rainfall.

How serious the mistake has been will be apparent if the rainfall records are considered. During the

ten years, 1888–1898, inclusive, the average rainfall has been 30.16 inches, and the average number of days has been 90.6 on which rain has fallen in each year. The lowest measurement was recorded in 1899, when 19.85 inches fell; the highest in 1891, when the rainfall measured 44.85 inches. The lowest number of days in which rain fell was 48 days in 1893; the highest, 105 days, in 1894. During the last three years, 1896 to 1898, the supply of water collected by the mines' dams has been notoriously short of the actual requirements. In 1896 the rainfall was 23.23 inches, the number of stamps running was 2386, and the tonnage crushed was 4,000,000 tons; in 1897 the rainfall was 28.98 inches, while 3567 stamps crushed 5,300,000 tons; and in 1898 the rainfall was 27.25 inches, for the supply of 4757 stamps, crushing 7,330,000 tons. There is obviously no sort of correspondence between the rainfall and the increasing needs of the industry. While the tonnage milled increases at a most terrific rate, the rainfall cannot be trusted to supply even the present comparatively modest requirements. There is, of course, most rain collected in the dams in those years in which the highest measurements of rain fall within the fewest days. What the mines want is a quick succession of heavy showers with a good run-off. Unfortunately, nature cannot be expected to accommodate itself to these ideal conditions. While the needs of the industry increase with quick and regular strides, the rainfall is uncertain, and, at best, insufficient. The catch area of the mine reservoirs is, of course, a permanent superficial element which cannot be increased in proportion to the demand made upon it. Everything that can or need be done in the provision of reservoir space has already been done. Thus, the Natal Spruit dam, to take a striking case, has a storage capacity for one thousand millon gallons. The best effort of the best year's rainfall supplied it to the extent of only 450,000,000 gallons.

Every ton of ore milled on the Rand requires a water feed of at least 400 gallons of fresh water. Of this amount the mines can themselves supply only 25%, and the remaining 75%—or 300 gallons for every ton of ore milled—has to be supplied either from the rainfall as collected in dams or from other sources. During the last two years an average of 6,000,000 tons of ore has been crushed per annum, and the supply of water from the mines and their dams has been short. On the assumption, however, that the companies can just manage to provide sufficient water for the crushing of 6,000,000 tons of ore in the year, when the time arrives that 10,000,000 tons are crushed, the water required for the extra 4,000,000 tons will obviously have to be provided entirely from sources outside both rainfall and mines. At the rate of 400 gallons per ton of ore, this will mean an extra supply of water to the extent of sixteen hundred millions of gallons. In other words, an extra supply of water will have to be provided of from four to five million gallons per diem. And, if crushing operations extend beyond the limit of 10,000,000 tons of ore per annum, the extra water supply will have to be increasad in proportion. That 10,000,000 tons is not merely a fanciful measurement of the scope of operations in the near future is a contention which will be readily admitted on the Rand. Its reasonable nature can be easily illustrated. In 1898 the Rand Mines as a single corporation crushed 1,107,025 tons. Again, the companies concerned in the development of the new water supply are at present dropping 3500 stamps on properties east of the Paarl Central, there being no necessity to consider properties to the west of that company on account of adequate rainfall. But it is estimated that within five years the same companies will be dropping 12,000 stamps as compared with the present 3500 head. The estimated increase of stamps will be more than 250% within five years. The increase in tonnage crushed will certainly be in equal if not higher proportion when the possibilities of improved duty are considered. And from whatever source the necessary water is to be provided, it must needs be of a kind which will yield a supply commensurate with the enormous demand as estimated for a period extending over the next fifteen or twenty years.

In the arid regions of the southern California and Arizona deserts, where the scarcity of water has proven a serious obstacle to the development of valuable mining districts, the difficulty has been overcome in a number of instances by the installation of pumping plants and pipe lines from the source of supply to the mines and mills requiring the water. These installations have in every instance been successful where applied to quartz mining. In length these pipe lines have been all the way from a mile or less to seventeen miles, and the height to which water has been lifted in large volume has been from 200 to over 500 feet. Where a large plant is established, the cost of water per ton of ore crushed has been surprisingly small. One of the most prominent of these pumping installations is that of the Golden Cross Company, San Diego Co., Cal., whose pipe line is twelve miles in length and the lift 500 feet. Through this line 250,000 gallons of water are pumped daily at a cost of about 10 cents per ton of ore crushed. By pumping back from reservoirs near the mill this amount can be increased 50%. This amount of water on the Rand would supply sufficient water for crushing about 1000 tons of ore daily.

Diamond and Gold Mining in Minas Geraes, Brazil.

NUMBER IV.—CONCLUDED.

The second largest mine is the Passagem near Ouro Preto. This city was formerly the capital of Minas, and the region of which it is the center was the richest in Brazil. The Passagem has also been worked since the last century. The ore contains a large proportion of arsenical pyrites, and it is from this that most of the gold is obtained. The quality is variable, and the mine has had a checkered history. In 1863 it was bought by an English company, and by 1873 they had extracted 23,500 ounces from ore yielding one-fourth of an ounce per ton. This was not profitable, and the company went into liquidation. In 1884 a new company, the "Ouro Preto Gold Mines of Brazil," bought the mine, and, with better methods of exploitation and reduction, the Passagem has justified its old reputation of being one of the best in the country. The ore averages one-third of an ounce per ton.

The best example of a mine where the gold is obtained from beds of peroxide of iron, called "jacutinga," a soft friable brown mineral, is the Gongo Soco. The mine is situated about fifty miles east of Morro Velho and high up on the ridge of the main sierra. It was discovered and worked before the middle of the last century. Stories that sound like fables are told of its marvelous richness. In 1818, the Brazilian proprietor took out over 5000 ounces of gold in one month. In 1826, the mine was sold to an English company for £74,000. The mineral is found in a bed 300 feet thick, interstratified between schistose slates and limestones lying at an angle of 45°. Much of the ore was so rich that the gold was plainly visible to the naked eye. Ore of this character was detached with picks, separated and powdered by hand, and then washed in pans. This work was entrusted only to the fifty English miners imported by the company. In one instance, a miner brought out in his hat half a peck of "jacutinga" which yielded 310 ounces of gold dust. The hat must certainly have been one of the leather hats so universally used in the Minas mines to-day. The bulk of the ore was crushed in stamp mills and subjected to a more complicated process than the selected portions. The upper parts of the bed were the richest, and from 1826 to 1841 the mine produced largely and at small outlay. During the following fifteen years the production decreased and the expense grew on account of the flooding of the mine. It was at last abandoned in 1856, after having yielded 400,080 ounes of gold for a total outlay of £989,000. During the early and profitable period the Government levied a tax of 25% of the gross product, and the company paid into the imperial and provincial treasuries over £333,000.

The Maquine mine, near Ouro Preto, the Pitangui, Cocaes, Boa Vista, and Morro das Almas, all near each other and twenty miles south of Santa Barbara, were other "jacutinga" mines of considerable value. None of them are being operated at present. Besides the Morro Velho and Passagem, there may be mentioned among the quartz and pyrites mines that of Pari, to the east of Santa Barbara; Catta Branca, directly south of Morro Velho; Cuiaba, owned by the Saint John d'El Rei Company; Faria, near the station of Honorio Bicalho, on the Central Railroad and owned by a French company; Raposos, near Sabara and belonging to the Passagem company; and Vira Copos. Most of these are in operation.

Shortly after the proclamation of the Republic in 1889, a considerable number of Brazilian companies were floated for the purpose of engaging in gold mining in Minas. The results so far have not been notable. There are undoubtedly large deposits of quartz and "jacutinga" yet unexplored, or which have not been worked because they have been covered up by early operations. Difficulties often arise on account of the impracticability of obtaining available water power sufficient to keep the mines free from the great quantities of water encountered in Brazilian mining. No coal is mined in Minas, and freight rates do not permit its importation so far inland; consequently, steam is unavailable for pumping, and there are no smelting works. Little Brazilian ore is free milling, and that which is not must be reduced by chemical processes. A large development of the mining industry of Minas is probable, but those alone who employ the safest and most scientific methods of exploration and installation, and who command large capital, can reasonably hope to be successful. Mining in Minas offers few inducements for small prospectors.

The legislation in regard to the acquirement of mining property now in force is liberal, and the restrictions and formalities imposed are few and reasonable. The owner of land has the first right to the mineral; but if he does not exercise it, others may explore, after giving notice. The discoverer of mineral is entitled to four lots of fifty meters square, with ground necessary for working. Claims are freely transferable, but no single person or company may own more than 100 contiguous lots. Abandoned claims revert. The most onerous burden is the State export tax, amounting to 5% of the gross product. The larger mines can not escape the payment of this tax, but there is much illicit exportation by small operators. This fact makes the gathering of complete statistics impracticable.

Fairly complete statistics exist of the amount of taxes collected in colonial times. Since the Government took one-fifth of all the gold produced, the computation is easy. The output of the larger mines in this century is also known. The contraband production of the last century and that of the smaller private mines in this can only be estimated. The gold production of Minas has been approximated as follows:

Years, inclusive.	*Ounces per year.*	*Total ounces.*
1700–1713	10,000	140,000
1714–1724	90,000	1,089,000
1725–1735	135,000	1,350,000
1736–1751	303,000	4,850,000
1752–1766	302,000	5,120,000
1767–1777	230,000	2,530,000
1778–1808	140,000	4,340,000
1809–1834	34,000	890,000
1835–1890	58,000	3,250,000
1891–1898	75,000	600,000
Totals	121,000	24,150,000

Other Minerals.—Next to gold and diamonds, the manganese mines are at present the most important in Minas Geraes. They are near the town of Miguel Burnier, 311 miles from Rio de Janeiro, on the Central Railroad. The ore is of good quality, containing 84% of oxides of manganese. It is extensively shipped to the steel mills of Europe and America, and these mines are among the most important sources of this mineral, so essential to modern steel making. The best known mine, the Usina Wigg, shipped 20,000 tons to the Carnegie Steel Co. of Pittsburg in 1896 and 1897.

Minas Geraes contains inexhaustible deposits of excellent iron ore, but the lack of coal prevents its being used, except for the manufacture of soft charcoal iron. Niter is found in considerable quantities in many localities. It has been commercially mined for over a century. Mica, graphite, topaz, beryl, chrysoberyl, andalusite, rock crystal, coal in thin seams, and building stone in great variety are found to exist in this State. Specimens of all these and of many others less important may be seen in the museum of the School of Mines at Ouro Preto. Probably no part of the world contains such varied mineral wealth as the State of Minas Geraes. It is worth the practical investigation of American engineers and capitalists.

Some Experiences of a Working Miner.

NUMBER XXIII.

Written for the MINING AND SCIENTIFIC PRESS.

One day while standing on the street in D—— I noticed the general manager of a wealthy mining corporation approaching. At the same moment I observed a man whom I knew to be a prospector emerge from a saloon, and a moment later intercept the mining man, Mr. M——. He was not always an easy man to approach, but in this case he stopped and listened attentively to what the man had to say. His remarks were too low to be heard from my standpoint, but it was soon quite evident he was talking about a mine, for he produced from his pocket a small piece of ore and proceeded to describe the claim. From his gestures I concluded he must have a very large mine and the small sample was evidently rich ore. As I have already said, I could not hear what he said, but the remark of Mr. M—— I heard readily. He suddenly interrupted the prospector with the remark: "Don't you know you're lying? If you had a mine like that I would give you $2,000,000 for it." Having heard this remark and seen M—— walk away, leaving the prospector staring after him, I could easily imagine what he had been saying. That is the trouble with most prospectors. They are expected to present a roseate description of their property, but it is often so completely overdone that the man whom they endeavor to interest in the proposition not only disbelieves the story, but becomes angry to think that any one would take him for such a fool as to believe it.

* * *

Mr. C—— concluded to mine. He bonded the L—— mine and spent considerable money on it—that is, he furnished considerable money, which was spent by someone else. He never would go down into the mine, partly because he was afraid and partly because he had sense enough to know he would be in no way wiser for going. He spent his time on the veranda of the boarding house, playing pedro. The mine was run for some months and C—— lost all he put into it, and now he condemns all mining ventures as hazardous and illegitimate—says all miners are robbers, and would go to sleep on shift.

* * *

There are men who will listen to no argument and will receive no statement as true from another until

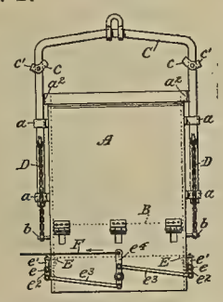
they have demonstrated it to their own satisfaction. Such a man was I——. He was one of a large force of men working at the B—— mine. One day at noon the miners were discussing the force of nitro powder. Some of the men claimed a concussion would set it off; others claimed concussion accompanied by fire was essential. I—— held to the latter belief and offered to prove it. One miner inquired in what way he intended to demonstrate his theory. I—— replied that he would cut off a piece, place it on an anvil and strike it with a hammer, and it would not explode. As he went about it a dozen men protested and warned him, but others, thinking to see some fun, remarked that of course I—— was right and he could easily prove it. He cut a good sized slice from a stick of No. 1 powder, placed it on the anvil, when someone suggested that he had better put it on an old tappet lying out on the dump. He followed the advice, for a wonder, and, laying the powder on the tappet, struck it a heavy blow with a striking hammer. The hammer flew 30 feet into the air and I—— went head over heels over the dump, finally bringing up in a clump of chaparral. The men, who had quickly retired when they saw he intended to put the experiment into execution, ran forward and saw I—— slowly climbing up the hillside, limping and holding onto his right hand at the wrist. He had sprained it so badly that for a time it was thought the bones were fractured or dislocated. He now knows, and has proved to his own satisfaction, that nitro powder can be exploded without fire.

Latest Mining and Metallurgical Patents.

Patents Issued June 27, 1899.

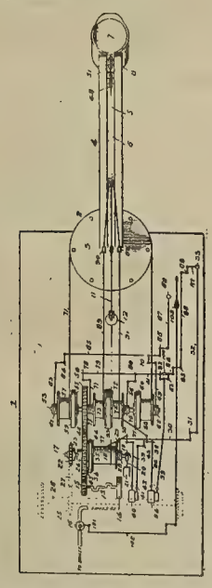
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

DUMPING BUCKET.—No. 627,306; J. F. O'Rourke, New York, N. Y.



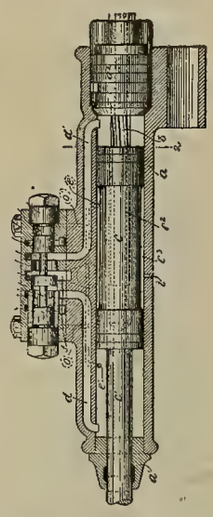
The combination with the body of a bucket and a door forming the bottom thereof, of a bail moveable with respect to the body, a loose connection between the bail and the door whereby the bail in its upper position supports the bucket through connection with the door, and means to connect the bail directly to the body, whereby the bail in its lower position supports the body directly and leaves the door free. A loose connection between the bail and the door, and a dog or latch carried by one of parts to engage the other in the upward movement of the bail. Means to connect the bail directly to the body, a latch to engage the door, and means to disengage the latch.

STEAM DREDGE OR SHOVEL.—No. 627,662; G. E. Turner, Marion, Ohio.



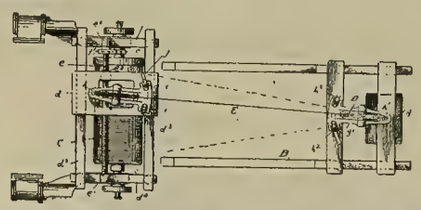
The combination in a dredge, of the shaft 17, the drum 18, the brake band 35 encompassing drum, the steam cylinder 40, having its piston rod operatively connected to brake band 35, and means for simultaneously operating piston rod and connecting or disconnecting drum and the power shaft, the drums 73, 74 mounted on the shaft 53, and the hand lever 33, operatively connected to drums 18 and 73, 74; the bucket 7, the door 8 hinged thereto, the spring-actuated latch 9, the lever 10 pivoted to latch, the flexible rope 11 connected at one end to lever, the weight 12 fixed to the other end of rope, and a shelf support arranged in the path of weight.

VALVE FOR ROCK DRILLS.—No. 627,703; T. Officer, Claremont, N. H.



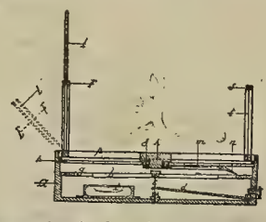
In valve mechanism, the combination of a cylinder having inlet and exhaust ports, a piston, a piston valve controlling ports, valve having pistons at each end thereof and a single one intermediate thereof, intermediate piston being of greater area than either of the end ones, and cylinder having reversing ports in the upper and lower portions thereof leading to the lower and upper ends respectively of piston valve, whereby piston valve is unbalanced when the piston passes the reversing ports.

HOISTING MACHINERY.—627,769; H. C. Behr, San Francisco, Cal.



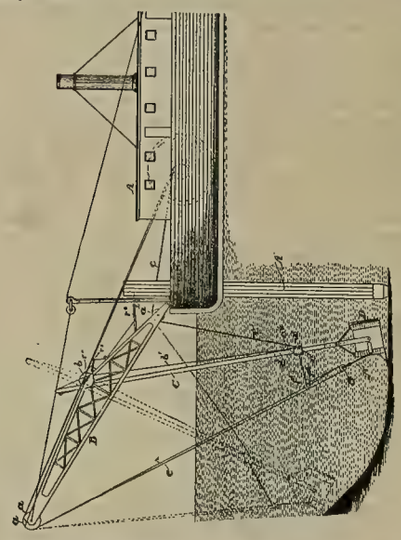
In a hoisting apparatus, the combination with the winding drum, of a sheave mounted so as to be free to swing with the deviation of the hoist or winding rope, a traveling carriage to which the sheave is pivoted, and of mechanism for imparting travel to the carriage as the rope is wound on an off the drum; sheave frame pivoted in close proximity thereto, a sheave mounted therein, the sheave frame being free to swing with the directing strain of the hoist rope upon the sheave, and of mechanism for imparting lateral movement to the sheave frame as the hoist rope is laid on and off the drum; the sheave frame pivoted so as to adjust its plane in the direction of the rope leading from a shaft, a sheave mounted in frame which leads the rope to the drum, mechanism by means of which the sheave frame is caused to travel in correspondence with the laying on or off the rope, and of a guide or pit head sheave mounted to swing about a fixed axis.

FOLDING MINF TRANSIT.—No. 627,638; J. A. Birsfield, Denver, Colo.



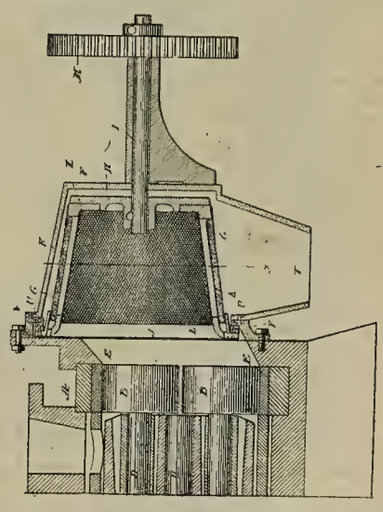
An instrument of the character described, the combination of the needle compass, the level or bubble glass, the vernier arranged on a central axis, and the folding or hinged sights, one of sights having a sliding mirror adapted to be projected beyond the normally upper end of sight, and retractible to permit of the folding of sight; parallel crossbars, the axis depending centrally from crossbars, the vernier arranged on axis below, crossbars having a deflected graduated portion, and the hinged or folding sights arranged between parallel bars, at their end; the graduated compass circle arranged below vernier, a transparent plate or portion interposed between crossbars and vernier, the bubble glass, needle playing in connection with compass circle and hinged or folding sights arranged between parallel bars, at their ends, adapted to fold flush with axis.

DREDGING APPARATUS.—No. 627,660; A. K. Stone, Boston, Mass.



A dredging apparatus; a boom; a main and an auxiliary chain or cable; a block carried at the end of auxiliary chain or cable; a bucket having an attached block over and about which main chain or cable is passed, chain or cable being attached to the block carried by auxiliary chain or cable; means to wind main chain or cable at a slow speed and to thereafter wind both chains or cables at a faster speed; a bucket beam, a pawl carriage, a carriage mounted thereon, pawls to hold carriage in adjusted position, friction drums mounted on boom, chains or cables connected with bucket beam extended about the friction drums mounted on boom, attached adjustably with carriage, whereby carriage may be raised or lowered on beam according to the depth of cut to be made by bucket; and backing-off chain connected with block carried by auxiliary chain or cable, and extended through carriage, and a drum to wind at proper times backing-off chain, as when the block connected with the auxiliary chain or cable is to be pulled to the block connected with the bucket.

PULVERIZING MACHINE.—No. 627,579; G. Frisbee, Philadelphia, Pa.



In a pulverizing machine, in combination, a pulverizing chamber, a stationary ring die and revoluble rolls therein, and a discharge apparatus comprising one or more cup-shaped screens located adjacent to one end of the pulverizing chamber and mounted upon an independently revoluble frame, the lower edge of screens being above the lower inner edge of ring die; a casing surrounding screening apparatus, a discharge spout for pulverizing material, and return passages for unpulverized material.

COPPER does not show, as yet, as material an increase in production as might have been anticipated under the impetus of high price. A large number of mines in various parts of the country, however, are making rapid preparations to commence production at the earliest possible day, and some of these are evidently destined to become large producers for a time. Should the present price be maintained, or a price near it, the year 1900 will see a large increase in the output of this valuable metal.

Scale of Wages in Colorado.

Answering inquiry on this subject, the following is the prevailing scale in Cripple Creek district, which, with some exceptions, is the same as that adopted in other camps of the State, wages being based upon an eight-hour day, except that of assayers:

Hand drillers	$3 00
Machine drillers	4 00
Machine helpers	3 50
Trammers	3 00
Pumpmen	4 00
Top cagemen	3 00
Master mechanics	4 00
Shift bosses	4 00
Superintendents	7 00
Engineers	4 00
Firemen	$3 00 to 3 50
Carpenters	3 50
Timbermen, underground	3 00 to 3 50
Blacksmiths	4 00
Blacksmith helpers	2 00 to 3 00
Laborers, surface work	3 00
Assayers, mine work	5 00

A baby machine driller gets $4 for eight hours, but he is his own mucker. Muckers back of large machines get $3 for eight hours.

In some of the wet and deeper mines hand drillers get $3.50 for eight hours, the men furnishing their own gum coats, boots, hats, etc.

Unlawful to Use Metal Tamping Bar.

TO THE EDITOR:—Please state in your next issue if there is any law in Colorado against using a steel or iron tamping bar in loading holes. MINER.

Globe, Ariz., June 20th, '99.

The fourth article of section 20 of the Colorado State laws governing the Bureau of Mines is as follows: "No person shall, whether working for himself or in the employ of any person, company or corporation, while loading or charging a hole with nitroglycerine powder or other explosive, use or employ any steel or iron tamping bar; nor shall any mine manager, superintendent, foreman or shift boss, or other person having the management or direction of mine labor, allow or permit the use of such steel, iron or other metal tamping bar by employes under his management or direction."

Recently Declared Mining Dividends.

American Zinc Co., $1 per share; payable July 15.

Industrial Notes.

—The cut in freight rates from the Atlantic to the Missouri river has got as far west as Utah.

—The total assessed valuation of the city of Los Angeles, Cal., in 1898 was $61,099,307; in 1899, $65,127,662.

—The Mercantile Trust Company of San Francisco has taken $1,000,000 of the bonds of the Yuba, Cal., Electric Power Company.

—The transportation of minerals and mineral products constituted 46% of the entire traffic of the Mexican Central railroad in 1898.

—The U. S. Navy Department has given the contract for the Mare Island, Cal., drydock to the Atlantic, Gulf & Pacific Company for $729,000.

—It is stated that the tramways of the Chilkoot pass route from Dyea to the Upper Yukon lakes are to be bought by the White Pass & Yukon Railway Co.

—The contract for the construction of the Government building at San Francisco of Raymond granite has been awarded to the Bentle Construction Co. of Milwaukee, Wis., at $802,500.

—All the tin plate works in the country were closed at midnight on the 30th ult., as a result of the failure to settle the wage scale at the conference in Chicago. Fifty thousand persons will be made idle by the shutdown. The Workers' wage committee made a demand for an advance of 20%. The present wage scale expired on June 30.

—Col. B. F. Allen, supervisor of the five forest reservations of southern California, has from the Federal Government an allowance for the fiscal year beginning July 1 of $15,000, which will enable him to do more effective work than heretofore. He selects men to act as rangers on the reservations. There are now thus employed fifty men.

—At Visalia, Cal., electricity generated at the Mount Whitney power house has been turned on. The power is supplied by water from the east fork of Kaweah river, diverted at Oak Flat, forty-five miles from Visalia, at an altitude of 2400 feet. The present capacity generates 1800 H. P. Power is transmitted to Porterville, forty-three miles.

—The Clear Lake, Cal., Electric Power Co. estimates the entire cost of the installing plant, ready for operation, at $656,095.07, including $108,800 for a reserve steam plant. The annual operating expenses, exclusive of the steam plant, are estimated at $55,490; the cost of operating the steam plant three months, $28,670. It is calculated that operating the plant at its full capacity, 4000 H. P., will bring an income of $228,000. The company proposes to issue $850,000 in 6% bonds to cover the construction and furnish a reserve fund.

—Consul General Gowey writes from Yokohama: "The customs returns show that during the year 1898 there were imported into Japan 234,941 pounds of copper plates, sheets and rods, valued at $29,243, and 94,925 pounds of yellow metal sheathing, valued at $9970. What proportion of rods were included in the foregoing the returns do not indicate. Under the heading of exports, copper sheets and plates do not appear, but of refined copper there were shipped abroad during last year 35,709,650 pounds, mostly in the shape of slabs and ingots, valued at $3,553,245. Exports of manufactures of brass at the same time were valued at $9856. The efforts made to produce sheet copper in Japan, I am informed, have not been encouraging and the press has reported the failure of one of the largest concerns in this line of trade at Osaka. Japanese copper, while of fine appearance, has produced much dissatisfaction as sheathing on vessels—salt water destroying it in a very short time. For Muntz metal, or its equivalent, there is undoubtedly a growing market in the Orient."

—At the close of the recent session of the Transmississippi Congress, T. C. Henry of Denver, Colo., in his speech, claimed that the intermountain States and Territories are retarding and losing population because of excessive and unjust freight rates, depreciation of mining properties and products generally through monetary conditions. The checkered progress and deterioration he ascribed wholly to the effect of the "long-haul" rates of the far-off East and West coast railroad lines, thus causing agricultural and manufacturing in the interior to be comparatively unprofitable. He made no reference to monetary conditions or to the mining interests.

—H. R. Robertson tells *Wood and Iron* that the Stella lumber raft, which is to go out from Washington by sea to San Francisco, is being built in a cradle 96 feet long and will contain 550,000 lineal feet of logs. These, computed to board measurement, make 6,000,000 feet of lumber. The two building on Puget sound are each 144 feet long, and each will contain 750,000 lineal feet, or 9,000,000 feet of lumber. No saw logs are contained in these rafts; they are constructed entirely of piles and spars. The Southern Pacific has just given him a $60,000 order for logs to be used on their lines in California. He says that sawmills will be erected in San Francisco for the purpose of turning log rafts into lumber piles.

—According to newspaper statements, Manager Shelby of the Pacific & Idaho Northern Railway is trying unsuccessfully to secure 500 workmen on Puget sound for his Idaho railroad. Shelby's new railroad is being constructed from Webster, Idaho, northward into the Seven Devils copper region, a distance of over 100 miles It is projected farther into the Buffalo Hump mining country and the White Pine region of Idaho. The Pacific & Idaho Northern will connect at Weiser with the Oregon Short Line. Another railroad will penetrate the same region from Huntington by following down the Snake river, while Shelby's road goes up the Weiser river. It is noticeable that these two streams run parallel to each other for nearly a hundred miles and yet flow in opposite directions.

—The Great Northern and Northern Pacific Railway traffic officials, in the application of the Pacific coast hardware jobbers for the cancellation of their present tariff on less than carload lots, have decided against the Pacific coast jobbers, and the present tariff will remain in force. The decision is the result of an appeal by Pacific coast men at the hearing held in St. Paul in May, and which was strongly contested by jobbers from St. Louis, Chicago and other Middle Western cities. The decision concludes thus: "We do not feel that we can successfully defend the position advanced by the Pacific coast jobbers; that its adoption would not be for your best interests or our own." The rate objected to by the Pacific coast jobbers was one which reduced by about 50% the difference that had previously existed between carload and less than carload rates on certain kinds of freight. For example, the less than carload rate on certain hardware was $2 per 100 pounds, and the rate on the same freight in carloads was $1.50 per 100. This was adopted at the Milwaukee meeting in April, 1898, and it was supposed to represent the difference in cost of handling the freight in full carloads or in small, broken lots. This difference gave something of margin to the Pacific coast jobbers, who shipped in large quantities from the East and distributed here to the retailers. Those rates had been in operation scarcely a year when the Northern lines cut the rate on less than carloads from $2 to $1 75, leaving the difference between the two but 25 cents, whereas it had previously been 50 cents. This was believed to be in the interest of St. Paul jobbers, who had laid in enormous stocks of the goods chiefly affected by the new tariff. The difference of 25 cents per 100 pounds was sufficient to give the St. Paul jobbers an advantage in certain territory, and the Pacific coast people objected and sent a large delegation to St. Paul to lay the matter before the traffic officials of the two Northern lines that had brought the change.

Personal.

JOHN FILLUS of Boston is in Redding, Cal., representing an Eastern mining company.

GEO. W. HEINTZ succeeds F. A. Wadleigh as general passenger agent Rio Grande Western Ry.

FRED H. HARVEY of Galt, Cal., has charge of the present work of the Jupiter Con. M. Co., Iowa Hill, Cal.

W. F. STUART has been appointed general manager of the Mountain mine in Sierra county, Cal.

F. GUITERMAN, formerly of Durango, Colo., is now Mgr. Pueblo, Colo., plant of the American Smelting Co.

F. H. NEWELL of the U. S. Geological Survey is examining the water storage possibilities at Phœniz, Arizona.

J. P. HARVEY, who has been Mgr. Republic mine from its start, has resigned, being succeeded by R. G. E. Leckie of Montreal.

FORREST FARNUM of Grass Valley, Cal., has gone to the Four Hills mine in Plumas county, Cal., where he has been engaged as foreman.

ON the 1st inst. Ralph Nichols, formerly of DeLamar, Nev, assumed the management of the Great Boulder mine, at Kalgoorlie, Australia.

Obituary.

ON the 3rd inst., there died in San Francisco an old-time miner, who was as great a hero as any ever pointed out by the flashing finger of Victory when cannon thundered over conquered field—reference is made to Roger Prendergast, an old California and Comstock mine foreman, who time and again was foremost in saving life when the mines where he was employed were afire and men were smothering in the lower levels. The last of a list of heroic and successful efforts to save life was at the Chollar fire, Virginia City, Nevada, where in rescuing some of the imprisoned miners he inhaled a deadly gas that ultimately caused his death. There was no parade about his life; there was little pomp or ceremony about his funeral, yet when old Roger Prendergast was buried the sods were piled above the remains of a typical miner and a brave man.

Leffel Class "B" Standard Center Crank Automatic Cut-Off Engine.

The accompanying illustrations represent the Class "B" standard center crank automatic cut-off engines being put on the market by James Leffel & Co., Springfield, Ohio. They are intended to meet the demand for a thoroughly good, simple and easily cared for line of automatic engines in the smaller sizes up to 50 H. P., that will prove durable and economical in operation. Fig. 1 is view showing cylinder side; Fig. 2 illustrates the governor of the band flywheel. The main frame or bed is of substantial proportions and of a design affording extra strength and stiffness. The cylinder and steam chest are of overhanging type, cast together and firmly bolted to bed. Cross head guides are a part of bed, bored out, and have very generous surface. Cross head is of improved mechanical design, having pin about mid-center and provided with gun metal wedge-shaped shoes above and below, arranged for convenient adjustment. Manner of fitting cross head pin enables easily keeping same absolutely tight at all times. Piston rod is of steel, and turned to a tight force-fit in piston, with suitable shoulder, against which piston is forced on rod, and end of latter is then securely riveted over, tightly and firmly holding piston in place. The connecting rod is provided with extra heavy brass boxes at each end, easily adjustable for taking up wear and keeping distance between centers same at all times. Main shaft is extra large and strong, forged in one solid piece from best quality hammered iron or steel, and is provided with suitable counter-balance discs, securely attached. The rectangular form of skeleton slide valve is used, balanced by being fitted with a pressure-relieving plate on back between valve and steam-chest lid, and is arranged to afford necessary relief in case of water in cylinder, and also made adjustable for wear. This gives a simple, efficient and well-balanced valve, that is easily understood, and no more trouble to care for than the ordinary type of plain slide valve. A simple and convenient device (not shown in cuts) is provided for draining cylinder, same being operated by one lever, and having outlet from each cylinder cock suitably connected to exhaust pipe.

These engines are equipped with the Rite's governing system. The governor consists of one piece, comprising the arms and weights, with one spring connection, and is pivoted on one hardened steel pin—nothing complicated, no links, no numerous joints or complicated parts. This governor, with the balanced valve used, affords a regulation that is practically perfect, speed being constant, and the same with engine loaded or running empty.

The manufacturers will be pleased to quote prices and furnish prospective users with any additional information desired regarding these engines.

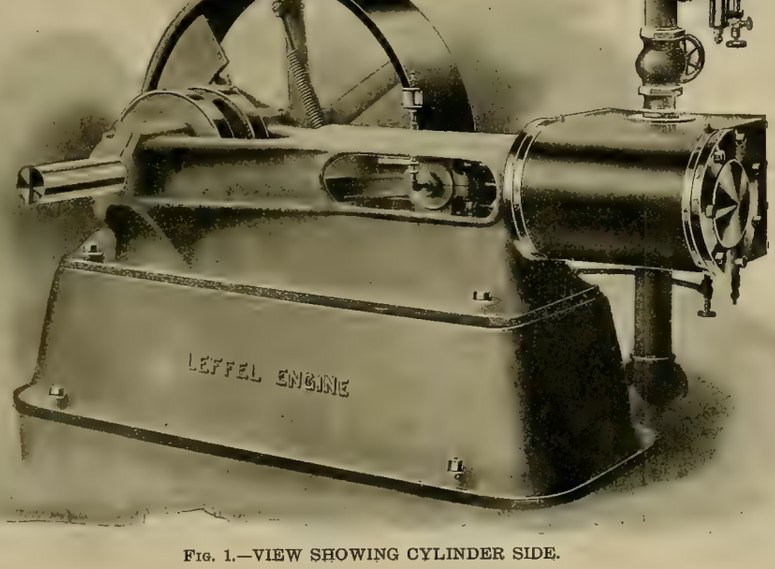


FIG. 1.—VIEW SHOWING CYLINDER SIDE.

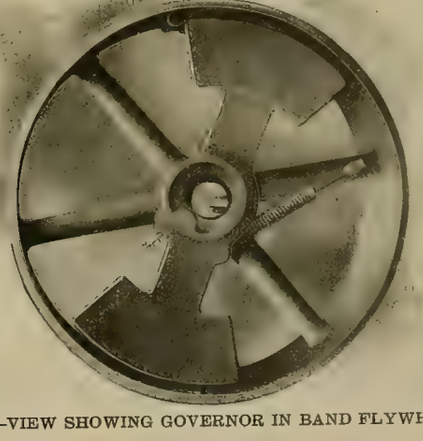


FIG. 2.—VIEW SHOWING GOVERNOR IN BAND FLYWHEEL.

Notes on the Alleged Shortage in Cyanide Bullion.*

By C. W. MERRILL, Assoc. Inst. M.M.

The impression that the bullion returns from cyanide plants are, in spite of the observance of all possible precautions, uniformly less than the correct tonnage multiplied by the difference between the values per ton indicated by assays of the "charges" and "residues," seems to have become so general that it was thought that a brief explanation would be of interest.

Figures have been made on results of operations from July, 1897, to November, 1898, of the tailings plant of the Montana M. Co., Ltd.,† the capacity of which is 12,000 tons per month, which was installed and operated under the writer's supervision, and which has been working during all but the severest weather between the dates named, it being impossible to economically handle the store tailings in midwinter, the thermometer sometimes dropping as low as 50° below zero in this northern latitude, and the tailings freezing as hard as sandstone to a depth of several feet from the surface in consequence. The plant was, however, operated for a short period during November, 1898, when the thermometer ranged from zero to 15° below.

About 135 truck or car loads of tailings are hauled to the bins daily, each car containing approximately three tons of sand. From six to ten of these are weighed, and large samples are taken from each of the cars so weighed. The accumulation of these car moisture samples gives the daily average moisture sample. From the number of cars dumped, the average weight per load and the moisture percentage determined from the average sample is figured the number of dry tons treated daily.

The sand passes from the cars to the bins and is withdrawn by a 24-inch belt conveyor, one of which discharges into a rotary distributor over the center of each sand vat. The stream of sand as it leaves the belt is sampled three times per hour during nine hours, which period is the average time consumed in filling a vat with 400 tons of tailings. The large "charge" assay sample so obtained is quartered down and four assay tons of the dried sample are taken for duplicate melts and weighings of gold and silver, care being taken that the lead buttons from each melt of two assay tons shall weigh approximately thirty grams. If the variation in the weights of gold obtained from these two melts of two assay tons each does not exceed $\frac{1}{10}$ milligram (equivalent to 20 cents per ton), the average is taken as representing the value per ton of the tailings charged that day; otherwise the assays are repeated in duplicate until such a concordance of weights is obtained.

After treatment the residue in the vat is sampled by removing sixteen cores from top to bottom by means of the sampler. The sample thus obtained, weighing several hundred pounds, is in turn cored with a small tryer, yielding about twenty pounds of residue, which is dried, mixed and quartered for the final assay sample. Of this, eight assay tons are taken for assay, the dore buttons from each melt of two assay tons being weighed separately and parted in pairs so as to give duplicate gold weighings from four assay tons each. If these weighings differ by more than $\frac{1}{10}$ milligram (equivalent to 10 cents per ton) the assays are repeated. All gold weighings are made on an Oertling 12A balance, sensitized to $\frac{1}{100}$ milligram.

The total amount of unprecipitated or pregnant solution flowing from the sand vats daily is measured, sampled and assayed, as is also the corresponding precipitated or barren solution.

Of the unprecipitated solution from four to eight assay tons are measured and evaporated in small bulk in ordinary saucers standing on a hot plate. Each saucer holds five or six assay tons, if larger volumes require to be taken a corresponding number of saucers are used and the contents, when sufficiently reduced, are poured into one. A mixture of litharge, silica and charcoal is then added and the whole heated till dry, when the contents of the saucers, after cooling, are mixed with sodium carbonate and charged into a crucible. Any residue adhering to the saucers is moistened with dilute nitric acid and taken up by a small piece of filter paper, which is then sprinkled with litharge and added to the crucible. The mixture is then melted, the resulting lead button cupelled, and gold and silver determined. Duplicate solution assays are not usually made, but when so made the results almost invariably agree very closely. The sodium carbonate is not added to the solution with the rest of the flux, because it would cake on the inner surface of the dish and make the mixture difficult to remove. Of the precipitated solution, from eight to twenty-four assay tons are similarly prepared for the furnace, as many as forty assay tons being occasionally taken.

These solution assays are of great practical utility, not only as guides to the efficiency of the precipitation, but also as giving warning of the presence of reducing material in any charge several days before the residue from such a charge is available for assay, and they are made primarily for these reasons.

The monthly bullion assays are made with the usual precautions, including determination of the cupel absorption, check for volatilization of silver, etc. The shortage of bullion in the first cleanup is usual in cyanide plants, the deficiency being made up in the succeeding months.

The output of gold determined by daily assays of charge and residue was seen to be $276,499.70, while the gold in the bullion obtained was $284,856.35, or 3.02% greater. The silver called for by daily assays was $51,596.51, while that obtained in the bullion was $52,572.27, or 1.85% more. Comparing the total values, we find $328,096.21 called for by daily assays and $337,428.62 obtained in bullion, or an excess of 2.84% over the estimate, a highly satisfactory concordance.

The estimates of precipitation have also averaged somewhat less than the gold and silver obtained, the value of the gold being slightly greater than that called for by daily assays of charge and residue, and that of silver materially less. The deficiency in silver is partly due to the fact that the lead buttons from the solution assays, which are made primarily as guides to the efficiency of solution and precipitation, are placed in the rear row of the muffle during cupellation.

The bases of values—$20.30 per fine ounce of gold and $0.50 per fine ounce of silver—were taken for reasons of convenience in computation, their values not affecting the comparison.

The ton referred to is the United States ton of 2000 pounds and the assay ton contains 29.166 grams, or the same number of milligrams as the ton contains of troy ounces.

*Condensed from Transactions of the Institution of Mining and Metallurgy.

†A description of the plant, which has since been enlarged, appears in the MINING AND SCIENTIFIC PRESS, April 30, 1898.

Something About Explosives.

In the popular mind many erroneous impressions prevail concerning the combustion of gunpowder and the meaning of the word explosion. There are two ways in which explosive compounds are consumed. One is called detonation, which is a form of reaction, so rapidly propagated through the explosive body, that it is termed an explosive wave. By the other method, the explosive body is burned from exposed surfaces, and is merely a form of rapid combustion.

Detonative substances are usually termed high explosives. Those which burn from surfaces may be termed combustive explosives. Combustive explosives, requiring an appreciable time for their consumption, are adapted to use as gunpowder by giving the projectile time to be moved forward in the bore of the gun before the complete consumption of the charge, thus providing space for the products of combustion, and obviating dangerous pressures.

Explosive compounds contain sufficient oxygen for their own combustion, and do not require atmospheric oxygen. Black gunpowder is a mechanical mixture of combustible substances, usually sulphur and charcoal, with some salt rich in oxygen, such as nitrate of potassium, termed saltpetre. It requires about seventy-five pounds of saltpetre to supply the oxygen for burning ten pounds of sulphur and fifteen pounds of charcoal. When black powder which has been pressed into hard cakes, or prisms, is fired in a gun, the small particles of saltpetre and sulphur at the surface instantly fuse and combine with one another and with the adjacent particles of charcoal, forming sulphate and carbonate of potash, setting free carbonic acid gas, nitrogen and carbonic oxide. The sulphate and carbonate of potash may be termed the ash of the gunpowder. These solids constitute about 56% of the total weight of the products of combustion; only about 44%, therefore, are gaseous.

Smokeless explosives are compounds in which the oxygen is in chemical union with the combustible elements—carbon and hydrogen.

The products of combustion of smokeless powder being practically all gaseous, it is easy to understand why it is so much more powerful than black gunpowder.—Hudson Maxim in Cassier's Magazine for July.

The Source of Gold.

TO THE EDITOR:—For several years miners worked the placer mines in a region which had never been surveyed. I was one of the number. There were some very peculiar things about the distribution of gold in the various gulches. One gulch would have a comparative abundance of gold and the next one to it would have little or none. The gold was found in the bottoms of the gulches and upon high bars along the principal streams. Much of the gold was coarse. So irregularly was the gold distributed that all were puzzled to account for the source of the gold. Many of the miners thought it came from a great distance—forty or fifty miles—and many were the prospecting parties that went off in the direction of the limestone range to find the source of the gold. One day I chanced to climb a very high hill, from the summit of which I obtained a magnificent view of the country for miles. As I sat and looked over the rugged hilltops, I thought how interesting a map of the country would be, and determined to make one. The work was commenced and required some time, and, when completed, it was only a good sketch map at best; but this map demonstrated some facts in the distribution of the gold. On it were marked all of the principal streams, with their sinuous courses and many of the tributaries. The quartz mines occurring in the region were also indicated on the map. It was then observed that the quartz veins occupied a belt about one mile wide and traversed the map in a northwesterly direction across the twenty miles of territory included in the map. Every stream or gulch, without exception, which headed in this great gold-bearing zone contained placer gold. Those streams which headed west of the belt and flowed westerly contained no gold. Those which headed west of the belt and finally entered and crossed the belt were not gold-bearing until they had entered the belt. Those streams heading east of the belt and flowing easterly contained some gold, but were, generally speaking, poor pay. Some of the streams were very crooked, and one, heading within the belt, flowed westerly, turned south and back to the east again; this stream was very rich, particularly when it reentered the belt. These facts demonstrated to my satisfaction that the gold belt was the source of most of the gold in the district and that the forces of erosion had worked from west to east. That found in the high bars along the principal streams may have been partly derived from more distant sources in the early history of those streams. A correct map of a mining region often throws light on perplexing geological problems. OBSERVER.

Rapid City, S. D., June 27th, '99.

Water Power Electric Plants in the United States.

B. C. Washington, Jr., of Washington, D. C., read a paper recently before the Electrical Section of the Franklin Institute, at Philadelphia, entitled "Water Power Electric Plants in the United States."

He gave a historical resume of the application of water power for operating machinery, and its recent application for driving dynamos. He also spoke of the development of water wheels from the crude devices of the ancients to those of the present time which have attained the maximum of efficiency. Methods for determining what water powers should be developed were explained, and the advantages of the electrical transmission of power were fully exploited. Attention was called to the possibility of developing water powers that are remote from manufacturing or mining centers.

The conditions which regulate the use of different styles of water wheels and the proper means of connecting them to the generators were also stated. Mention was made of water wheel governors and their value for regulating water wheels when there are variable loads on the generators.

He then stated his views concerning the proper kind of generators to use, and rules to be followed in building transmission lines. With a few remarks relative to insulators and transmission wires, he took up the description of such plants as the Folsom-Sacramento, Cal., transmission, the Newcastle-Sacramento, Cal., transmission, the Provo-Mercur, Utah, transmission, and the Mechanicville-Schenectady, N. Y., transmission. Then followed short descriptions of the equipments of a large number of transmission plants illustrating the various applications of electricity for mechanical purposes.

The subject was fully covered and illustrated by lantern slides, which showed almost the entire hydraulic and electrical equipment of four transmission plants. Sectional and plan views were shown of dams, views of the head gates, power houses, water wheels, water wheel governors, generators, switchboards, transformers, transmission lines, and substations and their equipments.

Views were shown of vertical and horizontal turbines and impulse wheels, operated singly or in numbers, direct connected or belted to generators or operating shafting with pulleys and friction clutches.

To cover the applications of electrical power views were shown of electric motors operating mining hoist, mining drill, ore crushers, ore roasters and converters and cotton mill machinery.

Due attention was called to the great value of water powers, and the fact that a great many powers of commercial importance were now allowed to go to waste.

As the result of Mr. Washington's investigations, he stated that there are nearly 500 water power electric plants in the United States, representing an aggregate investment of over $60,000,000; that the total H. P. represented by water wheels in these plants is upward of 200,000; that these plants furnish electricity for 28,000 arc lamps, 60,000 H. P. of motors used for manufacturing, mining and other purposes, and besides this supply current for the motors on the cars operated on 610 miles of electric railways.

In conclusion, he states that the utilization of water power for generating electricity for transmission has made possible the reduction of low-grade ores and the building up of large manufacturing cities in localities where the cost of steaming coal would have prohibited the establishment of such enterprises.—Electrical Review.

Mining Summary.

ARIZONA.

The Phœnix mine, eighteen miles north of Phœnix mountains, is to be reopened and a test made of the ores. When formerly operated, the ore gave some difficulty in treatment, but a cyanide plant has been put in and other improvements made and the owners now expect success.

In the Mineral Creek mining district J. C. Colquhoun, Supt. Arizona Copper Co., has opened up copper prospects at a depth of 40 feet.

Yuma *Sun*: It is reported that the Nicolson G. M. Co. has sold its properties in the Cave Creek district, Maricopa county, known as the Portmanteau group. There is in sight a large amount of ore. Considerable development work has been done in past years and it is understood machinery will be erected.——Chicago and Los Angeles people have purchased the old Poihamus group of copper claims, in Seneca district, including what are known as the Gregory, Grand Cross, Garfield, Grant, Homestake, Boston and Bay State mines, owned by D. J. Shackrow and J. May. The property is an old developed mine, which has produced thousands of pounds of bullion. The price was $50,000, of which $6000 has been paid. When formerly worked the ore was shipped to Swansea, Wales.

Globe *Times*: Grading is being done north of the Old Dominion smelter for more ore bins and a new 160-ton furnace is being erected. The new smelter engine, a Corliss, 22x30, runs smoothly. The new hoisting engine at the Old Dominion mine is the largest in the Territory, and has 20x60 cylinders, is direct acting, double reel hoist, operating two flat ropes ¾x5¼, either singly or in balance, and capable of hoisting a double-deck cage with two cars from a depth of 2000 feet.——At the United Globe smelters the present month will show a good output of bullion.——The claims of W. B. Collom, T. Kavanaugh and F. Gill were bonded by D. L. Browne, although there was no ore in sight. Work was started on the Man Tiger, Kavanaugh and Collom, and a 50-foot shaft on each of the claims shows rich bodies of ore. A company has been formed to operate these mines called the United Arizona, with a capital of $2,500,000. John P. Jones is president; C. Lane and C. E. Sherman are directors. There are two bank presidents also interested.

CALIFORNIA.

Amador.

The Columbia G. M. & M. Co. has sued A. Caminetti and L. A. Gross for $50,000 damages. The complaint states that Caminetti owned the Continental quartz mine, in Drytown district, and made an agreement in 1897 to transfer it to T. B. Dillon; that the Columbia Co. became the owner of Dillon's contract and of the mine by a transaction with him, and that it expended $16,500 in developing the mine; that on May 9, 1898, Caminetti entered the mine and forcibly took possession, and that the company has since been prevented by him from doing any work there.

Jackson *Republican*: The 10-stamp mill at the Klondike mine, near Butte mountain, is running. Steam power is used.——A furnace is being built for roasting ore at Campo Seco copper mines. Operations were resumed at this mine a year ago. There is a 30-foot ledge that will go from 4% up.——At the Shenandoah the shaft is down 120 feet and at that point the vein is 9 feet thick. Mr. Thornton, the manager, has purchased machinery and is now preparing to erect a hoist.——The Ivanhoe Co., near Plymouth, has stopped its mill and discharged several men while sinking the shaft, drifting, etc., is in progress, until a large body of ore is accessible. The ore of this mine is heavily charged with iron pyrites and contains also free gold. The water pumped out of the mine contains traces of copper.——The Bay State mine, near Plymouth, was promoted five years ago and a company organized to develop the property. Work was carried on two years and a shaft sunk to a depth of 700 feet. This shaft was in the footwall and parallel to the ledge, and no crosscut was made to the ledge from the lower portion of the shaft. The work was very expensive owing to the large volume of water, and work was stopped. It was sold to Stockton capitalists, who are continuing the exploration work. They will crosscut to the vein and run drifts, and sink 300 feet more in the shaft.

Calaveras.

At the Thorp mine, near Fourth Crossing, the lessees have put in a heavy hoist and other machinery, and explain that they mean to sink from the 650-foot level to the 1500 or 1800-foot.

The Fort Wayne Gold Producing Co., J. F. Clapp, Supt., has been attached for $3000. Sheriff Thorne seized $800 in bank in Stockton, and the gold on hand. Three weeks ago Supt. Clapp went East without paying his employes, whose payday had passed. Clapp not having been heard from, the men struck and the mine shut down when two months' pay was due, and made the attachment.

San Andreas *Prospect*: Operations have commenced on the Poorman mine at Railroad Flat. Sinking and crosscutting are in progress.——Work has commenced at the Veritas mine near San Andreas. The water supply has given out, but arrangements are being made to run the mill by steam while water for the batteries will be pumped from the Ford mine and piped to the mill.

Del Norte.

Crescent City *Record*: Johnson & Burnett are running the beach mine at Gilbert creek with fair profit. Since the storms are over, they have not been hindered by the ocean. Besides gold, they save considerable platinum.

El Dorado.

The Jumper G. M. Syndicate has bought the Griffith Con., Manzanita Queen, Manzanita King, Potosi and Chollar gold mining claims, near Diamond Springs. The consideration was $70,666.

At the Marguerite mine, south of Placerville, a rich ore body was found last week in the face of the south drift at the 200-foot level. It is said that the ore broken down hung together with gold.

Placerville *Democrat*: The Esperanza, near Garden Valley, has shut down for repairs.——The new mill at the Gold Note is completed.——McGraw & Roberts have found rich ore in their Santa Clara mine, in the Kelsey district. During the past week they put forty tons through the Smith & Ranney mill and realized $400. The ore was taken from the bottom of a shaft 35 feet deep. The width of the ledge has not been determined yet, but is estimated at 12 feet.——W. Meyers put men on the Gardner Con. mine, in which he is interested. This mine, formerly known as the Van Hooker, is situated one mile north of Placerville. A milling test of ore from the surface workings yielded $18 per ton. The present underground developments consist of a 500-foot tunnel with 500 feet of drifts. They are drifting east toward the shoot from which the test was made, where they will have 300 feet of backs.

Humboldt.

At Orleans Bar, on Klamath river, sixty miles below Happy Camp, a large area of mining ground is to be worked this season by hydraulicking. A company bonded the ground several years ago and built ditches and flumes, all of which were washed out and destroyed during the winter of 1890. The ground was then patented and will be opened again. It is a rich mining section.

Kern.

It is reported that the Yellow Aster Co. at Randsburg contemplates increasing the capacity of their mill, having developed sufficient water to supply more than is needed by the 30-stamp mill.

Bakersfield *Californian*: The Golden mine is eight miles from Caliente and owned by J. B. Ferris. It was located in 1896 and for two years no development work further than that exacted by the law was done. Lately it was decided to develop it. The ledge is 65 feet in width, low grade free-milling rock, in the center of which is a 2-foot streak that carries gold in quantities and from which specimens have been taken.

Mariposa.

The business part of Coulterville was almost totally destroyed by fire on the 6th: loss estimated at $200,000.

The Mariposa estate is again reported sold; this time to Mernher, Beit & Co. and Messrs. Smith & Perkins, mine owners and operators. The property comprises 44,387 acres and includes a number of noted mines, among them the Princeton, Mount Ophir, Mariposa, Pine Tree and Josephine. These mines are reported to have produced not less than $5,000,000. The Pine Tree and Josephine mines are in such a condition as to be soon made available for production.

J. Schroeder of Sherlocks has a gold mine on his ranch in that locality which he has been working off and on for twenty-three years. The mine produces pockets of gold.

J. Waller owns a copper mine located at White Rock. Returns from the last car of ore shipped netted him $1600. He has three more carloads of ore ready for shipment. The shaft is down 90 feet.

Mono.

The Standard mill at Bodie was shut down five hours during last week, owing to the effects of the lightning. The mill crushed 217¼ tons of ore for the week. Average assay vanner tailings, $10.56. Concentrates produced, 1¼ tons; assay value, $142.74. Plate amalgam produced, 1609¼ ounces; value per ounce, $2.29. At tailings plant No. 7, 244½ tons of tailings were worked for the week. At plant No. 2, 109 tons of tailings were worked. The gross value of the bullion product of these plants for the months of April and May was $15,164.42, of which $14,476.59 was gold and $687.83 was silver. The total cost of treatment was $1200.95, or at the rate of $1.19.91 per ton of tailings treated.

Napa.

The Boston Quicksilver M. Co. has been capitalized for $1,000,000. The officers of the company are: J. Pfaff, Pres.; W. B. Buckminister, Vice-Pres. and Treas.; C. Pfaff, 2d Vice-Pres.; H. C. Buckminster, Asst. Treas. and Sec'y. The directors are: K. Hass, J. Pfaff, E. H. Mason, S. Rotshchild, C. Pfaff, A. Nickerson, W. B. Smith, H. C. Buckminster, W. B. Buckminster. Principal office of the company is at Cheyenne, Wyoming. The company has $100,000 cash capital. The property consists of 6000 acres, eighty-four of which are patented as mineral land, the balance agricultural. The mineral land covers the outcrop of a ledge for a mile; the agricultural land contains timber land and water. Three shafts have been sunk, the deepest 600 feet, and a number of levels opened. The mine has produced 107,200 flasks of quicksilver. The work of developing ore reserves has not been pushed and the amount of ore in sight is not extensive. The company expect to use improved machinery and to increase the production.

Placer.

Colfax *Sentinel*: G. McAulay, Supt. of the Mayflower mine, at Forest Hill, reports that the mine has been leased for three years to J. Finning, S. Bowman, J. G. De Bons, A. Martin, F. Smith, G. McAulay, L. Smith and J. Kelley. The Mayflower Co. contemplate the purchase of the Albrecht tunnel. If this purchase is not made a new tunnel will run, as the company owns one and a quarter miles of unworked ground on the Mayflower and Orono channels.——The Dutch Flat Blue Lead M. Co. are busy grading the foundation for a 10-stamp mill, to crush cemented gravel from their drift mine near Dutch Flat.——A. Brown is taking out pay in his river bar claim on the American river, below the Forest Hill bridge. He made one run this spring, when with two men and wheelbarrows he took out fourteen ounces of gold in fifteen days.——R. Taylor and G. Middleton, of Colfax, fourteen years old, are river-bar mining on the American near Colfax. They run the pay gravel through a rocker.

Auburn *Herald*: Prospecting is being done this season in the Meadow Lake section, in the eastern part of the county.——W. Houchin cleaned up twenty ounces the first of the week from rock taken from the extension on the Conrad, near Auburn.——J. Johnson has leased the Hathaway and has put a crew of men to work.——The Big Pine and the Crandall, near Auburn, have been bonded to Hopkins & Barnard of San Francisco.——The Herman mine, near Deadwood, is paying its usual dividends. The ledge is worked through the lower tunnel and is 5 feet in thickness. It has paid from the croppings down to the present level, 450 feet.——The Boulder shaft, near Ophir, is down 275 feet, and will be sunk to greater depth. The ledge is 2 feet wide. Last week the men struck the pay shoot. The ledge at this point is rich in sulphurets and gold.

Plumas.

Lessees are working out pillars and scaling the walls of the Plumas Eureka mine and others are picking over the dumps. The mine produced $13,000,000 during a period of forty-four years' continuous operation under various management.

Plumas *Independent*: Gold bearing gravel has been struck in the shaft of the Golden Ancient mine on Bear creek. Work in the shaft for this season was resumed a month ago. Bedrock has not been reached, but results are of encouraging character. James Challen has been connected with the Golden Ancient, Channel and other enterprises in the Bear creek country, which now promise to give good returns to himself and his associates.——Peter Hansen, while working in his mine on Big creek recently, found a nugget valued at $141.

Riverside.

(Special Correspondence).—The mines in Virginia Dale district are not working full force, owing to the great heat of midsummer, when the thermometer daily goes to about 120°. The O. K. mine is opened to a depth of 230 feet, with levels at 50, 100, 150 and 200 feet. On the 50-foot level and above the vein has an average width of 19 inches; between 50 and 150 feet it averages 30 inches, and between 150 and 200 feet it is 35 inches. There are two shafts connected by the several levels, and the circulation of air is good throughout. The formation is light gray diorite, cut by black or dark green, fine-grained dykes. Large dykes of felsite also occur in the district. Some of the veins are found wholly within the diorite dykes, others at the contact of the coarser light-colored diorite and the later dykes. Still others are found independent of dyke rocks. The veins of the district range from a small seam to over 6 feet in width. The smaller veins are usually richer. The average values are $15 to $20 for the larger veins and $35 to $100 for the smaller veins. A scarcity of water is the only drawback to the development of this region. Gasoline engines have proven efficient in running hoists and mills.

San Bernardino, July 1st, '99.

San Bernardino.

Pleuth & Connell, who are working the Waterloo mine near Calico on lease, are reported doing well. There are still good streaks in the Waterloo and large quantities of low-grade ore.

W. E. Robinson, a director of the Ivanpah Smelting Co. of San Bernardino, brought suit in the Superior Court to have a receiver appointed for the company, of which J. D. Hanbury is president. The mine is in the eastern end of the county, near Ivanpah.

Santa Barbara.

Oil mining companies are filing claims along the Santa Barbara beach. The Castle Rock M. Co. this week filed a fifty-year incorporation, with a capital stock of $50,000.

Shasta.

It is reported that this county is to have a second smelting plant. A syndicate of German capitalists, represented by G. Bayha, are to establish the new enterprise. The smelter will be located on Pit river, six miles from the Southern Pacific Co.'s line and twenty miles north of Redding.

Assessor Ludwig has raised the assessment of the Mountain Copper Co. from $350,000 to $1,066,720, being the highest valuation placed on mining property in California, the next highest being the Utica mine in Calaveras county.

Dailey Bros. own the Sunrise, Sunset and Keystone claims between Shasta and the Mount Shasta mine, which they are developing. Their camp is called Oro Vista.

Redding *Free Press*: A lease on the Clara quartz mine in Shasta mining district, owned by O. LaPlant, has been secured by J. Gilardy and J. M. Bowden.

Redding *Searchlight*: Changes are in progress at the reduction works of the Mountain Copper Co. at Keswick. Two stacks are under way. A brick stack which, when completed, will be 12 feet across and 160 feet high will replace the present smaller one on the roasters. The second stack is of iron and will be 9 feet across and 140 feet high. The stack is equipped with dust chambers and waste from this source will be overcome. In the past the slag from the ore smelted was granulated in a stream of water and carried down the creek. An elevator is being erected and the slag will be loaded into cars to be dumped on the ground adjacent to the main track. Evidences of the fire of May 11th are almost entirely effaced. The engine is again employed on the road. It was repaired in the company's shops. The new shops are of corrugated iron. The largest is 60x220 feet and contains improved machines for iron work and specially designed machinery. The foundry is also complete. These shops construct and repair everything about the plant and at present are building the 600-ton furnace. Seventy-five skilled mechanics are employed.

Sierra.

M. H. Callaghan has men employed at his recently acquired gravel mine. They are working by the dry washing process and, it is reported, doing well.

The Butte mine near Sierra City has resumed operations.

W. Gillingham began work at the Chipps mine last week with eight men.

It is rumored that C. D. Lane of Angels, Cal., has bought the Young America mine and three-fourths of the Mountain mine near Sierra City.

Siskiyou.

Yreka *News*: It is reported that H. H. Hunter has bonded his copper claims at Happy Camp.——F. Brandenburg reports having found a cinnabar ledge on Young creek, near the Klamath river.——Parties from Colorado have purchased the interest of Hunter and Fry in the Cherry Hill mine.——Supt. Stevenson has erected a hoisting plant on the Nebrass property, which adjoins the Blue Gravel.——Cleaning out and repairing has commenced on the Old Craggy quartz mine, to be followed by development of the lower adit level.——Ore from the Merrimac mine, in Humbug district, is being crushed at McCook's mill at Brownsville.——Work at the Cope mine, in Greenhorn district, is progressing under new management. The milling plant is modern. Thousands of dollars have been extracted with the aid of a hand mortar.

Yreka *Journal*: There are, all told, 225 stamps and two rotary mills in Siskiyou county. Of this number 150 stamps are in operation, as much as the water supply of the properties will permit. Forty stamps are idle from various causes. The remaining thirty-five stamps are worked occasionally, doing custom work. Of the total 225 stamps, 100 are in the Salmon river country, as are also the two rotary mills. Not one of the stamps in that district is idle, and several arrastras are kept busy in same locality. Of the forty stamps now idle, fifteen are to be started. The 225 stamps are divided among thirty-two mines. The Black Bear and Gold Ball have the largest number. A number of new mills are in contemplation by parties who have recently purchased mines here.——Page & Co., who have purchased the Abe Erno mine in Quartz valley, are down 70 feet with their shaft, near bedrock. They have an 85-H. P. boiler for running the pumping machinery.

Trinity.

The La Grange property is four miles from Weaverville. The company owns 3000 acres of land there, with miles of ditches and pipes. Five giants are in use. A million of dollars have been spent in equipping the property. The season's cleanup is to be made soon.

Three successive dry seasons have affected the district. Cleanups are being made.

The McMurry & Hupp mine has yielded $17,000 for the season.

A new property is that of T. Bergin, which was sold within the last week for $35,000. It is located at the junction of Dutch creek and Trinity river, seventeen miles below Weaverville. The new owners are making improvements, including fifteen miles of ditches, the preliminary surveys for which are being made.

At Trinity Center the Bloss & McClary mine is running to its full capacity.

Tuolumne.

Sonora *Union-Democrat*: The Stanislaus Dredging Co., of which W. M. Stover is Pres., will put in a dredger near Robinson's Ferry. It will be 80 feet long, 40 feet wide, and draw 14 inches of water, permitting its operation during the period of low water. Bedrock is to be reached by a caisson 14 feet square, which will be sunk by its own weight, when the water will be forced out by compressed air and the space within the caisson cleaned up, and so on. The dirt is to be hoisted to the boat by means of a 12-inch centrifugal pump and turned into a double line of sluices, each making the circuit of one end and both sides of the craft, an aggregate length of 400 feet. An electric plant is to be installed.——The Atlas mine, an extension of the Bown, near Jackass hill, which has been lying idle for six months, will resume work the coming week, orders to that effect and $25,000 having been received from Scotland. The 500-foot tunnel from Soldiers' gulch will be driven to the old Atlas mine, 4500 feet farther. Mr. Barnar is Supt.——At the Confidence mine, at Confidence, ore is being mined on the 800 level. The force is small, owing to a limited supply of water, and the mill is hung up.——Drifting for the east vein in the Bown continues from the 300 and 400 levels. A shipment of concentrates to Selby has been made.——Pumping the water out of the Belle mine continues.——The Street mine at Tuttletown resumed operations last Monday, with G. Bower as Supt. For the present a day shift will be employed and work confined to sinking in the main shaft.

Sonora *Independent*: The Draper mine, near Soulsbyville, from a new discovery in the old workings, has shipped four tons of ore to Selby at San Francisco. This is the first time in thirty years that the mine has produced any ore of consequence. The mine is now in the hands of the Boston G. M. Co., G. F. Dyer Supt. This company secured the property last April, and since that time has been placing the workings in condition. The shaft is 300 feet deep and will be sunk an additional 300 feet. A 10-stamp mill will also be built. The Draper ore is high grade.

Jamestown *Magnet*: The Harvard M. Co., at their mines on Whisky Hill, near Jamestown, have erected a boarding and two bunk houses. Commencing July 1st, this company will board its employes. Supt. Munger is grading for a 60-stamp mill. The site selected for the mill is on Woods creek, east of the old mill.

COLORADO.

Pres. W. N. Byers of the State Board of Arbitration says that everything is favorable

for a settlement of the differences between the Smelter Trust and its employes. President Nash of the Smelter Trust is expected in Denver, and it is believed he will give Mr. Grant authority to conclude the negotiations now under way.

For the twelve months ending June 30th, '99, the gold received and paid for at the Denver Mint was $21,144,247, as against $16,240,441.93 for the year ending June 30th, '98. About 97% of the bullion received at the Mint is credited to Colorado mines.

BOULDER COUNTY.

The Nancy M. & M. Co., at Wall Street, has installed a three-drill air compressor and a 50 H. P. boiler and engine. The tunnel is in 190 feet and is to be run 700 feet farther to intersect the Gillard vein. The shaft on the Gillard will be sunk 400 feet to intersect the tunnel. A steam hoist has been installed on the Gillard.

CLEAR CREEK COUNTY.

Denver *Republican*: Anderson & Co., working the Jenny Lind mine, in Hukill gulch, have opened 7 feet of pay ore, which was found near the junction of two lodes in the adit level.——Philadelphia parties have taken a lease and bond on the Bullion claim for $10,000. A shaft will be sunk at the mouth of the adit level and machinery installed as soon as the shaft has reached sufficient depth.——The Marshall property at Empire is to be worked under the leasing system. Sixty-five full patented claims are owned and several of the lodes have been cut by the tunnel. Mr. Marshall says five of the claims are being worked. Within sixty days he expects to be working twenty sets of leasers. Machinery is to be put in by one of the lessees who has a wide streak of ore on one of the claims. The owner will put in a compressor and drive the tunnel 2000 ahead feet.

GUNNISON COUNTY.

(Special Correspondence).—The Ashland M. Co. of Ohio City is developing a group of twenty-one patented claims, located between Jones and Dutch gulches. The property has over 1000 feet of development—most of it done in prospecting, near the surface. Thirty-one veins have been opened. The result of this work being satisfactory, the company has begun a crosscut tunnel to cut the veins at depth. This tunnel is in 135 feet, and at 130 feet cut a blind lode 5 feet wide which looks well. The company is drifting on this vein for an ore shoot and at the same time driving the main tunnel ahead, the first of which will be reached in 50 feet. The crosscut gains 600 feet vertical depth in the first 500 feet of length. The veins pitch toward the mouth of the tunnel.

Among the mines surrounding the Ashland group, the Chloride recently shipped three cars of ore averaging $150 per ton and another shipment is being taken out. This property was purchased last fall for $25,000 and is credited with paying the purchase price, running expenses and a dividend since that time. The mine employs fifteen men.

The Granite Mountain is working six men and getting out a little ore. The manager expects soon to strike the main shoot.

The Calumet ships a car of high-grade ore occasionally and the mine is improving.

Two years ago the Little Jessie shipped two cars of ore, netting $2500, and has since suffered from litigation. The trouble has been settled, and work on this mine is now progressing on a 12-inch streak of $200 ore.

The Raymond mine employs fourteen men and is producing some rich ore. The values have improved from the surface to the present depth, 200 feet, and the manager states that the ore is becoming richer and more abundant. The Raymond Co. intend to drive a crosscut parallel and 3000 feet north of the Ashland Co.'s main tunnel. In 1000 feet the crosscut will open the Raymond vein at a vertical depth of 800 feet.

The Cortland has considerable ore on the dump ready for shipment.

The Sacramento and Volunteer, the two best developed mines in the camp, are idle. According to the statements of former managers, they have produced about $1,000,000 each, and, it is reported, they are still in ore. Reasons given for the shut-down are various. It is reported that the Sacramento is to start up again.

The Treasury, Little Dora and a number of other claims are working small forces, and the prospect for considerable development work in the camp this year is good.

The Mono cyanide mill is running steadily on the tailings from the Baker mill and is reported to be getting from $5 to $15 per ton from them.

The formation up here is mainly gneiss, granite and schist, cut by porphyry dykes. There is some hornblende, diorite and, according to the experts, trachyte. The ores are quartz, with iron oxide near the surface, and copper and iron sulphides with depth. The veins are fissures and contacts, mostly the former. Good roads, timber and water are abundant.

Ohio City, July 1st, '99.

The pumps at the Black-Queen mine, Crystal district, have started and development will be commenced when the mine is unwatered.

The machinery for the Cramer concentrator has arrived at Scofield and the mill will be ready to treat ores by July 10.

La Plata mine in Paradise gulch, Crystal district, will make its first shipment this week. A large amount of good ore is on the dump.

PITKIN COUNTY.

The people of Aspen have formed the Aspen Home M. Co., with a capital stock of $250,000, to develop a number of properties in the vicinity of Aspen.

LAKE COUNTY.

The Sedalia mine at Leadville is again in the hands of the owners, O. C. Bartholomew and Mr. Pickering. The mine was developed by W. H. Yankee, who sunk a shaft and took out considerable ore. The mine was examined and accepted by a son of Senator Clark of Montana last fall, and the money for the first payment deposited in bank, but a disagreement arose and defeated the deal. Arrangements are making to resume operations.

SAN JUAN COUNTY.

The 450-foot crosscut tunnel on the Jordan mine has been completed, and has cut a 10-inch streak of solid gray copper and lead that yields a good value.

SAN MIGUEL COUNTY.

Denver *Republican*: The Caribbeau mine and mill of Ophir has resumed operations after a suspension of two weeks. Seventy men are employed in mine and mill.——The operators of the Keystone placer have reached bedrock at a depth of 40 feet, and are putting in an elevator. The company has a gravel deposit 40 feet thick, 300 wide and 2 miles long. The elevator will handle 2500 cubic yards daily. ——The Mayflower, one of the big producers of Bridal Veil basin, will resume operations next week.——The erection of the Gertrude mill at Ophir will be commenced this week. ——The Tom Boy mine at Telluride is working 200 men in mill and mine and taking out 200 tons free milling ore daily. The mine has storage facilities for concentrates produced during a run of seven or eight months, while the gold saved on the plates pays the expenses of operation.

IDAHO.

The Mammoth mine at Wallace has resumed work with a force of twenty-five men.

Spokesman-Review: R. M. Sherman of Spokane has commenced work on the Hobson's Choice with a small force. The claim is an extension of the San Francisco.——Rigley & McKinney, part owners of the Big Buffalo, are still shovelling snow from the open cuts on the Merrimac, to have the surface ready for the experts who are expected.——The Crackerjack is cutting the lead, and is looking well. The owners will commence drifting as soon as the crosscut is finished.——The St. Paul is working a force of men, but nothing concerning the development has been made public. ——The snow is disappearing slowly and old stakings are beginning to show up. Of the new locations made since February it is now impossible to read some of them from the ground. On a tree which stands on the lee side of the brow of a hill there is a notice, now 20 feet above the snow, which is still 10 feet deep about the tree.——The Big Buffalo Syndicate has a United States deputy surveyor at work on Lake creek surveying placer ground, and has its ditch for the work nearly completed. The work is under the supervision of W. H. Hill, the company's engineer.——F. Brown has men at work on his placer ground, the Truesdale, on Deer creek, running a ditch. They are shovelling through 4 feet of snow.

NEVADA.

Pumping operations on the Comstock continue and are making material progress since the repairs to elevator No. 1 were completed. Mgr. Ross' latest official telegram is as follows:

"VIRGINIA, Nev., July 6th, '99.

"*To Alg. Waterman, Secretary Comstock Pumping Association, San Francisco*: No. 1 elevator is working continuously. The water is down 191 feet 1 inch below the 1750-foot level and stands 3 feet 11 inches on the 1950-foot station level. G. McM. ROSS."

NEW MEXICO.

Santa Fe *New Mexican*: R. A. Bradley has made mineral discoveries at Bradley's camp, four miles from Glorieta. It is low-grade ore with many pay streaks, and near the railroad, with water and timber plentiful. Thirty claims have been staked out by Minnesota parties. Mr. Bradley has staked off fifteen claims, on which he has done development. On one prospect there is a 200-foot and a 100-foot shaft, with 235 feet of tunnel and other development. This lead is 25 feet wide and has a granite foot wall and a lime hanging wall. Twelve claims have been staked on this lead. It contains gold, silver and copper. Another lead is 30 feet wide and has four claims staked on it. There are several other large and well-defined veins. Galena and lead ores, as well as magnetic iron ore, are found around Glorieta. Some of the iron ore carries gold and silver. There is also lime and coal at the camp. Mr. Bradley has erected a steam hoist. He has worked at Glorieta for eighteen years.

OREGON.

A new tramway is to be built at the Union-Companion mine at Cornucopia, by A. Sanders of Silverton, Colo.

Jacksonville *Times*: Lund Bros., who are developing the cinnabar ledge in Beaver creek district, for the Siskiyou Quicksilver M. Co., have struck good ore.——J. Berham of Portland, who is interested in the cinnabar mines in Meadows precinct, has let a contract for running a tunnel.

SOUTH DAKOTA.

The Moore group of tin mines, seven miles west of Custer, which were recently purchased by E. C. Johnson, comprises the Dolphin, Tempest, Tornado and other locations. The veins vary from 4 to 20 feet in width, and in all the open cuts or shafts of 10 to 30 feet in depth tin stone or cassiterite shows up. There are also found veins of quartz which carry gold. It is said that these mines have been purchased with the intention of developing them and working them for the tin they contain.

UTAH.

(Special Correspondence).—Recent attacks of an Eastern paper on the Boston Con. Copper & Gold M. Co. and its Bingham, Utah, proposition have brought forth vigorous protests from many of the most capable mining men of the State, who consider the aspersions unjustified by facts. It is believed the unfavorable comments were made without an investigation of the property or an inquiry into results of developments, assays and mill tests.

Without seeking to become the champion of the Boston Con. or to pose as an authority to settle questions of economic metallurgy, I desire herein to record some of my observations as the result of a day's visit to the property in Bingham canyon. The company's holdings comprise 339 acres, extending from the Highland Boy grounds on the west to the DeLamar properties on the east. Adjoining them on the south and on the east are the Commercial group and that of the Old Jordan and Galena. On the north are the properties of F. B. Cook & Co. The Highland Boy and Boston Con. appear to end-line with each other, and the veins and ledges, so well developed on the former, are undoubtedly the same as those which are opened on the latter. The grounds of the Boston extend from Muddy gulch, a branch of Carr Fork, across a mountain spur, to Bingham canyon. On the Carr Fork side of the mountain is that portion of the property known as the Stewart group, whose surface workings have produced a great deal of oxidized gold-bearing ore. On this side are four tunnels—the Armstrong, Campbell, Phœnix and Bulldozer. The first-named is the lowest, and goes in 1000 feet, which crosscuts the main vein. The Campbell has been driven to a depth of 1300 feet, opening the same vein as that cut by the Armstrong. An upraise is being made to connect the two. The veins encountered by these two lower tunnels are contacts, having porphyry foot wall and lime hanging wall. Several hundred feet higher up the hill is the Bulldozer tunnel, in about 900 feet, which crosscuts several veins, and farther in it drifts on a vein which parallels the main vein of the Armstrong and Campbell tunnels. This tunnel is driven at a level where the oxydized and carbonate ores above appear to meet the sulphides below. Development here is such as to disclose ledges of solid ore from 20 to 50 feet in width. The oxidized material is rich in gold. The sulphides carry copper, gold, lead and silver. Still higher up the hill is the entrance to the Phœnix tunnel, driven to a depth of 400 feet, on the strike of the vein. Here there is in evidence the work of former lessees, where much stoping and some sinking has been done. On this level the ores are chiefly oxidized, wherein the gold values doubtless preponderate. The Phœnix vein is apparently the same as that found in the upper workings of the Highland Boy, which initiated the latter as a gold proposition and caused its cyanide mill to be built. All the veins in the four tunnels named, yielding sulphides in the lower and oxidized ores in the upper workings, are carried by an immense zone, trending eastward and westward, and approximately 2500 feet in width, the material being porphyry, limestone and quartzite.

In general, the ores of veins just described run from 4% to 16% copper, with gold values of considerable importance right through. The proposition presented by conditions on this side of the hill is very similar to that of the Highland Boy, and appears to have been as thoroughly tested as the latter, though it is doubtless true that Highland Boy ores carry higher values than do the ores from the Stewart group of the Boston Con.

But, climbing to the crest of the mountain spur and looking to the opposite side toward Bingham canyon, the company's remaining grounds spread out before you. About 700 feet above the bed of the canyon the Copper Center tunnel cuts into the mountain a distance of 1300 feet in a westerly direction toward the Stewart group, on the opposite side. About 1000 feet above the Copper Center the Jubilee tunnel penetrates to about 800 feet in the same direction. At various stations crosscut drifts are made from the main tunnels for the purpose of exploration. The entire workings disclose the fact that this side of the mountain comprises an immense mass of mineralized porphyry. There appears to be an absence of well defined veins, but simply a great zone, which thorough tests prove to be uniformly mineralized. Tests by concentration and assays extending, it is claimed, over a period of five months, showed a saving of about 80% of the values, which showed an average of 2.47% copper and 58 cents gold per ton. It is shown that the Markham concentration mill was leased for several months and was kept busy running this ore. In the tests made twenty-two tons of crude ore were concentrated into one ton and the values are attested to by the returns from the smelter which reduced the concentrates.

A question raised was whether copper ore of this grade can be mined, concentrated and smelted at a profit. The mining proposition, so far as this copper zone is concerned, is simply a question of stripping and quarrying; the concentration problem is one of facilities for handling a large tonnage of the ore in the vicinity of the mine; the smelting factor is a question of concentrating the ore down so that it will stand shipping and treatment charges. The matter of providing water for a large concentration mill will entail some expense, but this is not a serious problem. The only figures and calculations I have seen in the direction of settling the question above are those compiled by the Boston Con. Co., and their figures are evolved step by step from such thorough and apparently accurate tests that I think the mining public will not fail to properly discriminate between conclusions based upon tangible demonstration and those built upon presumption. WASCOTT.

Salt Lake City, June 26th, '99.

The Taylor & Brunton Sampling Co., since Jan. 1st, '99, have handled from Tintic district, 23,871 tons; Bingham, 4223 tons; other Utah camps, 4538 tons; total, 32,632 tons.

FOREIGN.

BRITISH COLUMBIA.

Frankie Florman, of Rapid City, S. D., has discovered a vein 200 to 600 feet in width and a mile long at Atlin City. Surface assays average $8.

Sandon *Review*: The Noonday mine near Silverton is being worked, the management paying $3.50 for eight hour shifts. The ore body contains 5 to 9 inches of concentrating ore and from 10 to 24 inches of solid galena. Gray copper has also been found.

Cascade *Record*: Underground work on the Golden Crown, in Wellington camp, has been stopped pending the installation of the 60 H. P. boiler and engine and the 5 drill compressor. The shaft will be continued to the 300 level.——D. Mann, who owns the North Star, near Fort Steele, and mines near Greenwood camp, including the Brooklyn, Stemwinder, Idaho and Rawhide, will organize a company, to be known as the Dominion Copper Co. to open and work these mines.——Since the 200 level was reached with the double compartment shaft on the Mother Lode, in Deadwood Camp, 600 feet of crosscuts have been run from the bottom of the shaft in four directions.

MEXICO.

The Copeta copper and gold mine in Sonora is reported sold to a New York syndicate for $3,000,000. The mine is owned by W. Melczer of Phœnix and J. J. Hardwick.

NEW ZEALAND.

The development of the Keep-it-Dark reef, discovered a few months since at Reefton, is progressing. The tunnel being driven from No. 3 level to intersect this lode is in 200 feet and will make available 400 feet of backs. The company is erecting a plant for the treatment of the tailings by the cyanide process, as the tests made have shown that gold is lost by the ordinary milling operations. The company paid dividends in the past amounting to £113,415.

SOUTH AFRICA.

Johannesburg *Mining Journal*: The first mile of 28-inch piping has arrived for the permanent main of the water scheme decided upon by the United controlling groups for the supply of water to the line of Main Reef. The scheme involves the lifting of the needful quantity of water to a storage reservoir on the Klipriviersberg range of hills, from which the water will distribute itself by gravitation. The remaining seven miles of this piping are being shipped. The pumping engine required to lift 9,000,000 gallons of water daily to the height of 900 feet is also being shipped.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

POSTAL BOX SIGNALS.—Francis C. Bates, San Jose, Cal. No. 627,635. Dated June 27, 1899. This invention relates to a device which is called a "postal box signal." It is especially designed for use in connection with boxes for receiving mail matter in rural districts, where the postmen have to traverse considerable distances, and where the boxes are frequently at some distance from the regular line of travel. It consists of one or more signals connected with the box and a means for displaying the signal by the act of introducing postal matter into the box, so that it can be seen from a distance whether there is anything in the box to be collected, and in the same manner a signal is displayed to indicate to those using the box whether any mail matter has been placed in the box for them by the carrier.

CULTIVATOR.—John A. Bliz, Pleasanton, Cal. No. 627,637. Dated June 27, 1899. This invention relates to improvements in cultivators of that class in which the cultivating teeth are attached to a frame having V-shaped or convergent sides. It consists in the employment of independent detachable boxes having sockets through which the standards of the cultivator teeth are vertically slidable and adjustable without being capable of turning from side to side. The faces of the boxes are inclined with reference to the sockets in which the standards move, so that when they are fixed to the inclined beams of the frame the standards and cultivator teeth will always remain in line parallel with the line of travel of the cultivator.

TRICYCLES FOR INVALIDS.—John C. Eames, San Francisco. No. 627,639. Dated June 27, 1899. This invention relates to improvements in tricycles of that class which are manumotive, or propelled by hand power. The frame consists of a rectangle formed of the front main axle, a rear bar is parallel therewith and has longitudinal connecting bars; a steering wheel socket with an inclined brace rod connects the rear bar of the frame with the base of the socket, and tubular vertical seat-supporting posts extend upwardly from opposite sides of the center of the axle. A rear bar and upwardly converging bracing bars connect at their lower ends with the front and rear bars of the frame, their upper ends uniting to form a support for the crank axle journal boxes, with independent crank axles mounted in said boxes and power connections between the crank axles and the front axle.

BED LOUNGES.—Charles H. Mullen, San Francisco. No. 627,657. Dated June 27, 1899. This invention relates to certain improvements in that class of furniture known as bed lounges, and it consists of a seat and back flexibly hinged together, automatically foldable legs having opposite ends in the plane of the movement of the back and intermediate portions turned at right angles to said ends, and means connecting said intermediate portions, said legs connected with the seat and the back and extensible to support the back in its horizontal position. A containing box forms a base and support for said superstructure, with hinges connecting the rear of the seat with the coincident edge of the box, and hinged connecting links by which the movement is limited.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JUNE 27, 1899

627,635.—POSTAL SIGNAL BOX—F. C. Bates, San Jose, Cal.
627,769.—HOISTING MACHINERY—H. C. Behr, S. F.
627,657.—CULTIVATOR—J. A. Bilz, Pleasanton, Cal.
627,960.—WALL FOR BUILDINGS—J. Brower, S. F.
627,846.—IRRIGATOR—W. A. Dunton, Los Angeles, Cal.
627,639.—TRICYCLE—J. C. Eames, S. F.
627,490.—TUBE CUTTER—J. P. Esveldt, Dartford, Wash.
627,640.—SCREEN—J. A. Fugate, Irving, Ogn.
627,777.—NOZZLE—H. H. Gorter, S. F.
627,921.—HAT FASTENER—H. S. Grace, S. F.
627,937.—DYNAMO—L. O. Lieber, Los Angeles, Cal.
627,761.—WEIGHING MACHINE—S. P. Mackey, Ridgefield, Wash.
627,737.—RETORT—G. W. McLeod, Tacoma, Wash.
627,757.—BED LOUNGE—C. H. Mullen, S. F.
627,527.—BURGLAR ALARM—A. P. Prichard, Tacoma, Wash.
627,702.—TEMPORARY BINDER—C. K. Rosenberg, S. F.
627,883.—SWITCH—T. A. Smith, Azusa, Cal.
627,562.—PROPELLER—W. Wood, Banta, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

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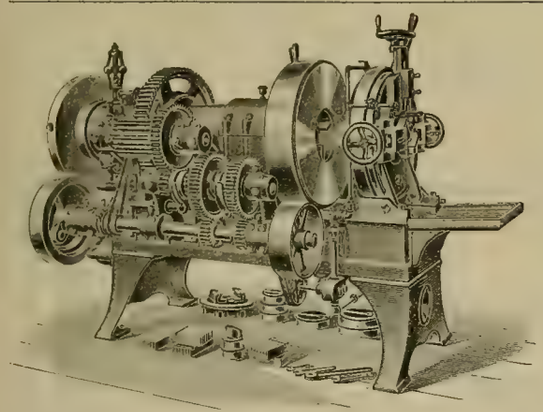
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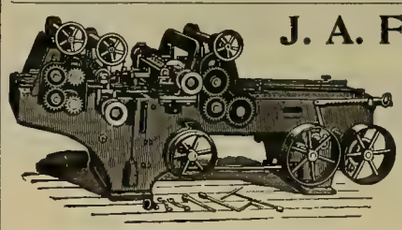


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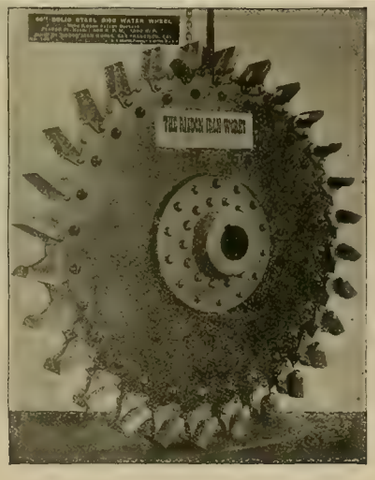
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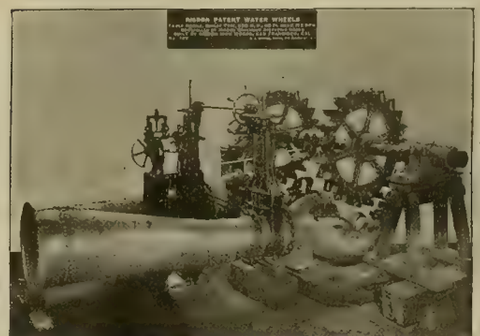
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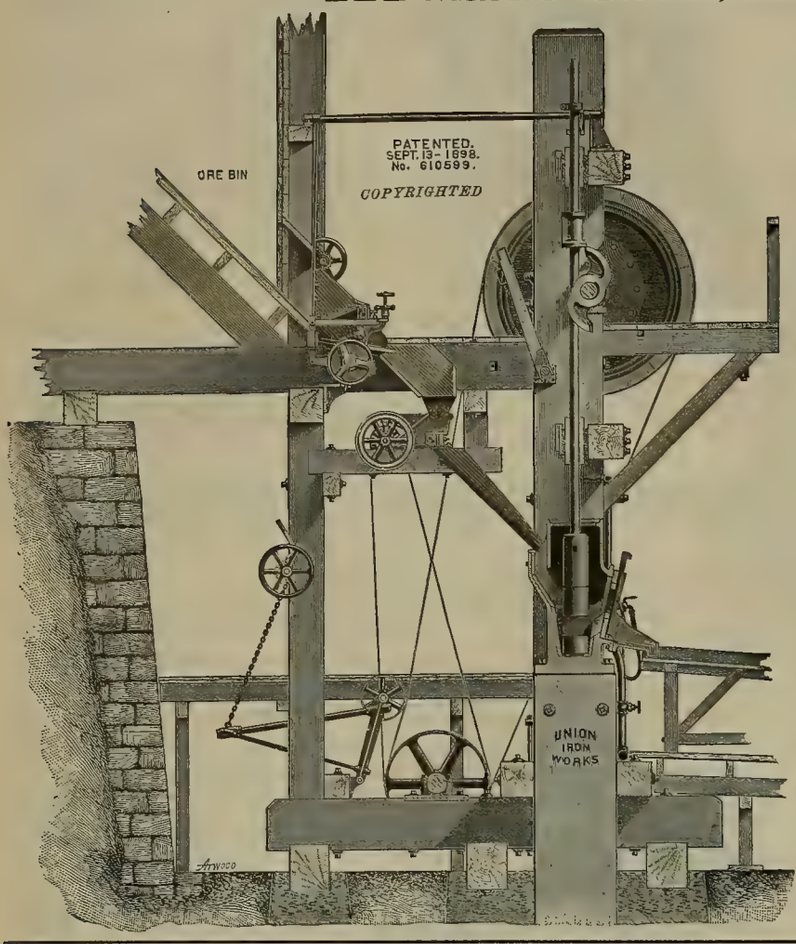
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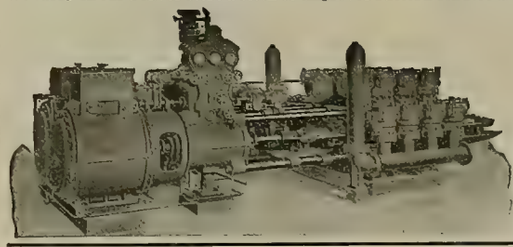


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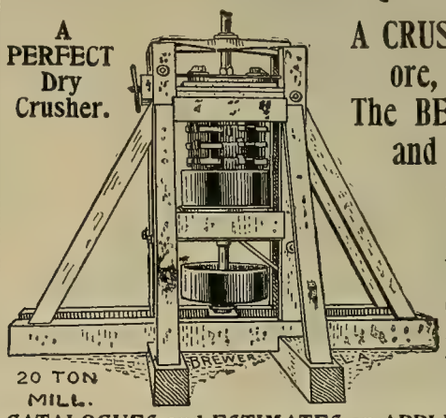
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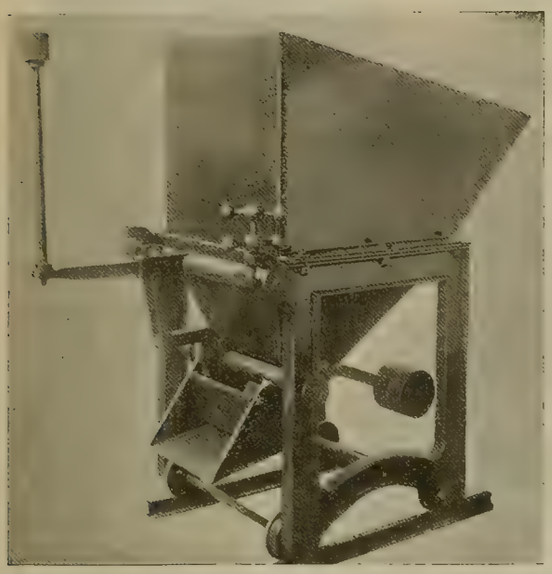
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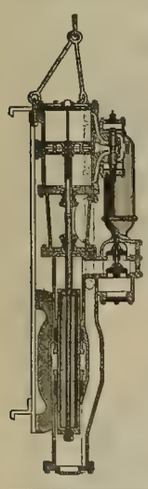
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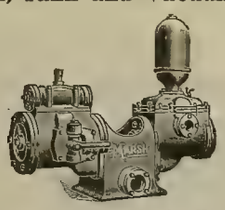
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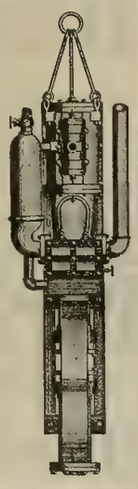
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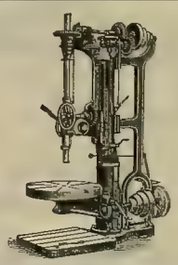
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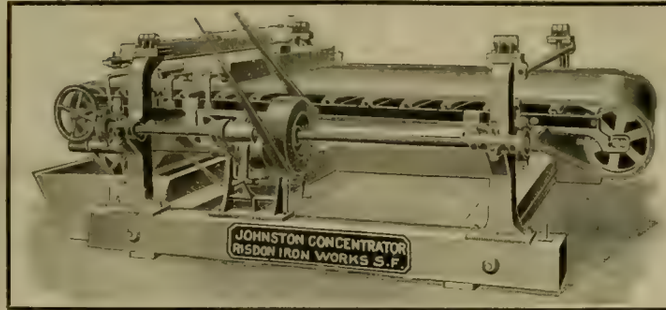
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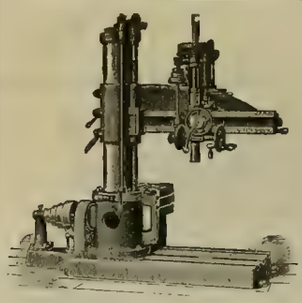
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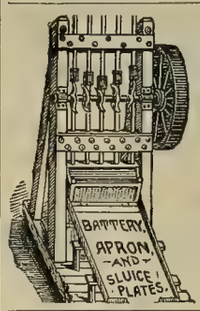
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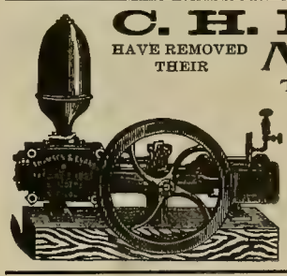


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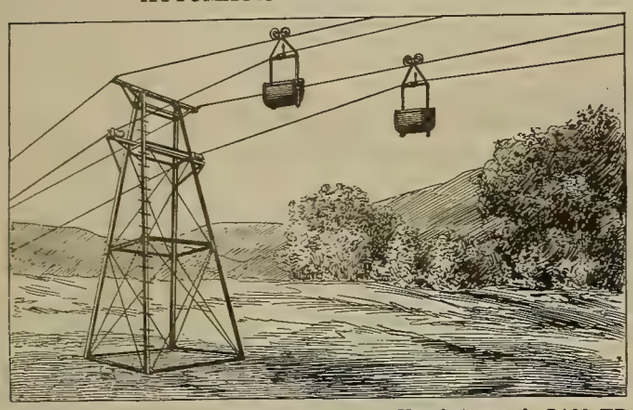
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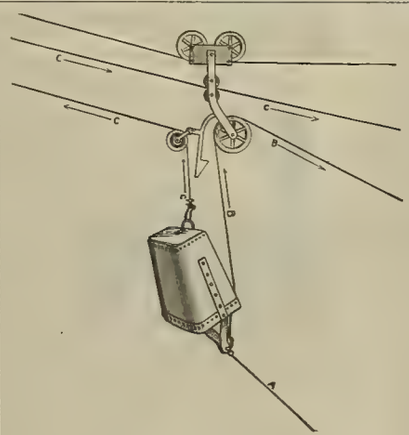


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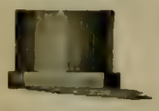
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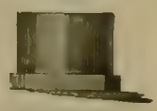


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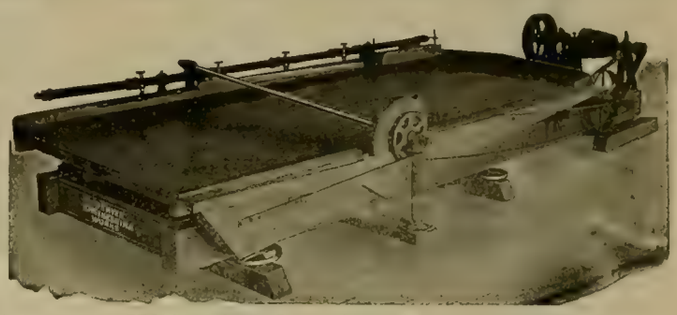


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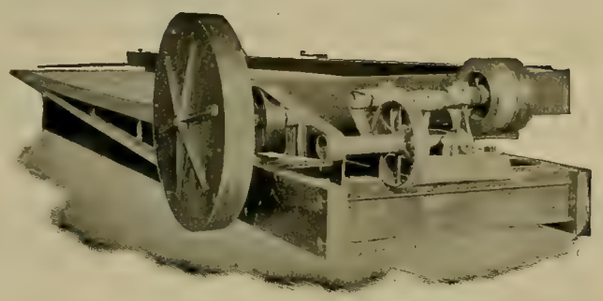
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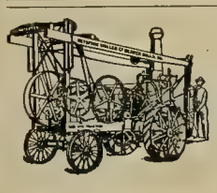
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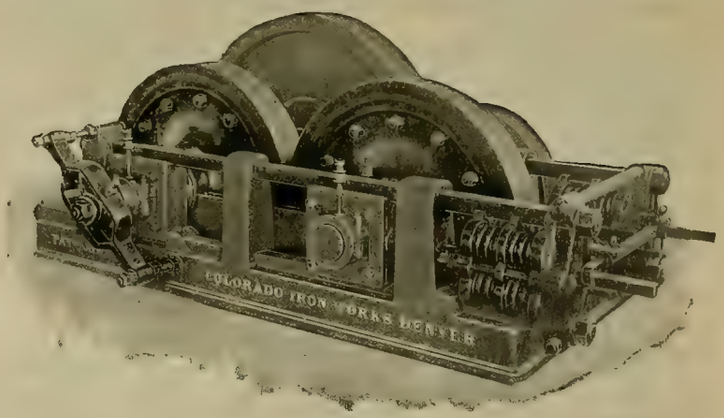
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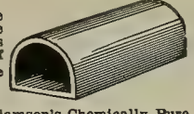
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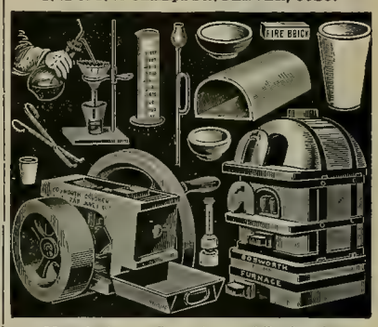
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1-3 ACTUAL SIZE.



The engraving herewith illustrates Brunton's Pat. Pocket Mine Transit as it appears when folded ready for the pocket.
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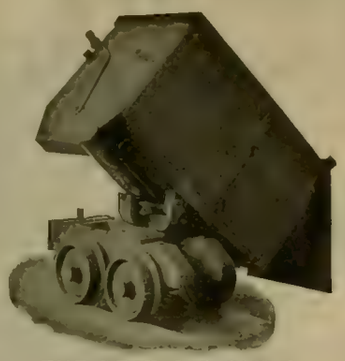
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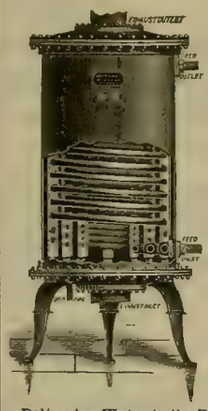


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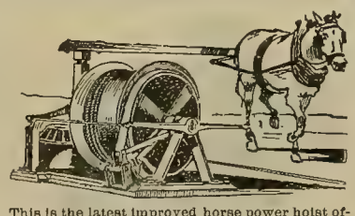
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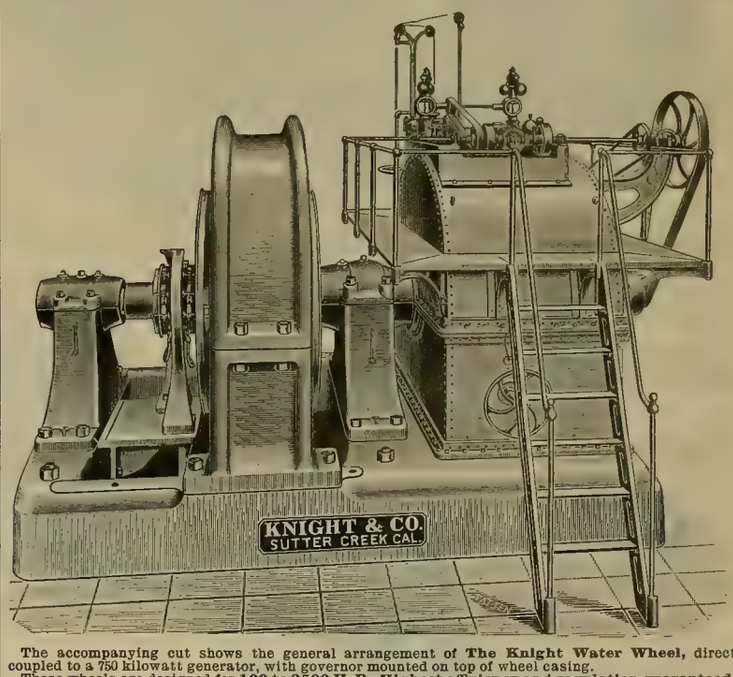
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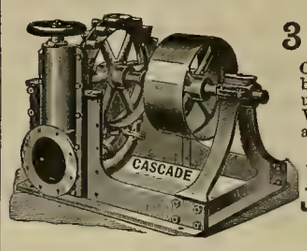
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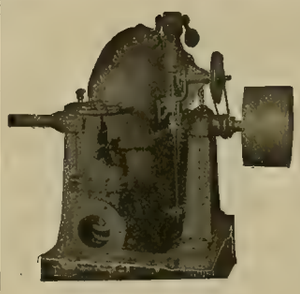


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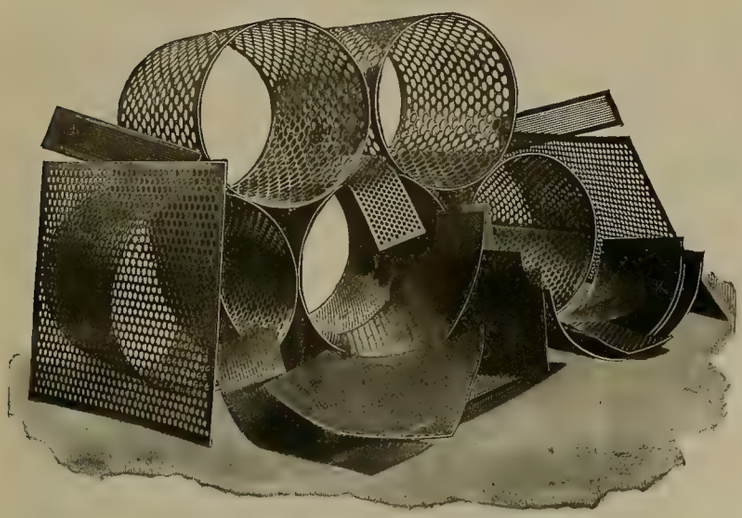
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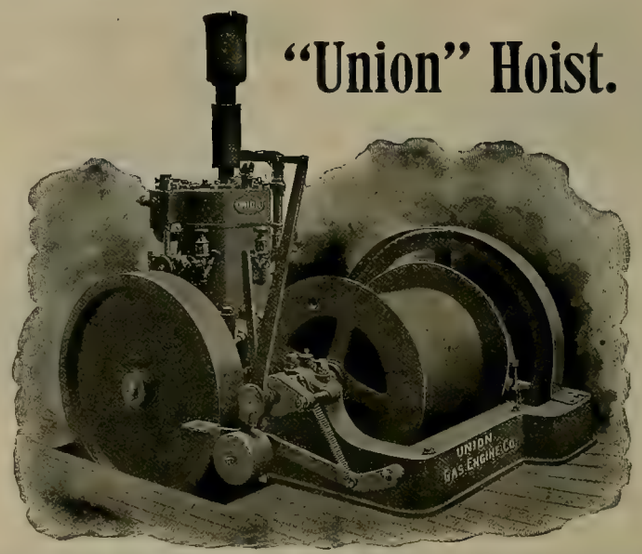
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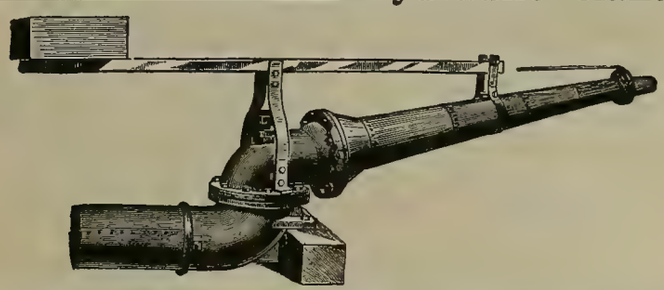
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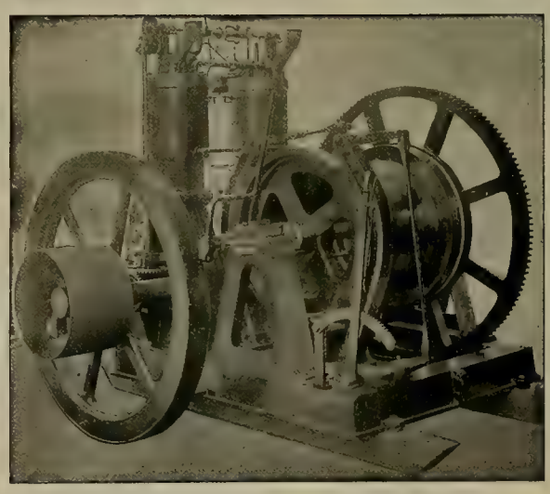
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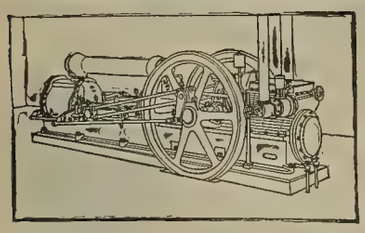
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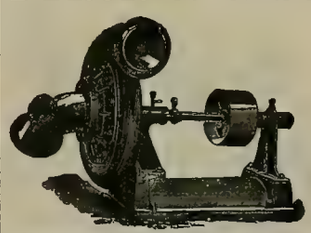
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Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.

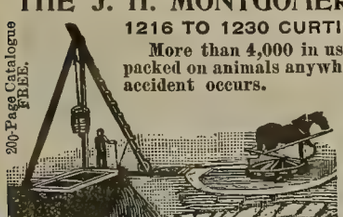
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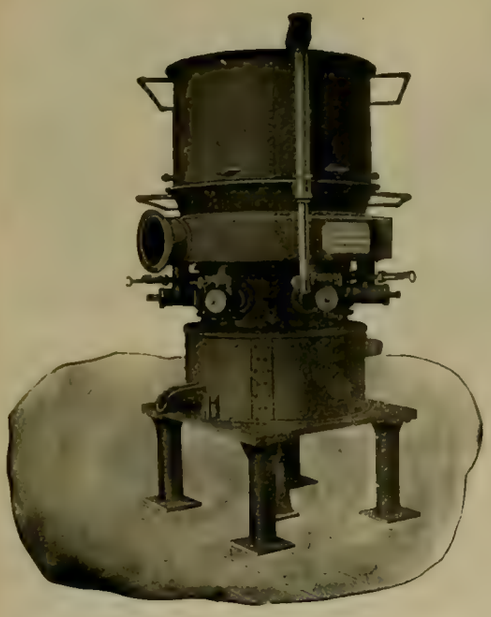
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(SEE PAGE 49.)

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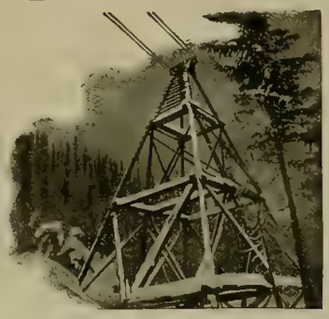
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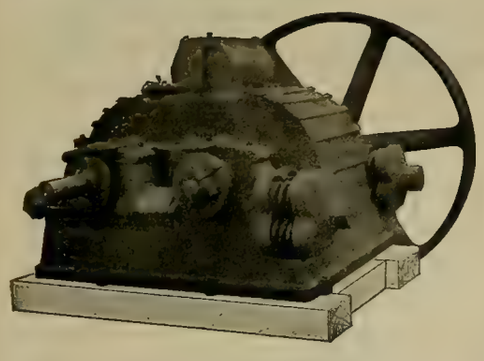
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Watch this Space for Description of the Above Machinery.

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Market Reports.

SAN FRANCISCO, July 6, 1899.

SILVER.—London, 27¾d; New York, 60⅝; San Francisco, 60⅜; Mexican Dollars, 49¾@50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports firmer, $4.50 bid, $4.55 asked; brokers' price, $4.30. Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6.50c.

COPPER.—New York reports Lake steady at $18 bid, $18.50 asked; brokers' price, $18 25@18.50; mill copper plates, 23¼c.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12¼@13c per pound.

TIN.—Quiet, $26 bid. $26.15 asked: pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 68⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia. ..)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 6, 1899.

9:30 A. M. SESSION.

250 Belcher	35c	200 Ophir	$1 05
900 Best & Belcher	61c	100 Overman	15c
100 Caledonia	60c	200 Savage	26c
2150 Con. Cal. & Va.	$1 90	300 Sierra Nevada	63c
400 Gould & Curry	37c	100 St. Louis	10c
450 Mexican	53c	500 Union Con	36c
100 Occidental	25c		

2:30 P. M. SESSION.

900 Ophir	$1 05	300 Hale & Norcross	35c
450 Mexican	58c	400 Yellow Jacket	38c
400 Gould & Curry	40c	500 Sierra Nevada	65c
600 Best & Belcher	64c	200 Overman	15c
350 Con. Cal. & Va.	$2 00	400 Justice	07c
100 Savage	28c	900 Union Con	40c

Recent Mining Incorporations.

Kern River Oil Co., San Francisco; capital stock, $25,000; W. H. McKenzie, C. Reis, H. Voorman, C. Kroeger, H. C. Tilden.

Anderson Oil Co., Fresno; capital stock, $30,000; G. French, D. C. Bristow, H. Coehne, H. Coleman, A. A. Blasingame, G. Fowler, R. Calderwood.

Kern Canyon Oil Co., Hanford; capital stock, $50,000; J. J. Mack, J. F. Michel, D. S. Fish, W. J. Newport, A. R. Orr, J. B. Newport, W. W. Parlin, G. Daggett, H. H. Fish, H. F. Fish, M. M. Lovelli.

New Hope M. Co, San Francisco; capital stock, $120,000; G. Goettinger, F. Golden, S. Marx, L. Davis, W. C. Barnard.

California Dredging Co., San Francisco; capital stock, $30,000; W. E Palmer, W. M. Klink, F. S. Mayhew, L. J. Holten, F. B. Peterson, B. M. Wright, J. W. Goodwin.

Commercial Paragraphs.

THE San Francisco office of the Oakland Iron Works has been moved from 114 First St. to Room 610, 330 Market St.

THE Jeanesville Iron Works, Denver, Colo., A. Middlebrook, Mgr., report an order from the Vindicator Con. G. M. Co. at Independence, Cal., for compound condensing mine pump, 800 feet lift, and a compound condensing pump, capacity 1000 gallons per minute, for the Dislodge Con. Lead Co., St. Louis, Mo.

THE Westinghouse Electric & Manufacturing Company has received a contract from the Laflin & Rand Powder Company for an electrical equipment for their powder works at Wayne, N. J. The contract calls for the installation of induction motors using the alternating current, self-contained and enclosed, the highest type of machinery for use in a powder works, where a spark means disaster.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. MONEY loaned, mines, MINING companies organized, their property exported, financed and managed. MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.



—EASTERN PRICES BEATEN.—

SAN FRANCISCO Pioneer Screen Works,

JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices.

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—

221 and 223 First Street, San Francisco, Cal.



QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.

DEWEY, STRONG & CO.,

PATENT AGENTS, 330 Market St., S. F.

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

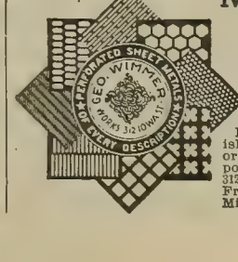
GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

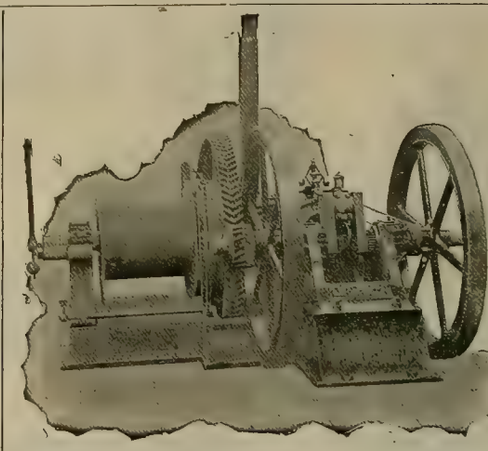


Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes GEO WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.



FRESNO, June 25, 1898.

Hercules Gas Engine Works.
San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine

Hercules Gas Engine Works,

305 MARKET STREET, SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

509-511 Howard St., - San Francisco.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc'S, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

Sulphuric Acid

—MANUFACTURED BY—

THE WESTERN CHEMICAL CO., Denver, Colo.

For Chlorination, Refining and other processes. Also Muriatic and Nitric Acids, Blue Vitriol, Copperas, Etc.

Our CHEMICALLY PURE ACIDS and AMMONIA are guaranteed perfect.

DEARBORN BOILER COMPOUNDS.

We analyze your feed water, make a diagnosis of your case, then prepare the proper Compound.

DEARBORN DRUG & CHEMICAL WORKS,

29, 30, 31, 32 and 33 Rialto,

CHICAGO.



Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati Ohio.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2:30 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 7th day of June, 1899, an assessment (No. 7) of five (5) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 1st day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 8) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California

SILVER KING MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of June, 1899, an assessment (No. 21) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of July, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 8th day of August, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

DELINQUENT SALE NOTICE.

THE MARGUERITE GOLD MINING AND MILLing Company.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 13) levied on the 9th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Marcus Schwab	64	500	$50 00
Kath. Emhoff	93	500	50 00
H. Helfrich	166	250	25 00
Mrs. M. L. Faas	209	5	50
Peter Kruckel	232	62½	6 25
J. Beck	233	62½	6 25
Andreas Kruckel	251	100	10 00
John C. Lutz	265	200	20 00
Chas. Riegert	274	100	10 00
H. Helfrich	295	100	10 00
John C. Lutz	318	100	10 00
John C. Lutz	335	100	10 00
Adam Miller	350	125	12 50
C. Kayser	360	25	2 50

And in accordance with law, and an order from the Board of Directors, made on the 9th day of May, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office, 237 Twelfth St., San Francisco, California, on MONDAY, the 10th day of July, 1899, at the hour of 5 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth St., San Francisco, California.

DELINQUENT SALE NOTICE.

ARRASTRAVILLE MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 3) levied on the 16th day of May, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
A. E. Sayre	627	4,400	$440 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of May, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, 213 Jackson St., San Francisco, California, on TUESDAY, the 11th day of July, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

TRADE MARK.



(M'ARTHUR-FORREST PROCESS.)

Gold Medal, Columbian Exposition, 1893.

MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

The MacArthur-Forrest Cyanide Process.

ALMARIN B. PAUL, Agent,

27 Crocker Building, San Francisco, Cal.,

for California north of and including Mono, Madera and Merced counties.

Samples assayed and fully reported upon. Particulars upon application.

Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

OFFICE: McPHEE BUILDING, DENVER, COLORADO.

Tenders for Placer Mining Claims on Dominion Creek, in the Yukon Territory.

SEALED Tenders addressed to the undersigned and marked on the envelope "Tender for a placer mining claim" will be received at this Department until noon on Friday, the 1st day of September, 1899, for placer claims and fractions of claims on Dominion Creek reserved for the Crown.

The following is a list of the numbers of the claims and fractions and the approximate frontage thereof as surveyed by Messrs. James Gibson and R. W. Cautley, Dominion Land Surveyors:

BELOW UPPER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	5	10A	33.3
2A	19	15A	42.25
3A	30.5	31A	43
8A	87.4		

ABOVE LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	12	6A	85.00
2A	59.1	10A	143.25
4A	1.25		

BELOW LOWER DISCOVERY.

No.	Length in ft.	No.	Length in ft.
1A	56.3	75A	24.7
2A	7.2	76	500.
2C	20.3	77	449.8
8A	34.00	16C	333.8
9A	39.25	18A	164.7
11A	98.4	78A	3.6
13A	68.5	80	451.3
16A	40.25	81A	15.3
20	202.1	83	500.
21A	71.9	84	500.
22	500.	85	500.
22A	60.7	86	500.
23	446.2	87	500.
25	500.	87A	500.
26	120.66	87B	387.9
31	350.5	89A	35.1
33	500.	91	500.
34	500.	92	500.
36	500.	93	500.
37	500.	94	500.
38	352.	95	500.
68A	94.7	96	500.
69A	40.5	97	500.
70A	72.6	98	500.
71	414.4	99	500.
73A	12.3	100	478.7
74A	21.3	101	119.

Each tender shall specify the numbers of the claims and fractions tendered for and also the amount of bonus offered for each claim and fraction. The tender may be for the whole lot or any one or more of the claims and fractions and must be accompanied by an accepted cheque in favour of the Minister of the Interior for ten per cent of the amount offered, one-half of the remainder to be paid into the Department of the Interior at Ottawa or to the Commissioner of the Yukon Territory at Dawson within thirty days from notice of acceptance of tender, and the balance within six months thereafter with interest at the rate of four per cent per annum.

Entries for the claims and fractions will be granted in accordance with the Placer Mining Regulations on acceptance of tender.

The entries will be subject to the usual royalty and the provisions of the said Regulations from time to time in force, except as to representation provided for by Clause 39, which will not be required.

The claims and fractional claims for which entries may be granted shall not include any portion of the bench or hill claims for which entry may have been previously granted.

The highest or any tender not necessarily accepted.

JOHN R. HALL, Secretary.

Department of the Interior,
Ottawa, 27th May, 1899.

PROPOSALS ARE INVITED FOR THE CONstruction of a pumping plant and pipe line at Minas Prietas, Sonora, Mexico. Length of line, about 16¼ miles; delivery 275 feet higher than intake; capacity 300,000 gallons per 24 hours, with margin to allow of increase to 600,000 if required; pumping plant of sufficient power to do work required with most economical use of steam, and pipe of suitable strength to allow a safe margin over pressure it may be called upon to stand. Contract for material and installation will be let as a whole, or separate contracts will be made for furnishing material and installation, as the company may determine. For further information, profile of line, etc., address W. T. BARRETT, Minas Prietas Water Co., Torres, Sonora, Mex.

Stockholders' Meeting.

Notice of Stockholders' Meeting of the Union Hill Consolidated Mines.—In accordance with a resolution passed by the Board of Directors of the Union Hill Consolidated mines, a meeting of the stockholders of this company will be held at 11 o'clock in the forenoon on WEDNESDAY, the 12th day of July, 1899, at its principal office, 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Hundred Thousand ($200,000.00) Dollars in 200,000 shares at the par value of One Dollar each.

Dated: San Francisco, May 25th, 1899.

JOSEPH H. MOOSER, Secretary.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

Mining and Metallurgy.

The latest and best books can be had from the Book Department of the MINING AND SCIENTIFIC PRESS at best prices. ALL BOOKS SENT POSTPAID. Following is a partial list:

ASSAYING:—PART I—GOLD AND SILVER ORES.
Third edition; Rewritten and Improved by the Author, C. H. Aaron; 130 pages, illustrated....$1

MODERN COPPER SMELTING:
E. Dyer Peters, Jr. Eighth edition. Rewritten and enlarged. Profusely illustrated.....$5

STAMP MILLING OF GOLD ORES:
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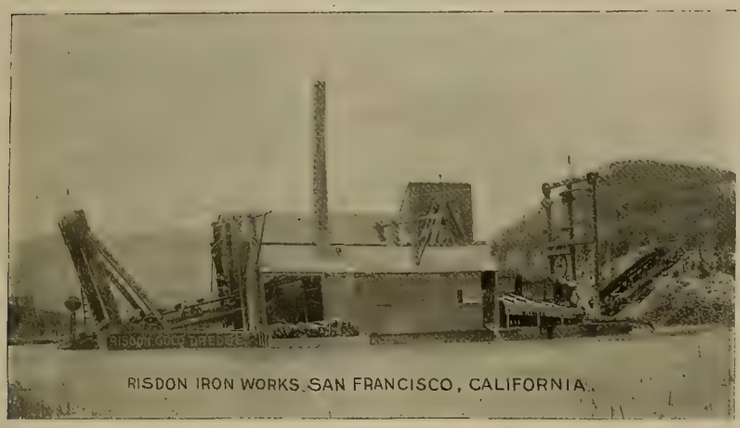
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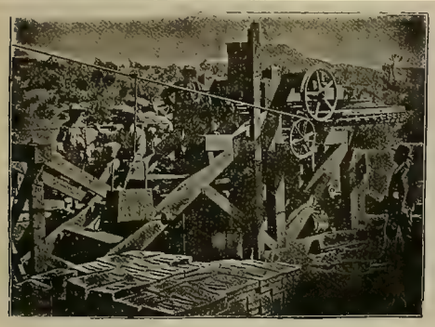
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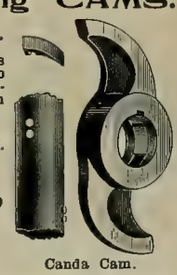
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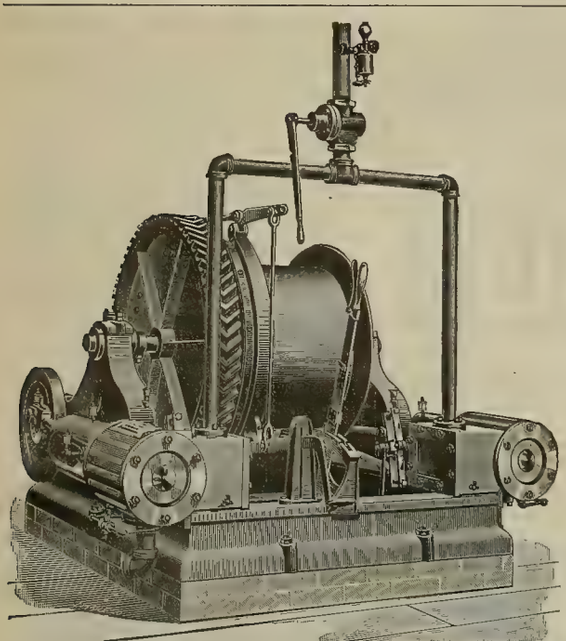
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Pioneering in British Columbia.

Throughout the West the men who discover and open to the world new mining regions have many obstacles to overcome and privations and hardships to endure which are unknown to those who have never left their comfortable homes to pioneer in a wilderness of timbered and rugged mountains or labor wearily across a waste of burning sands. There are none of the conveniences of civilization, but the pioneer must be fruitful of resource, and, as the history of the West shows, he usually finds a way to overcome these difficulties.

Three of the illustrations on this page convey a very good idea of how a pack



Kootenay, is an important stream flowing into the Columbia near Galena P. O. The trail to the mines on this creek starts from the Columbia at a point opposite Spillmachene landing, to reach which from the Golden and Fort Steele wagon road, it is necessary to swim the horses across the Columbia as illustrated herewith. The creek is twenty-eight miles long. The camp of tents shown is at the head of Bugaboo creek near the Twenty-One and Western Cross mines. The formation in which the veins occur is slate, cut by veins of quartz carrying sulphides of iron and lead containing gold and silver and are high grade. The veins are not large and the amount of development does





SWIMMING PACK TRAIN ACROSS COLUMBIA RIVER, B. C.

train is transferred across a deep, swift river. The scene is in British Columbia and is taken, together with the other illustrations on this page, from the last report of the Minister of Mines for that province. Here the pioneer miners, finding it necessary to cross the stream and having no bridge or suitable vessel for transportation, drive their horses into the stream and make them swim to the opposite shore. The beautifully picturesque scenery is illustrated in each of these pictures. Bugaboo creek, in East Kootenay, is an important stream flowing into the Columbia near Galena P. O. The trail to the mines on this creek starts from the Columbia at a point opposite Spillmachene landing, to reach which from the Golden and Fort Steele wagon road, it is necessary to swim the horses across the Columbia as illustrated herewith. The creek is twenty-eight miles long. The camp of tents shown is at the head of Bugaboo creek near the Twenty-One and Western Cross mines. The formation in which the veins occur is slate, cut by veins of quartz carrying sulphides of iron and lead containing gold and silver and are high grade. The veins are not large and the amount of development does not entitle them to particular prominence at this time, but they are interesting and in a country of wild scenic grandeur. The altitude at the head of the creek is 7650 feet, above which rises the neighboring ranges and peaks to a much greater height.



HEAD OF BUGABOO CREEK, GOLDEN DIVISION, EAST KOOTENAY, B. C.



FALLS ON BUGABOO CREEK, EAST KOOTENAY, B. C.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Swimming Pack Train Across Columbia River, B. C.; Head of Bugaboo Creek, Golden Division, East Kootenay, B. C.; Falls on Bugaboo Creek, East Kootenay, B. C., 85. Steel Head Frame, High Ore Mine, Butte, Mont., 89. Continuous Process of Slimes Treatment, 90. Latest Mining and Metallurgical Patents, 91. Self-Dumping Bucket, 93.

EDITORIAL.—Pioneering in British Columbia, 85. The Phantom Millions of Alaska; Strikes of Valuable Ore in the Leadville District; Shortage of Water in Some Counties of California; Alive to the Importance of the Mining Industry; Miscellaneous, 86.

MINING SUMMARY.—From the Various Counties of California, Nevada and Other Pacific Coast States and Territories, 96-97-98.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 110.

MISCELLANEOUS.—Concentrates, 87. Steel Head Frames for Mines, 88-89. Some Experiences of a Working Miner, 89. A Continuous Process of Slimes Treatment, 90. Latest Mining and Metallurgical Patents, 91. Characteristic Mines of the California Gold Belt; Stage Winding, 92. The Occurrence of Roscoelite in California; A Self-Dumping Bucket, 93. Mines of the Frontine and Bolivia Co., Colombia, S. A.; Corundum in California; Number and Area of the Philippine Islands; An Experiment in Cyanide Poisoning, 94. Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Obituary; Catalogues Received, 95. Recent Mining Incorporations; Recent California Dividends, 99.

THE continued high price of iron and steel is being felt in the industrial world in the rise in price of machinery. In some cases large Eastern manufacturers of heavy machinery for mining purposes are reported refusing to contract to deliver large orders at a specified time, owing to the uncertainty of being able to obtain the necessary raw material. Some of the large copper mining companies on Lake Superior, it is said, being desirous of increasing their output, are unable to get the necessary stamping and other machinery.

IT has been unanimously decided by the Supreme Court of Colorado that the eight-hour law is unconstitutional. The law passed by the last Colorado Legislature applied only to mines, smelters and mills for the reduction of ores. The effect upon the most important industry of Colorado when the law went into effect is known—nearly every smelter in the State closed down, for the reason that the American Smelting & Refining Co. refused to pay the same wages for eight hours that had previously been paid for ten and twelve hours' work. Although the courts have declared the law unconstitutional, there is no disposition on the part of the workmen to work a longer time than eight hours and they demand that the union be recognized. Negotiations between smelter managers and workmen are still in progress.

ALTHOUGH it is now over twenty years since the Leadville district was discovered to be a region of lode mines, and it has since been explored and exploited extensively, it is almost a weekly if not a daily event to learn of a new strike of valuable ore. At first attention was almost wholly directed to the oxidized ores—carbonate of lead and iron oxides. Later the sulphide ores commenced to appear and many predicted the beginning of the end, but the industry has continued steadily though its pathway has been strewn by many obstacles, among them vast volumes of water, long rigorous winters, labor troubles, scarcity of timber for mining purposes, etc., but still it has advanced. In the early years little attention was given to gold mining, which may be considered strange, as twenty years before the camp became famous for its lead-silver ores, millions of dollars in gold were taken from the rich placers of California, Iowa and tributary gulches. It is now known that the source of this gold was the eruptive rocks back of the city on the western slope of the Mosquito range. One of the first mines of this class to attract attention was the Antioch, which produced a large amount of gold, still this did not direct attention to the possibilities of the gold belt. They are now more fully realized and active work is being carried on with a view to thoroughly opening the mines of this class. In the lead-silver region new finds are of very frequent occurrence, and it is still safe to predict new discoveries in this district which are not anticipated by the miners.

The Phantom Millions of Alaska.

With the arrival of each steamer from Alaskan ports comes the announcement that there are hundreds of thousands of dollars on board, and usually connected therewith are the names of half a dozen adventurers who are presumed to own the gold. If the various amounts already reported as having arrived are considered in the aggregate they will soon reach several millions of dollars over the amount which has actually come from the north. Very little is said of those who come back without a dollar, having wasted two or more years in that frozen zone to no purpose, and no mention at all is made of the thousands already there struggling to earn enough money to procure the bare necessities of life, and who would leave the country only too gladly if opportunity afforded. The thousands of men who frantically surge from one point to another in the North upon the announcement of a new rich strike are not those who do own good claims as a rule, but those poor unfortunates who have little or nothing beyond the means of reaching some new locality where there is the faintest hope of recovering their losses. They are like drowning men who grasp eagerly at straws. When the history of the Arctic gold fields is truthfully written it will contain little of romance and much of hardship, privation and suffering.

Miners and others now returning from Alaska bring reports which confirm the finding of gold on Snake river and its tributaries in the Cape Nome district. Some very extravagant stories are told, among them one to the effect that, owing to the frozen condition of the ground, the deepest workings were but 3 feet deep, and from this $10,000 was taken. The ground worked covered an area of 25x1000 feet. Six men were employed fifteen days, and a good portion of the ground was carried 50 feet to the sluice boxes. These men must have been heroic workers to have removed nearly 2800 yards of gravel, partly frozen, and carry it 50 feet to a sluice box in fifteen days. This case is analyzed to show how far such statements depart from the truth. It may be added that all such statements are made by those who have a direct interest in promoting immigration to Alaska.

EVER alive to the importance of the mining industry and mindful of the business that mining activity causes, all the railroad companies—except the principal one in California—constantly issue handsome pamphlets, finely illustrated, and replete with up-to-date information concerning the development of the mineral resources of the regions traversed by their lines. The latest to hand is from the Rio Grande Western Railway, a good advertisement for Utah and the mineral wealth of that great State. Like Colorado, Utah understands the value of advertising; it realizes that the mere possession of mineral wealth is not of much material value to those now on earth unless people are told about it; hence the newspapers and railroad companies vie with each other in proclaiming to the would-be investor the possibilities for profitable placing of capital. This is an advertising age; the concern or commonwealth that does not advertise is sure to fall so far behind that it fails to keep step with the music at the head of the procession. In announcing the possession of mineral resources and pointing out the honest profit in their legitimate development, the railroads do the State a service, and such enterprise is commendable.

ALREADY in several counties of California the shortage of water is being felt in the conduct of mining operations. For fifty years the mines of California have been worked actively, and yet no concentrated effort has been made by those most interested—the miners themselves—to provide sufficient water to last through a single season. During the dryest years an abundance of water flows to waste in the earlier months down almost every canyon heading in the Sierras. A few weeks later the streams diminish rapidly and by early fall the beds of the streams are practically dry as far as their utility for mining goes. Those who are far-sighted enough make contracts with water companies for a continuous supply, and others, less providential, are obliged to run on short allowance or shut down altogether. The natural supposition would be that after years of such experience the miners would formulate some plan by which water might be stored in sufficient quantity to insure a supply throughout the dry season, but no concerted effort in that direction has yet been made.

A NEW-PROCESS MAN, Mr. Geo. S. Engle, is in the field with a new idea which, as usual, will revolutionize mining and metallurgy. In his modest little folder the inventor says, with his process he saves the cost of a concentrator, does away with the expense of buying silica and other fluxing material, and also saves the cost of a roaster. He works his process with eight or twelve men where plants of similar capacity operated by any other known process would require 150 men. He places the cost of a 400-ton concentrating plant and a smelting works at $600,000 where by his process the plant can be built at the mine, saving freight, cost of hauling ore, etc., and ship from the plant "mat" worth several thousands of dollars per ton. He can erect his plant complete with a capacity of 400 tons daily at a cost of about $5000, and can treat the ore for from $1.00 to $1.50 per ton. That this latest of patent-process men has arrived at a most opportune moment no one will doubt. He is the kind of fellow the owner of low-grade mines has long been looking for, but it is almost unnecessary to say that Mr. Geo. S. Engle and his process cannot endure in this age.

LONDON appears to be in unusually good luck in securing most of the "big things" in new mining ventures nowadays. The latest is the Ray Copper Mines, Limited, of Pinal county, Arizona. These mines were formerly known as the Taylor, Ray and Innes groups, and are situated in the Mineral creek country. They were sold by the owners to the Globe Minerals Exploration Co. of London, it is reported, for $150,000. The Ray Copper Mines, Limited, is an outgrowth of this transaction and is floated on a basis of £260,000 in 260,000 ordinary shares, of which 145,000 have been issued, presumably to the control. The property comprises fifty-two claims and the company's expert reports 190,000 tons of ore in sight, worth anywhere from $665,000 up, net. While it is legitimate to purchase a mine for $150,000 and float it for a larger sum, if this figure is all the mines were worth it seems that a sum approaching nearly ten times that amount is somewhat extravagant, particularly in an English market, where capitalization is rather more important than in America.

FROM New Mexico, in the Jarilla mountains, northeast of El Paso, comes a tale of wonderful richness. The press dispatches describe a land destitute of water, teeming with poisonous reptiles and insects common to the desert; where no comfort exists, where every plant bears a thorn, and where only hardship and misery can be the lot of those who venture there, but where gold may be had without mining, simply for picking it up from the surface or knocking chunks off of the outcropping ledges, which is not an easy task, as the rocks "are matted together with metallic gold." Such fairy tales as this are sure to lure the uninitiated and hundreds will rush there. San Roque landing and Cerro Pintado, in Lower California, are a paradise to this new gold field in La Journada del Murte, as that desert in southern New Mexico is called, and its naming is significant—"the Journey of Death."

THE legal division of profits and property as the result of litigation has received fresh illustration in the case of the Golden Cross mine, San Diego county, Cal. Originally attached by men to whom was due money for supplies, machinery, etc., the case dragged on for years, with the customary outcome. Fifteen Los Angeles, Cal., attorneys get $188,000 in fees; nine San Francisco attorneys get $156,000; a San Diego, Cal., law firm gets $66,000. Then one other Los Angeles lawyer and two other San Francisco lawyers get securities said to be worth $400,000 more.

Concentrates.

CORUNDUM is not an aluminous silicate, as previously inadvertently stated, but an oxide of alumina.

ACCORDING to reports from El Dorado canyon, Nevada, the cyanide plant there saves 98% of the assay value.

"SAPROLITES" is a term used in the Dahlonega, Georgia, district, to designate decomposed bodies of ore in place.

THE value of the mineral output in Tasmania for the first quarter of the year was £45 4s 10d per man employed.

THE stockholders of the Homestake M. Co. voted in San Francisco to increase the capital stock from $12,500,000 to $21,000,000.

THE U. S. Government is paying $400 a ton for 2200 tons armor plate for the new battleships now building at San Francisco and elsewhere.

THE character of eruptions from the interior of the earth has varied at different geological ages. Those of late Tertiary and recent time have been almost exclusively of a basic type, and include andesites and basalt.

INJECTORS are in common use on steam boilers, and are considered economical. One of recent build will take steam from one boiler at 75 pounds pressure and deliver water into another boiler carrying 225 pounds of steam.

A GOOD aneroid barometer may be used to measure the depth of a shaft if a number of trips are made and the average taken. These trips should be made without delay, that is, without stopping at intermediate points.

THE ridiculous assertion that "four tons of virgin gold from the Klondike will be exhibited at the Paris Exposition in 1900" is simply a newspaper story. If the man who wrote it repeats it two or three times he will begin to believe it himself.

LONG crosscuts through hard ground to reach a vein at great depth, which has only superficial work at the surface, are not advisable, no matter how rich the vein may be on top. Prove first that the vein has sufficient value and depth to justify the crosscut.

WIRE ROPES, ordinarily known as plow-steel ropes, are of high tensile strength, and made of high-grade crucible steel, which in the form of wire will bear a strain of 100 to 150 tons per square inch of section. Large drums and sheaves are advisable on all kinds of wire ropes.

BORAX minerals where found in place, that is, in the form of a vein as that in the east Calico, Cal., mines, may be located the same as lode claims, but where they occur in the basins of dry lakes, etc., they should be located as placers. Deposits of salt are located in the same manner.

TO RAISE 1000 gallons of water (111 miners' inches) per minute to a height of 80 feet, would require a 40 H. P. engine. With a 4-inch pipe, a velocity of 18 inches per second, a friction head of .96 inch, there would be a friction loss of .04 lbs. per square inch, figuring on each 100 feet in length.

UNDERHAND stoping is not commonly followed but is sometimes employed to get ore without the expense of drifting to an ore shoot from a main shaft. It is sometimes used in working small veins of rich ore. It requires more timber where followed extensively than overhand stoping and the timber cannot be recovered.

THE idea that when volcanoes are active they discharge, along with cinders, rocks, mud and water, large quantities of gold, which, falling back to earth, is washed into the streams and found as placer gold, is absurd, and one of the strongest proofs against it is that basaltic and other volcanic lavas do not contain gold.

ROCKS in the presence of moisture under great pressure melt at a lower temperature than where dry and exposed to ordinary atmospheric pressure. Consequently rocks in the interior of the earth are supposed to become molten at a lower temperature than would be necessary if they were melted by artificial heat on the surface.

RATES of commission charged for transactions in Utah mining stocks vary as elsewhere. On stocks selling to 5 cents $1.50 per thousand is charged; from 5 to 15 cents, $2.50 per thousand; 15 to 35 cents, ½ cent per share; 35 cents to $1, 1 cent per share; above $1, 1% on the money. There are several reputable stock brokers in Salt Lake City.

A GREAT source of error in working mines by the pillar system is the practice of leaving pillars in large deposits of the same size as those found to answer in smaller deposits. A vein 5 feet thick may be supported by a pillar of given size, determined by the character of the ground; but a pillar of the same size would not sustain the roof in a 20-foot vein in the same ground.

THROUGH the recent denouncement of Arizona mining fakes by the Governor of that Territory, it transpires that stock in some of the swindles was sold wholesale in the East to innocent "investors." In one little New York village $60,000 was thus "invested"—about all the money in the place. Doubtless all those who thus "invested" will pronounce mining to be a failure.

THERE will be a meeting of the Executive Committee of the California State Miners' Association in San Francisco on the 25th inst., to discuss the best way to effectually combat the present efforts of the Anti-Debris Association, which organization seems desirous to render nugatory the acts and to question in the State courts the jurisdiction of the California Debris Commission appointed by Act of Congress.

THE Homestake gold mines at Lead City, in South Dakota, were discovered in 1876, and now comprise the greater portion of the properties included in a gold-bearing zone 6000 feet long and 2000 feet wide, extending from Deadwood gulch on the north to Gold Run on the south. The principal mines are the Homestake, Highland, Deadwood-Terra, Father De Smet and Caledonia. There are a great many other claims in the group.

A PLOW-STEEL WIRE CABLE, according to the tables furnished by the makers of this class of ropes, will break of its own weight when 60,000 feet in length. An inch rope weighs 1.58 pounds per foot and breaks under a strain of 47 tons. A 2-inch rope weighs 6.3 pounds per foot and breaks under a strain of 189 tons. Hoisting engines should always be started and stopped slowly, for the sudden start or stop subjects the rope to a strain several times greater than the load.

THE United States Statutes provide, that where mineral veins are possessed, which possession is recognized by local authority, and to the extent so possessed and recognized, the title to town lots to be acquired shall be subject to such recognized possession and the necessary use thereof; but nothing contained in this section (2386) shall be so construed as to recognize any color of title in the possessors for mining purposes as against the United States.

ALL minerals excepting coal and iron are reserved from railroad grants. If the mineral character of land included within a railroad grant can be proven prior to issuance of patent to the railroad, the land belongs to the public domain and is open to exploration and purchase under the mining laws, the same as any other public mineral lands. The Supreme Court of California has held in several cases that in an action at law a patent issued to a railroad company can be attacked by showing that the lands in controversy are mineral lands.

TO ESTIMATE the percentage of sulphur in coal, one gramme of the finely pulverized coal is intimately mixed with four grammes of manganese dioxide, one gramme of permanganate of potash and one gramme of dry sodium carbonate. The mixture is placed in a platinum crucible, gently heated at first and afterwards to redness for thirty minutes. The crucible and contents are put into a beaker with water, acidulated with nitric acid and heated, the solution filtered and the sulphur precipitated with barium chloride in the usual manner.

WINZES and mill holes cut for passing ore or rock from stopes to level below, should never be driven under an angle of 35°, for at a lower angle rock will not run, and, if there is much fine material and wet, it will not run well at 35°. Where small veins dip at a lower angle than 35°, levels should not be over 75 feet apart, as shovelling must be resorted to, which makes mining expensive. Where broad veins lie at a lower angle than 35°, the raises may be put in to better advantage by starting on the foot wall side and raising toward the hanging.

AIR CURRENTS in mines sometimes do strange things. On the Comstock lode, in Virginia City, Nev., two shafts were connected by underground workings. One was an up-cast and the other a down-cast draught. A fire occurred in one of the mines, and the heat in the down-cast shaft overcame the natural air current and reversed it; it continued after the fire had been extinguished, the up-cast becoming the down-cast shaft. There are numerous satisfactory ways of ventilating mines and shafts by outdoor furnaces, blowers, exhaust fans, wind sails, water blast, etc., and by dividing the shaft into two compartments by an air-tight partition.

EAST of the Sierras fake advertising schemes no longer exist. West of the Sierras the books, souvenirs, programmes, "specials," survive. East of the Sierras no one will advertise in anything but a live journal with a good circulation among probable buyers. West of the Sierras the smooth talker is still able to coax advertisements from business men by telling what his book or other transient publication is "going" to be. East of the Sierras men have learned that money so paid is thrown away. West of the Sierras men have not yet learned that no transient advertising scheme has any business claim to patronage, as it cannot give any value for money received.

WHEN stopes are so wide that the square system of timbering is necessary, sills should always be placed on the floors of each level and these should always be long enough to reach the width of two sets at least and when possible three sets, in order to facilitate the work of connecting levels. Without these long sills it will be found a most difficult and dangerous undertaking to break through from a level to that above when stoping. Where filling is practiced, as it always should be in large stopes, a floor of heavy lagging laid on the sills will assist making connections. When the levels are connected by the stopes many pieces of lagging can be recovered, but often at a greater expense than their worth. When intermediate levels are opened between two main levels sills should also be laid on the floors of these levels.

THERE is no feature of mine development more important than providing for drainage. Tunnels and drifts should always be run at a slight grade, sufficient to insure the flow of the water toward the natural outlet or toward a shaft or sump from which it is removed to the surface by buckets or pumps. A drain should not only be provided, but should always be kept open. In large tunnels the drain is often placed under the center of the track, and this answers well where the flow of water is large, but where it is small the drain should be placed at one side or both sides of the track, where it is readily accessible and may always be kept clear of debris. Very often prospectors, in their haste to advance their work, fail to make proper provision for drainage and do poor timbering with disastrous results later.

MONTANA'S new law, senate bill No. 25, says: "Every person who sinks any shaft or runs any drift or cut, or causes the same to be done, within the limits of any city or town or village in this State, or within one mile of the corporate limits of any city or town, or within 300 feet of any street, road or public highway, and who shall fail to place a substantial covering or a tight fence around the same, is punishable by a fine not exceeding $1000. The owner of any property or his agent in charge thereof, or any person in possession of the same, shall be deemed to be within the provisions of this act if he permits any such shaft, drift or cut to remain open, exposed or unprotected upon his property, or the property in his charge or possession, for a period of more than ten days. Mining, irrigating and other ditches may be dug or cut to a depth not exceeding 10 feet without incurring the penalty of this section."

HYDRAULIC mining is legally defined by the Civil Code of California, as follows: "Hydraulic mining within the meaning of this title is mining by means of the application of water under pressure through a nozzle against a natural bank." Lieut.-Col. G. H. Mendell of the U. S. Engineer Corps in his report made pursuant to the provisions of the River and Harbor Act of 1880, upon a project to protect the navigable rivers of California from the effects of hydraulic mining, gives the following definition: "Hydraulic mining, as it is understood in California, is that process by which a natural bank is excavated by a jet of water and conveyed by the same water through the sluices to the dumps. Water does all the work; manual labor is useless to a perfect bank. When boulders are found too large to pass through the sluice they are sometimes blasted into smaller pieces. Where the bank is cemented or contains pipe clay, it is shattered by powder."

CHLORINE GAS is generated in the Plattner chlorination process in leaden vessels by the action of sulphuric acid upon a mixture of sodium chloride (salt) and black oxide of manganese. The gas is introduced under the charge in a large vat provided with a false bottom. A cover is luted onto the vat, rendering it air-tight. A small hole in the cover closed by a wooden plug affords a means of communication with the charge. When it is thought the gas has been passing into the vat a sufficient length of time, the plug is withdrawn and a bottle of ammonia held near the hole in the cover. If the gas has penetrated the charge and has reached the surface, this fact is demonstrated by the formation of a white cloud of ammonium chloride. When this test is sufficiently pronounced, the "gassing" is stopped. The terchloride of gold formed in the vat in this operation is washed out with water introduced at the surface of charge and allowed to percolate through the entire mass of pulp and is drawn off into another vat. The gold is precipitated from the solution by the introduction of iron sulphate.

IN each instance where the cyanide process is introduced at first it may be considered an experiment, for there are so many factors which have an important influence on the success of the operation that no rules can be established other than those of a most general character. Among the most important considerations are the condition in which the gold exists in the ore, size of the particles, whether or not the material is porous enough to make extremely fine crushing unnecessary, the tendency of the ore to slime, which influences the kind of crushing machinery employed and has an important bearing in the construction of the plant. Some ores can be successfully treated by agitation that can not be treated otherwise, some require roasting, others do not. In some ores the coarser sands and slimes are separated and are worked separately, others do not require it, and so on through a large variety of ores. Careful experiments should always be made in the laboratory on a scale sufficiently large to insure their reliability before a plant is built, or failure may follow what have been considered successful laboratory experiments.

A GREAT deal of effort has been made in all parts of the world where mining is carried on to great depth to arrive at a satisfactory average of the increase of temperature with depth. A few years ago it was commonly assumed to be one degree for each 90 feet in depth. More recently deeper workings under other conditions have led to the belief that it is something over 200 feet for each degree of increased temperature. The fact is that the depth to which mining has thus far been carried is so shallow as compared with the great distance to the center of the earth that it is not known what the average increase of temperature with depth is. The observations made at the various places have been where the surrounding conditions were so different that the tests are not satisfactory. The bottom of the deepest shafts in the Lake Superior region, 5000 feet below the surface, are not so hot as levels only half as deep in the Comstock lode in Nevada. In some instances in the Comstock the water was scalding hot, reaching 158° F. and a man falling into a sump where water is at that temperature has usually been scalded to death before he can be rescued.

WHEN applying for a patent to a mining location, the application must contain a copy of the plat; certified copies of all location notices, original and amended, upon which the order of survey was based and under which claimant asserts title; proof of posting on the claim the notice of intention to apply for a patent, and copy of the plat; proof of citizenship of the claimant; agreement of the publisher of the newspaper published nearest to the claim, designated by the Register as the one in which publication is to be made; proof that annual labor has been performed, showing the location to be valid and subsisting at the time the application for patent is made; abstract of title or proof of possessory rights where there is no record title; where the land is borne on the tract books as agricultural, proof of its mineral character. The application for patent and accompanying instruments are filed by the Register upon the payment of his fees ($10), if the land is clear on the tract books. If the land applied for appears from these books to be wholly or in part covered by a previous entry, a homestead filing, or a prior pending application for a mineral patent, or is included within some antecedent reservation or executive withdrawal, the Register will decline to receive and file the papers until the obstacle is removed. The proceedings to obtain patents to lode mining claims are generally applicable to placer locations.

ORDINARILY miners who are washing gravel are anxious to get rid of black sand, but recently there has been an effort to save the sand and ship it to the smelter for the gold it contains. All black sand does not contain gold in paying quantity, but some of it is rich in precious metal. By the ordinary process of sluicing it is a difficult matter to save both gold and black sand, but presumably it may be done by an ingenious arrangement of sluices. The material should first be screened or passed over a grizzly to rid it of coarse material, which will increase the capacity of the sluices. The upper two lengths of sluice should be set at a grade sufficient to keep the sand moving while the gold is retained. These boxes should be lined on the bottoms with gunny sacks or Brussels carpet. The remaining boxes should be set at a grade which will permit the sand to settle and fill the spaces between the riffles while the lighter material passes on. A long sluice will be required if a large tonnage is to be handled, as the riffles will quickly fill and the black sand will ripple over the top of the riffle bars and pass on to the next section. The riffles take up about 60% of the superficial area of the box. In a sluice 1000 feet long and a foot wide, the riffles being 1¼ inches high, the quantity of sand retained by the riffles will equal about 50 cubic feet. If the concentrate is clean iron sand it will weigh, when dry, from four to five tons. The above plan is for a plant requiring no power. If very large quantities are to be treated, and the percentage of sand and the volume of material to be treated justify it, a plant of machinery consisting of revolving screens, jigs or other mechanical concentrating machinery could be successfully employed. Of the black sand in streams and elsewhere a very variable proportion is magnetic.

Steel Head Frames for Mines.

Written for the MINING AND SCIENTIFIC PRESS by GEO. S. BINCKLEY, Butte, Montana.

The use of steel for head frames is particularly advantageous where the structure is of large size, or where there is difficulty in obtaining suitable timber, for in the latter case the cost of a large steel head frame is little if any in excess of that of a wooden frame of the same height and strength, and the advantage of greater durability and safety from fire is often an important factor in the determination of the nature of the material.

In spite of the undoubted advantages of the steel frame, however, it is still somewhat of a curiosity even in districts where the conditions are such that the use of metal would be very desirable on all accounts. However, where they have been used they have not always been an unqualified success, owing to the fact that there has been in many cases a blind adherence to the traditional form of the wooden frames heretofore used. Mining men are very conservative, and tradition has frequently as much to do with the determination of the design as considerations of strength and durability. Some few engineers have realized the fact that the common forms of the head frame are very defective, and have made notably rigid and economical structures; the one at the Oneida mine, Amador county, Cal., designed by Hans Behr, and the one at the Pennsylvania Hill, at Grass Valley, designed by Arthur de Windt Foote, the manager of the North Star properties, being conspicuous examples of good design.



STEEL HEAD FRAME, HIGH ORE MINE, BUTTE, MONTANA.

Many of the earlier examples of steel frames have retained the same defects that have existed from time immemorial in the wood frame, and are designed with the same utter disregard of the nature of the strains that the structure is subjected to, and in the case of some frames in South Africa, the material used and its possibilities as regards bracing and distribution are ignored, and the design is exactly the same as if it was of wood. Its type is the same as that illustrated by the sketch, Fig 1, which is one of the most common forms of the wooden frame, in which it is seen that there is an elaborately braced structure rising directly above the shaft, with the sheaves resting near the ends of heavy timbers laid across the caps. A moment's study will demonstrate that the resultant of strains due to the tension on the ropes falls entirely outside the rectangular structure that is so elaborately braced and counterbraced, and which is evidently considered so important a feature, and comes almost entirely on the diagonal back braces of the frame, and on the vertical members of the square tower which are on the same side as the back braces. This simple fact seems never to have been understood, for the ropes are always in the center of the square tower, as if the weight was hung from the sheave timbers, and the back bracing seems to have been considered merely as a safety member, and not as the one that would have to stand most of the strains that the structure is subjected to.

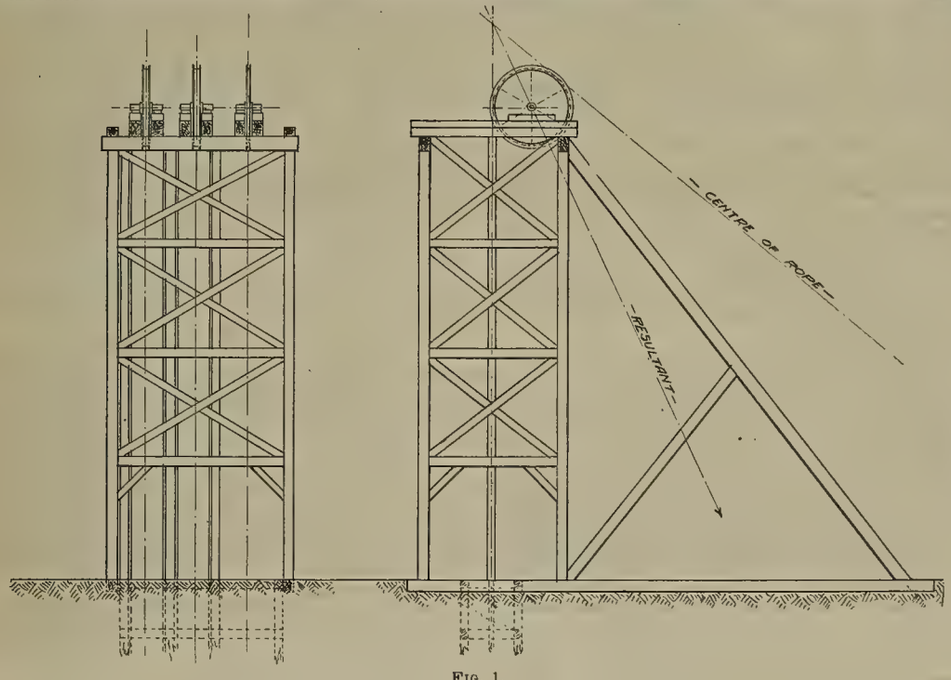


FIG. 1.

The consequence of this is that enormous amounts of timber are used in these structures and they are not as stiff as a correctly designed frame employing but half the amount of material used in their construction. When these methods are extended to the design of steel frames the effect is likely to be disappointing, for in comparison with wood, steel is not nearly as rigid, strength for strength, and while the wood frame might be reasonably satisfactory, one of same design in steel would be a failure.

Another form of wood frame is shown in sketch Fig. 2, which illustrates the form most common in Montana, where the frame is of large size. This type seems to be an effort in the right direction, but an abortive one. The main compression members are inclined, but are not placed in the line of the resultant of the strains on the rope. This form combines the defects of instability and waste of material to almost the extent of the one before instanced, although it has not the feature of the square tower over the shaft.

In this form of head frame the heaviest member is placed at an angle, with its foot back of the shaft, and the head inclined far enough forward for the sheaves to come to position over the center of the hoisting compartment.

Another member, in the nature of a back brace, is carried off toward the engine, and the resultant of the strains on the ropes falls between these two members. In front of these is another brace, the purpose of which is not susceptible of mathematical demonstration, if it is assumed that the structure is sufficiently tied together to keep it from falling to pieces from its own weight. This brace is also carried out forward from the shaft, and the whole structure rests on two sills running along under the ends of the three braces. As will be seen, all these members are vertical in the end elevation, and the sheaves are carried on long timbers reaching from one side of the frame to the other, a measure of stability being secured by the knee braces shown.

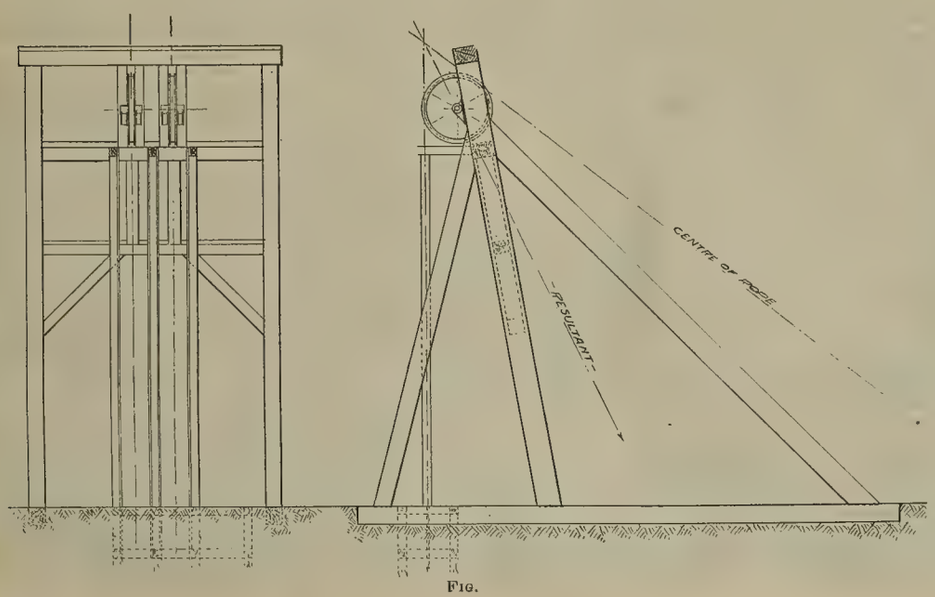


FIG.

These details would be of small interest but for the fact that this type of frame is used in connection with the heaviest hoisting engines in the West—the engines at the Montana Con. and the Neversweat mines of the Anaconda Co. in Butte. The timber used in these frames is 24 x 36 inches and was brought from Oregon. The frames are less than two years old, and cost a pretty sum, but the one at the Neversweat is about to be torn down, to be replaced by a steel frame, and neither of them is

stable, in spite of the enormous amount of material used in their construction.

The spread of the legs at the base is 38 feet, and height to the center of the sheaves is 60 feet, and with the same amount of material distributed as Mr. Behr has done in the frame of the Oneida mine these frames might have been made absolutely rigid.

The types of frames illustrated by the sketches herewith are chiefly interesting in their defectiveness, like many other things, and merely indicate the necessity of ignoring tradition in the design of steel structures for the same purpose, for if this is done there is a chance for some good engineering and a surprising economy of material. In the steel frames that are being erected on the Neversweat and High Ore shafts of the Anaconda Co., illustrated herewith (the illustration being taken from the High Ore), the conditions were rather unusual, and the amount of material that was used was a secondary consideration, for it was desired that the structures should be extraordinarily strong and stiff, and the fact that in the case of the Neversweat frame the dimensions of the base were already fixed by the position of the engine and ore bins made it desirable to take every precaution as to rigidity, as the height of the new frames was fixed at 100 feet, to the center of the sheaves. For these reasons the weight of the structures is somewhat in excess of that which would be required if the conditions were more favorable to the proper proportioning of the height and the base; and if this was not fixed by existing circumstances the weight could probably have been brought down at least 25%. The conditions at the High Ore mine were almost identical, and with a few minor changes the frames are the same, having a base of 38 x 65 feet and a height of 100 feet to the center of the sheaves. The weight of each of the frames, complete, including the steel guides and hoppers for the self-dumping skips, is about 312,000 pounds, this amount being the weight of the steel and not including the cast iron bases and the anchor bolts. These bases are a feature of some note, for on account of the fact that the ground near the shaft is likely to move there is a vertical adjustment provided in the bases by means of which the vertical alignment of the frame can be preserved, even if the ground should settle a foot. Where the base is so small as in these frames this adjustability is of great importance, for without it the whole structure would be subject to serious displacement. This adjustment was suggested by the former supervising engineer of the Anaconda Co., Mr. Ames, who probably originated it.

The use of self-dumping skips in the Neversweat and High Ore mines in connection with these frames makes it possible to secure an enormous extraction and very great economy in the handling of the ore, for in both of these places the conditions are such that it was possible to arrange the ore bins below the collar of the shaft, so that the skips will dump directly into the bin without the necessity of any tramming or handling of any kind, and the railroad by which the ore is shipped to Anaconda runs below the gates of the bins, so that it may be said that the ore runs by gravity from the skips to the smelters, there being no handling from the skips to the cars, and the road being down grade all the way to Anaconda. Loading chutes are provided at the stations below ground, with gates operated by compressed air, so there is almost no time lost in loading; and at the Neverwseat, where the skips hold ten tons of ore, the extraction per day is frequently 1200 tons, although so far only one skip has been used. With two skips the extraction could be made almost anything desired, for running in balance a higher speed could be obtained, and far greater economy in operation.

At the High Ore mine the conditions are about the same, but the engine is not as large and the extraction will never be so great, five-ton skips having been provided for. However, the extraction may easily reach 1000 tons per day, and this is doing pretty well for one mine. The conditions were not so favorable for the economical handling of the ore at this time as at the Neversweat, for in order to get the railroad at a point below the bins, as in the other case, it was necessary to make a cutting about 500 feet long with an average depth of 25 feet, much of it through rock. However, the saving in the handling of the ore was so great that the expense was well justified, and it will make one of the most economical plants in the West. The engine is double direct-acting, cylinders 30x72 inches, with Corliss valve motion and poppet valves, built by the Union Iron Works of San Francisco, duplicates of this being in use at the Anaconda and St. Lawrence mines, and one is also in use at the Homestake mines at Lead City, S. D. All of these engines are well housed in steel and brick buildings, and all used by the Anaconda Co. are provided with steel head frames, the frame at the St. Lawrence being the first steel frame erected in Butte, but being also the least satisfactory, as it was designed without sufficient attention to the requirements of rigidity, and vibrates considerably under heavy work.

In the design of the steel frames for the High Ore and Neversweat mines the writer was governed in the proportions employed, as pointed out before, by the extraordinary stability demanded and conditions that limited the area of base, but the general principle of the triangle was strictly adhered to throughout the structure, not alone in the bracing of the panels but in the relations of the main members to each other as well, the two triangles forming the side panels being spread as far apart as possible at the base, and brought as near together at the top as the sheaves would allow, making the box girders that actually carry the weight as short as possible, and distributing the strains from near the apex of the pyramid formed by the axes of the four main members, the resultant falling about midway between the front and back panels of the structure.

This form of frame is undoubtedly as rigid as any that could be designed with the same base and altitude, and where the question of material is not of overwhelming importance it will probably remain the form most used, but in cases where the cost of material, erection and freight is so great as to call for the best possible use of material and labor, it would be possible to design a frame that, although not more rigid than the form above discussed, would be equally so, and would not require more than about 60% of the amount of material. In this form the main strength would be concentrated in a panel set in, or a little back of, the plane of the mean resultant of the strains due to the tension on the ropes. No matter how suddenly this strain is applied, the resultant is always the same, and the strain on the panel could only be compressive, having no tendency to pull it back or throw it forward. This being the case, the rest of the structure could be designed with only sufficient strength and rigidity to carry the weight of the main compression member, which, owing to its inclined position, would tend to fall toward the shaft.

The part of the structure in front of the main compression member would be merely a light framework, with its main members designed to resist tension rather than compression, and would carry the guide posts and part of the platform surrounding the sheaves. It would be well anchored to a heavy foundation, so that in case of overwinding (when the resultant, owing to the fact that the cages would foul the sheaves, would fall outside the axis of the main member, and would coincide with the center of the rope), the vertical members of the light bracing would be able to resist the tensile strain that would result and prevent overturning the structure, the strain possible being proportionate to the strength of the rope, the base in side elevation to the structure, and the distance from the base of the main member to the center of the rope, at right angles to the rope. This last distance would always be somewhat greater than the base of the structure in side elevation, owing to the fact that the vertical members of the front bracing would be set back of the shaft, but the difference would not be so great and the limit of tension that could come on these members through the fouling of the cages would be practically the strength of the rope, and it is plain that if the section is sufficient to sustain the weight of the main compression members, it would be amply strong in tension to break the rope.

In the end elevation of this type of frame the main compression members would be brought as near together at the top as possible, and well spread at the base for lateral stability, but the front bracing could be vertical and consist of three main members tied to the compression panel with light braces, firmly connected at the top and well anchored at the base to a heavy foundation.

Although this design is, in the opinion of the writer, perfectly practical and based on correct mathematical principles, it is so revolutionary and defiant of all tradition that it is doubtful if most mine managers would have the courage to construct one on these lines, and so long as the form that has been adopted for the Neversweat and High Ore mines is not considered too expensive, there would be no particular object in using this, but where the question of freight and material is of the first importance this design certainly offers a method of obtaining the greatest results for the amount of material employed, and by the introduction of iron tension rods in the vertical members of the front bracing the design is as well applicable to a wooden frame as to steel, and the economy of material equally striking.

In the design of several large steel frames besides those at the Neversweat and High Ore mines the writer has followed the same general lines, but for two of these—80 feet high to the center of the sheaves, although of great strength and stiffness—the weight of each was about 165,000 pounds, including the cast-iron bases. However, the design above referred to as the one for the greatest economy of material would in this case have effected a saving of fully 45% in the material used, which in the present state of the iron market amounts to a pretty figure.

This design is merely offered as a suggestion, and may be found of value under the conditions named. Conservatism is a pretty good thing in its place, but it should not be allowed to interfere with business.

MANY of the old sources of the world's nickel supply are practically exhausted. Ore is still obtained from Norway and Hungary. South Africa supplies an arsenide containing over 25% cobalt.

Some Experiences of a Working Miner.

NUMBER XXV.

Written for the MINING AND SCIENTIFIC PRESS.

Almost any one who has a grain of sense is presumed to know the difference between coal and other black but incombustible rocks, but such seems not to be the case, for it is only a very few years since a company at C——, under the direction of a so-called expert, sunk a shaft 20 or 30 feet, and, when water drove the miners out, operations were confined to driving a tunnel into the hillside nearly 100 feet. All of this work was done in a black slate, as hard and almost as lustrous as anthracite coal, but not an ounce of coal was ever discovered. The most curious part of this business was that the people who paid for the work believed it was coal, for the expert told them so. Another odd feature was that within half a mile there were some small streaks of coal in sandstone, but nothing of value. Still what little coal there was there would burn, but the black slate mined by the parties above referred to would not burn in a thousand years, and yet this simplest of all tests was never tried on what was presumed to be coal.

* * *

Several years ago a company of men who had had some experience in mining, and I am told financially successful experience, undertook to open a new quicksilver mine at N—— A——. They selected a spot where it would be convenient to sink a shaft; where dump room was abundant and where, if they found enough good ore they could establish a camp without too much inconvenience or expense. The shaft was started in serpentine on a sort of flat or bench near the base of a steep hill. At the foot of the hill ran a small stream and on the opposite side of the creek was a ridge of rocks, perhaps 40 feet in height, in which were numerous blotches and streaks of cinnabar; in fact, a very fair prospect, though nothing more than superficial work had ever been done on it. There was not a sign of cinnabar in the serpentine, but it was a convenient place to sink and this seems to have been the main idea. The shaft was started at any rate and they did a very fair job of mining. The shaft was carried down 60 feet in serpentine when it entered a deposit of washed gravel and continued in this material to a depth of 110 feet, when being still in the wash, sinking was abandoned and a drift was started and run east 500 feet toward the main hill which rises several hundred feet above the creek, when, becoming discouraged, work was discontinued. Hearing of this somewhat unusual occurrence, I visited the place to see if some suggestion could be gotten from the surroundings, which would indicate the cause of the serpentine lying upon washed gravel. Before going there I had an idea of what must have occurred, and upon reaching the place a single glance at the steep hillside above the shaft showed plainly what had occurred. Many years ago, but at a very recent time, geologically speaking, a great landslide had taken place. A segment of the hillside 1000 feet in length and about 300 feet in width at its widest place, opposite the shaft, had slid from near the top of the mountain side, which was solid serpentine. The creek had evidently at one time been a much larger stream than now and had in the course of time deposited a large amount of gravel in its bed. This must have been the case as indicated by the gravel found in the shaft where it was at least 50 feet in depth and 500 feet wide. The great mass of serpentine had slid down upon the accumulation of gravel, choked the channel of the stream, which had cut for itself a new course at the contact of the slide and the rocks on the opposite hillside. Smaller landslides had occurred all along the mountain slope for a distance of a mile or more and in each case the dislocated material had piled up a mound directly below on the slope of the mountain or at its foot, and the largest of these mounds was the bench upon which the shaft had been started. One would naturally presume that the miners could scarcely have failed to have noticed this, particularly after the shaft passed from serpentine into washed gravel, but they did not.

* * *

At the head of one of the tributaries of D—— creek was found a lot of float boulders of quartz, rich in lead and silver. These fragments of ore were scattered along the gulch for several hundred yards and near the evident source of the ore the rocks were large, a foot or two in diameter. Numerous pits were made in search of the vein from which these boulders came. The pits extended all along the gulch, but wherever deep enough to reach bedrock slate was found and no ore. Step by step the prospectors worked up the gulch and, still finding nothing, a large cut was made in the side hill, where boulders of ore were found in the loose earth, but with the same result as before—slate but no ore. Just beyond the cut was an abrupt cliff of porphyry with a talus of porphyry at its base. Back from the edge of the bluff several yards could be seen the remnants of shale and thin layers of limestone lying flat. In this a shaft was started, and continued

about 6 feet, when, entering porphyry without a sign of ore, work was discontinued and the prospectors left, satisfied the float had been carried into the gulch on ice from some distant region. Later another prospector came upon the float, and noticing the numerous cuts, followed them to the large cut below the bluff. Finding no ore but seeing fragments scattered in the alluvial, he rightly concluded that the ore lay under the porphyry and, acting on this judgment, in a day or two had uncovered a valuable ore deposit. The difference between these two parties lay in the fact that one worked with his muscles and with a will but his reasoning power could not carry him a foot beyond the last piece of float. The last fellow was a close observer and at once located the place where in all reasonable probability it should be found, and there he found it as he had supposed.

* * *

Some good ore was found at S—— D—— and a number of prospectors went there as they do to every new find. The extent of the ore deposits were never determined, for they were not properly explored. The most promising claim showed a quantity of ore in the loose earth and rock on the hillside and a cut was run in to develop it, and in this cut a shaft was sunk. Soon all trace of ore was lost, but the shaft was continued for some depth but never encountered any more ore, and the district was abandoned. I have never been there since and do not know even now that the ore shoots which created the first excitement have ever been discovered, but beyond a doubt the work was done too far below the outcrop. MINER.

A Continuous Process of Slimes Treatment.*

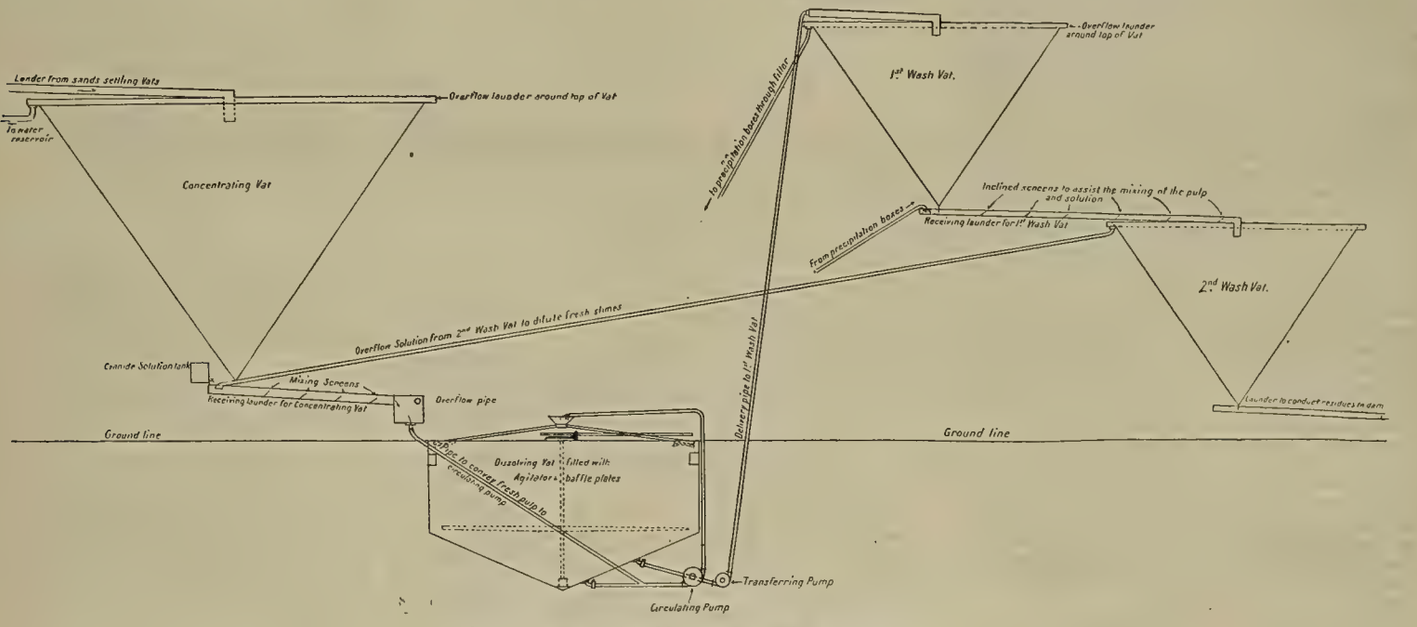
By ERNEST T. RAND.

I wish to bring to notice a process the practical details of which I have been working on for a considerable period. We know that the probable ideal method of treating slimes will be by some continuous process of one kind or another, and I shall describe a process which I think approaches towards this end. I do not claim that it is a perfect process. Perfection will only be attained by increased experience.

I may say that the slimes are, from entering the works until finally treated, in a constant state of movement. The process itself may be conveniently subdivided into four different stages. In the first stage the slimes pulp from the overflow of the sands settling vats passes into large spitzkasten or inverted conical vats, with the sides at an angle of 55° to 60°. These vats or spitzkasten are of sufficient capacity to settle the slimes to a consistency of one or one and a quarter wet to one of dry slimes. A settlement equivalent to three hours is given to these, that is, a certain proportion of the pulp will take three hours to fill one of the vats without anything being drawn from the bottom and before the clean water begins to overflow.

An inverted conical vat with delivery of slimes pulp at center of vat is preferable to a spitzkasten owing to the much larger overflow line. When the vat begins to overflow the nozzle at the apex of the cone is opened and the slimes allowed to flow out in a very thick, continuous stream. It is desirable to have the vats large, in order to be able to use a large nozzle, as a small one which would necessarily be required for a small vat would, owing to the very thick pulp, be more liable to choke. The overflow water can be taken back directly to the water dams by pump or gravity, according to circumstances. The pulp leaving the vat passes into a V-shaped launder, fitted at intervals with ¼ inch mesh screens inclined in the direction of flow, and occupying two-thirds of the depth. The object of these screens is to cause the slimes and the solution added at the head of the launder to mix thoroughly. The quantity of solution added is that required to bring the pulp to a consistency of four and a half of solution to one of dry slimes. Fresh potassium cyanide is added at the head of the launder in sufficient quantity to make the strength 0.015%. Lime is also added, principally to assist settlement after the dissolving of the gold has been effected. At the lower end of the launder is a box into which the pulp is delivered. To the side of this box near the top is placed an overflow pipe, which would come into use should a stoppage occur. The pulp from the first settling vats could thus be run into some suitable place, whence it could be taken and worked when the plant is again running.

The second stage comprises the solution of the gold in the dissolving vats. There may be one large vat or, still better, two smaller vats to work simultaneously. These are constructed with conical bottoms, the vats having two-thirds of their total depth with vertical sides, the remaining one-third being conical. This arrangement ensures that no deposition of settled slimes takes place on the bottom. These are together of a capacity equal to that required to contain the pulp run into them from the first settling vat for seven hours, without anything being permanently withdrawn. The vats are each fitted with an agitator, the speed of the ends of the blades being about 620 feet per minute when in motion. A circulating pump capable of passing through all the pulp contained in the two vats once every one and a half hours, connected to a hole near the bottom, is used to circulate the pulp already in the vat, and to introduce the pulp from the first settling vat. This circulating pump delivers into a pan placed over the center of each vat, and from the bottom of which radiate a number of pipes closed at their outer ends and perforated by a number of small holes in each, in order to spray the pulp (thus producing a slight aeration) as near the periphery of the vats as possible. The vats are fitted with baffle plates placed near the surface of the pulp, in order to cause the greatest possible mixing of the freshly introduced pulp with that in the vat. Into the suction pipe of the circulating pump, at an inclination towards the pump, is introduced a pipe leading from the box into which the pulp from the first settling vat flows. The dissolving vats, if possible, should be placed so that their top is slightly below the bottom of above box. This pulp then flows from the first settling vat into the suction pipe of the circulating pump by gravity. Air may be introduced into the pulp by checking the passage in the suction pipe leading from the dissolving vat, the air passing down the fresh pulp pipe. As will thus be seen, the fresh pulp receives a preliminary treatment in the pump before entering the dissolving vat. A pump having its suction pipe with valve fixed half way up the slope of the conical bottom draws the pulp away from the dissolving vat at the same rate as it passes into it from the first settling vat. By this means a constant level is maintained in the settling vats. As it takes seven hours to fill these vats, the pulp practically receives a seven hours' treatment. I say practically because, though some of the pulp may get away before it has received its full seven hours, other pulp in the vats must receive as much more as the former receives less. Therefore, since there is no reason why pulp with gold undissolved should get away before that which has its gold dissolved, the time for dissolving in the vats may safely be put down as approximately seven hours. This time, by the way, is in excess of that usually given to present production slimes as at present generally treated. The pump drawing away the treated pulp from the dissolving vats delivers into an inverted conical vat (this being the third stage of the treatment) of such dimensions as to give the pulp three hours settlement. This represents the first wash. The overflow from this solution passes through a suitable filter to the precipitation boxes, and from these into a sump, whence it is pumped to mix with the pulp leaving the bottom of the first wash vat. This pulp is, as far as possible, regulated to the consistency of that leaving the first settling vat. The pulp from this vat or spitzkasten passes into a V-shaped launder, also fitted with similar mixing screens. There it is well mixed with the solution from the precipitating boxes and by gravity runs into the center of a vat in every respect similar to the first wash vat. This brings us to the fourth stage of the treatment, where the second wash takes place. The overflow solution from this second wash vat passes to the head of the launder, carrying the pulp from the first settling vat, and forms continuously the solution necessary to be strengthened for the fresh slimes. It will be seen that no solution storages are necessary. Of course, when there is loss is from leakage, evaporation, etc., the solution can be maintained by a water service. The slimes from the second vat pass to the residue dam. The consistency is the same as that leaving the first settling and first wash vats. Thus, from the 4½ water to 1 of slimes delivered into the center of the first wash vat 3½ parts is taken away to boxes, and the same quantity from the second wash vat, and so 6½ tons of solution will have been separated out from the slimes in the treatment of every ton. The slimes treated by this method require three hours in first settling vat, seven hours in dissolving vats, three hours in first wash vat and three hours in second wash vat—in all sixteen hours from entering the works until discharged with gold extracted.



CONTINUOUS PROCESS OF SLIMES TREATMENT.

So much for the explanation of the process, and now for some practical results. I shall now describe an experiment worked at the Simmer & Jack slimes works with this process on a fairly large scale and give particulars of the results obtained. Two of the dissolving vats were used, both being connected to a centrifugal circulating pump. The first was used as a pulp storage. In this way a pulp of a consistency of 4½ to 1 was made up in it, water—not cyanide solution—being used. The agitator of the vat was kept going to maintain the pulp in a uniform consistency. The second vat was used as the dissolving vat, the supply of the untreated pulp being drawn from the first vat. Near the bottom of the dissolving vat a pipe, with valve, was fixed. This delivered into a launder which conveyed the pulp to a settling vat. This vat was 24 by 8 feet deep, and had been made into the form of an inverted cone inside, although the angle of the slopes of the sides was not acute enough for the best work. Eight inches of 1¼-inch pipe, terminating in a $\frac{5}{16}$-inch nozzle, was fixed to the apex of the cone. Around the top of the vat was a launder, to which a pipe delivering into the precipitation boxes was fixed.

*From the Journal of the Chemical and Metallurgical Society of South Africa.

The solution from the vat overflowed into this launder and passed through the pipe to the boxes. The launder from the dissolving vat delivered the pulp into the center of the vat and at the surface of the solution in such a way as to cause no appreciable motion of the surface of the solution. The method of working this experiment was as follows: The pulp was drawn from the first vat at a rate equal to ten tons per hour, and passing through the circulating pump was delivered into the dissolving vat along with the pulp being circulated. The cyanide was added to the pulp in the dissolving vat; a very strong solution was allowed to drip into the vat, thus maintaining a fairly even strength of .014%; forty pounds of lime was added every four and a half hours. A quantity of pulp equal to that coming into the dissolving vat from the first vat was drawn off continuously, a normal level of the pulp in the dissolving vat being maintained. This pulp passed directly to the settling vats. The solution overflowing from this was quite clear, the surface of the slime being kept from 9 inches to 1 foot below the overflow rim. The pulp taken from the bottom could have been better concentrated had the angle of sides of vat been more acute. It contained 40% of dry slimes, so three of the four and a half parts of solution were separated and passed to the precipitation boxes. The experiment lasted three weeks and a little over 1000 tons were treated. The cyanide used worked out .5 pound per ton. A second wash was not given, as there were no conveniences for doing so; but I shall leave you to judge for yourselves what the results would probably have been had a second wash been given, after putting before you the results of one wash only. Of the residues leaving the settling vat a sample was taken every two hours; part of this was put into a pail containing clear water and part into a jar. Every twenty-four hours samples of unwashed and thrice water-washed slimes were sent to be assayed—the washed and the unwashed being part of the same sample taken from the settling vat. Thus a very fair comparison could be made. A sample of the overflow solution from settling vat was taken every two hours, and daily assayed. The original value of the pulp averaged 1.8 dwts.

The following are the results of a few of the residues obtained:

	Dwts. per ton.
April 6th, unwashed residue	0.3
April 6th, washed residue	0.05
April 8th, unwashed residue	0.15
April 8th, washed residue	0.10
April 10th, unwashed residue	0.15
April 10th, washed residue	Trace
April 12th, unwashed residue	0.40
April 12th, washed residue	0.20
April 18th, unwashed residue	0.50
April 18th, washed residue	0.10

The solution overflowing from the settling vat assayed:

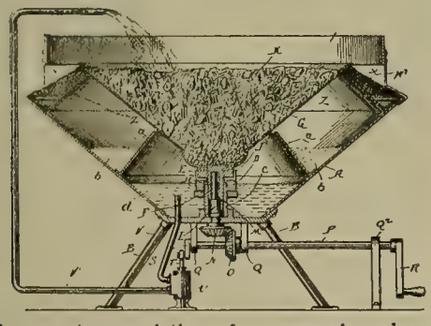
	Grains per ton.
April 7th to 10th	9.5
April 15th	8.0
April 20th	6.0
April 28th	9.0

Latest Mining and Metallurgical Patents.

Patents Issued July 11, 1899.

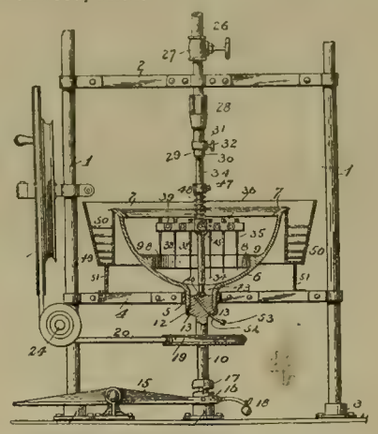
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

CONCENTRATING AND AMALGAMATING MACHINE.—No. 628,697; G. R. Couls and P. P. Dohlgreen, Tacoma, Wash.



A separator consisting of a reservoir, a hopper mounted to rotate therein, means for giving hopper a vertical vibration when being rotated, a screen extending from the upper edge of the hopper to the upper edge of the reservoir for screening the material passing from the hopper, an amalgam plate arranged beneath the screen, a partition located within the reservoir so as to form a pocket, a pump, a pipe leading from the bottom of the reservoir to the pump, and a pipe leading from the pump to a point above the hopper. A reservoir consisting of a suitable casing, a spindle journaled in the bottom of reservoir, a stationary cam block, a hopper having cam projections upon its under side, projections resting upon the cam block, a shank projecting downward from the hopper and having a socket therein for the reception of the squared end of the spindle, means for rotating the spindle, a pump adapted to be actuated in unison with the rotating of the spindle, a pipe leading from the bottom of the reservoir to pump, a second pipe leading from the pump to a point above the hopper, a guard *W* surrounding the hopper to prevent the spilling of the water, sand and flour gold so that it must of necessity fall on the amalgam plate, a screen extending from the upper edge of the reservoir, an amalgam plate located beneath the screen, and a partition so placed within the reservoir as to form a pocket for the retention of sand and the like. Hopper mounted to rotate with the reservoir, means for giving hopper a vertical vibratory motion when rotating, a pump for withdrawing the water from the lower portion of the reservoir and projecting it upon the material within the hopper, means for screening the material passing from the hopper to the reservoir, means for collecting the precious metal from mineral, and a pocket formed in the reservoir for catching and maintaining sand and the like so as to permit the water to pass to the bottom of the reservoir free from such material.

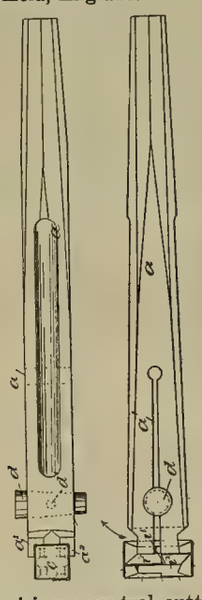
AMALGAMATING MACHINE.—No. 628,108; S. Moreau, Ironwood, Mich.



In an amalgamating machine, the combination with the vertically movable and rotatable pan, formed with a flange at the upper end and with an interior ledge between the ends, of the stationary water pipe, the rake arms, one of which is provided with a lug vertically movable on water pipe, the rake teeth, the collar on pipe and the coiled spring.

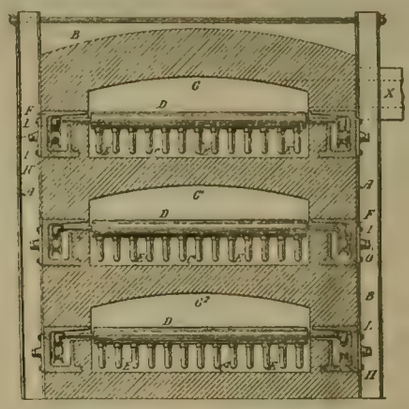
The vertically movable and rotatable pan formed with a flange at the upper end and with an interior circular concaved ledge, and the sluicebox provided with riffles surrounding pan, of the water pipe, the rake arms vertically movable on pipe, the rake teeth clamped between arms, the shaft secured to one of arms and stepped in the lower part of pan, the fixed and movable clamps, the yoke, the set screw, and the coupling with which fixed clamp is connected.

ROCK DRILL AND ROCK DRILL BIT.—No. 628,530; A. Gozzard, Sheffield, England.



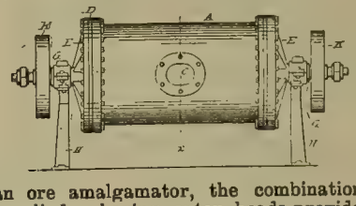
A cutter comprising a central cutting ege, transversely extending portions at each end of the central edge, portions having thereon cutting edges and having also dovetailed abutments adjacent to cutting edges and forming recesses larger at the inner ends whereby the transverse portions provide the cutting and holding means; a central cutting edge with dovetailed abutments located to one side of the central edge to receive dovetailed parts on the holder, central edge being provided with oppositely arranged bevels and being also produced beyond the transverse edges; the reversible cutter having the central and transverse cutting edges with dovetail recesses, and the holder having the split end with separated dovetails a^2 one on each side of the central edge with the taper plug for spreading the parts; the holder having a split end with dovetail portions to engage the cutter, and a cutter having a plurality of cutting faces with dovetailed abutments to engage the dovetail portions of the holder.

CALCINING FURNACE.—No. 628,077; W. B. Devereux, New York, N. Y.



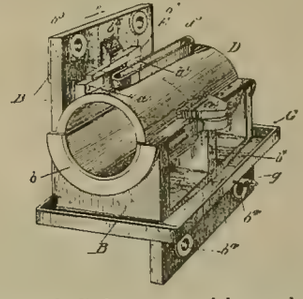
The combination with the side walls and the roof of a calcining furnace, of a hollow metallic girder having three sides closed and the fourth side divided by a continuous slot extending throughout its length, set longitudinally into the wall of the furnace, with its outer face set in the plane of the exterior wall of the furnace and forming the exclusive support for the side walls and roof above channel, and with the slot opening into the interior of the furnace throughout the length of the bed; a suitable hearth; two hollow metallic channels, constructed in and forming integral parts of each side wall of such furnace, on each side of the hearth; mechanism for stirring the material on the furnace bed, and means within each channel for supporting and moving the stirring mechanism over the furnace bed.

ORE AMALGAMATOR.—No. 628,499; J. E. Sutphen, Albany, N. Y.



In an ore amalgamator, the combination of a rotary cylinder having outer heads provided with hollow trunnions, heat receptacles formed about the shell and ends of cylinder in communication with the openings of trunnion, and a roller having a smooth outer surface arranged within cylinder. Heads having closed central portions separated from the outer cylinder heads to form heat chambers communicating with the openings of trunnions and provided on their outer edge with opening communicating with the longitudinal chambers of shell, and a roller having a smooth outer surface arranged within cylinder. A rotary cylinder having its shell provided with longitudinal heat chambers, of outer cylinder heads provided with hollow trunnions, and inner cylinder heads having closed central portions separated from the outer cylinder heads to form heat chambers communicating with the openings of trunnions and provided on their outer edge with openings communicating with the longitudinal chambers of shell.

JOURNAL BOX FOR STAMP MILLS.—No. 628,447; T. W. Capen, Chicago, Ill.



In a cam shaft box comprising a lower right angular base provided with an oil trough, a semi-cylindrical bearing portion supported thereon and an upwardly extending flange portion, a semi-cylindrical cap portion provided with two lugs on its inner lateral edge, a lug and stud on its outer lateral edge adapted to enter a recess or opening in the outer lateral edge of the box proper, a lug on the upwardly extending flange of the box proper arranged above and between the lugs on the cap, and a wedge arranged to be driven between the lugs on the box and cap to secure them together.

Characteristic Mines of the California Gold Belt.

From Quartz mountain, in Tuolumne county, northward to Carson hill, in Calaveras county, the mines are of a type similar to those near Poverty hill—the Mazeppa, Jumper, New Era and Golden Rule—described in previous articles on this subject, and these latter, in a general way, are very much like those farther south near Coulterville, in Mariposa county. In all these mines the structural geology is much the same and consists essentially of a zone of greater or less width—from a few feet to over 300 feet—of dolmitic mineral, in part ankerite, throughout which occur large and small masses of quartz in the form of lenses and vein-like sheets. These are disposed in various positions throughout the mass of dolomite, sometimes on or near the hanging wall side of it, and sometimes near the foot wall side, and in many instances there are several of these veins, or lenses, occurring abreast in the dolomite. They also vary greatly in size, from small seams to great masses 10 to 30 feet wide, and, when large, their outcrop often forms a striking feature of the landscape. These large lenses of quartz are usually parallel with the strike of the dolomitic zone and are frequently connected by other veins which cross the strike of the dolomitic zone in various directions, constituting a netlike mass of reticutaled veins. The inclosing formation varies from place to place and is not constant. The most prominent rocks occurring as walls to the dolomite are black slate, diabase, diorite and amphibolite schist, resulting from their alteration, serpentine, gabbro and a dyke rock of granitic type. These are the distinguishing features of the dolomitic zone from its most southerly occurrence in Mariposa county to Carson hill in Calaveras county. In Tuolumne county, near Tuttletown, the dolomitic zone commences to branch, and on Carson hill there are several distinct and large zones of this material, the occurrence of quartz in each of them being similar to that already described as being characteristic of the occurrences farther south, where confined to a single zone. Northward from Carson creek, on Chaparral hill, the first eminence north of Carson hill, several large and well defined quartz veins may be seen, but they occur in the amphibolite schists, serpentine and diabase rocks, and the dolomitic zone is no longer seen. It appears to terminate in Carson hill, where it has spread out, fanlike, in a number of sheets. And this is one of the strongest evidences which tend to the belief that the dolomitic zone, whatever may have been its original mineralogical character, is of eruptive origin. Structurally it possesses many of the features of large intrusive dykes, and in this respect is not unlike the diabase itself, which is so commonly associated with it, though seeming to be later than the diabase, and most of the other intrusive rocks along its course, excepting possibly the granitic dyke above referred to, which is seen along Moccasin creek and as far north as the Eagle mine, in Tuolumne county. After its disappearance at Carson hill, this dolomitic mineral is no longer seen in Calaveras county, as far as I have observed or ever heard, and not until Jackson, in Amador county, is reached does it again appear. Beginning just east of Jackson and extending for a distance of more than a mile in a northwesterly direction, the same formation reappears and has been extensively developed in the Bell Wether and Jackson Gate mines. Its structural conditions are similar to those observed in Mariposa, Tuolumne and southern Calaveras county, and includes large lenses of quartz with broad zones of reticulated veinlets throughout the mass, which in Amador is more than 100 feet wide.

Returning to Tuolumne county, it should be said of the numerous mines and undeveloped locations which cover every foot of the lode that they have developed some interesting facts concerning the distribution of the gold. At the Golden Rule and Jumper mines there is very little gold in the ankerite (dolomite) and not a great deal in the massive quartz lenses which accompany it, but appears to be confined chiefly to a zone of chlorite schist of variable width, usually very siliceous and associated with a dyke of rock which may be a type of diabase. In the Quartz mountain mines, a mile to the northward, the gold occurs in the large quartz masses chiefly. In the App mine the principal vein is near the foot wall. In the Dutch mine, just north of Quartz mountain, gold also occurs with auriferous pyrite in chlorite schist (amphibolite schist). Northward, or more properly northwesterly (for the entire gold belt has a trend 20° to 30° west of north, and a strike in any other direction is of purely local occurrence), as far as Table mountain, the mines have characteristics essentially similar to those at Quartz mountain. Along this distance are scattered a number of working mines. From the vicinity of the Dutch mine to Whisky hill, near Jamestown, the vein is not prominent on the surface and can only be found with difficulty; but at the crossing of Woods creek it again becomes prominent and continues with bold outcrops to Table mountain, two miles or more. From Whisky hill to the Alabama mine there are several places where extensive exploration has been carried on in the amphibolite schists which occur along the hanging-wall side of the vein. Here a broad belt of these rocks—chlorite schist and slate—has been found gold-bearing, and has produced a large amount of coarse gold from soft seams and veinlets of quartz. They have been worked by pocket miners in their peculiarly erratic manner. The schists in the neighborhood of Whisky hill have been honeycombed by men following this class of mining. As to whether or not the whole mass of schists will pay for mining and milling depends wholly upon the value of each claim. Some, perhaps, will not pay to mine as a whole, while others have paid and continue to do so. The Little Gem, about half way between Whisky hill and Table mountain, is a notable example. This has been successfully worked for years, the rock (chlorite schist with some quartz) being crushed in a small mill near the mine run by overshot water wheel.

Table mountain is the name given to an ancient river channel which crosses the lode about three miles north of Quartz mountain. The gravel is covered by a thick flow of black feldspar basalt which has resisted the weathering influences better than any of the other rocks of the vicinity, and, as a result, is a prominent object in the landscape. It runs for miles a nearly flat table with a course generally westward toward the plains of the San Joaquin, though with a more or less sinuous course like that of a great river. It is about half a mile wide. On the north side of the mountain lies a broad, flat, meadow-like tract known as the Rawhide ranch. In this valley, about half a mile distant from the foot of Table mountain, is the Rawhide mine. Here the outcrop of the lode rises from the meadow and presents its usual characteristics for several hundred feet, but soon disappears to the northwestward. At the Rawhide the disposition of quartz lenses in the mass of dolomite is similar to that already described in mines south of it.

The Rawhide, however, possesses one notable feature in which it differs essentially from most others, in that the dolomitic mineral is gold-bearing, and in places to a remarkable degree. In 1893 a rich strike was made in this material, which has been described to me as consisting of a series of short, thin shoots of rich ore. The quartz and chlorite schist are also auriferous in a variable degree. North of the Rawhide the Rappahannock mine has considerable development, and rich quartz is found. It is said that gabbro on the footwall side of what is here considered the lode (the dolomite being absent) is gold-bearing. This statement I cannot substantiate. The Alameda and Tarantula mines, farther to the northward, are essentially similar to the other occurrences described south of Table mountain. The quartz is gold-bearing, and at the Alameda mine, in addition to the usual metallic gold, auriferous pyrite and chalcopyrite, is found auriferous tetrahedrite (gray copper). This mineral also occurs at the Rawhide, at Pinon Blanco in Mariposa county and at a few other localities, and is usually indicative of a good grade of ore.

In all of the region from Mariposa to Carson hill, and including the occurrences of the dolomite at Jackson, Amador county, the green, scaly mariposite is prominent. There are large masses of the carbonate mineral, it is true, in which mariposite is absent, or occurs only sparingly, but it is usually present.

In a number of the mines of this belt in Tuolumne county and on Carson hill in Calaveras county telluride minerals occur, calaverite and petzite being of most frequent occurrence. In the Melones mine on Carson hill is found the rare telluride of nickel—melonite. Native gold usually occurs with the tellurium minerals. W. H. S.

Stage Winding.

At a recent meeting of the South African Association of Engineers, L. I. Seymour opened the discussion on H. W. Miller's paper on the subject of stage winding by remarking that the paper opened up very interesting possibilities for all. Up to the present he did not know of any shafts in contemplation on the Rand, which were more than 5000 feet, but there was no doubt that on the central portion of the Rand especially some very deep shafts would be sunk. Alexander Agassiz, who was here some time ago, said he thought mining could be carried on here to a depth of at least 8000 feet, and possibly more. As to the question of temperature, it appeared that 1° for every 203 feet was about what they found temperature to increase at, and this temperature was very much lower as soon as the connection was made between the shafts, as the natural current of air passed along the drive and through the stopes. These temperatures had been carefully taken with special thermometers. As to the question of when they would begin to operate stage winding he would not like to say, as the Rand had moved so fast in many ways that they could only judge when a new process would take place by existing processes in other places. Describing a visit he had paid to the Calumet & Hecla copper district some four years ago, the speaker said he had found there the Red Jacket shaft, 4400 feet, and it had now been sunk to 4900 feet. The deep-level is known as the Tamarack, and the shaft is now nearly 5000 feet, and is intended to cut the reef at 5400 feet. From there it will pass through the reef, 600 feet, making a total depth of shaft of 6000 feet. The engines for this work are a pair of horizontal engines, having a double conical drum all made in one piece. The diameter of the drum, small part, is 14 feet and the large part 32 feet. The cylinders are 32x84 inches, Corliss valve gear, non-condensing and non-compound. The trip gear is operated by a governor of the usual type. Unfortunately, the steepness of the cone and the width of the drums was so great (the centers of the main bearings being some 27 feet) that the rope slipped down the side of the cone when it was about half way up and worked round the shaft, and, without doing much damage, pulled the engines out of line. The foundations had not been well put in, but that matter had now been remedied, and he believed the engines were working again.

The question of rope was a very important one, and only the best quality of steel was used. The rope is 2½ inches in diameter, and the hoisting speed very great. The Calumet Co. are hoisting in their Red Jacket shaft a load of ten tons of ore from 4900 feet. The rope is also 2½ inches in diameter. The engines are of what is known as the "Whiting System," and are the largest and most complicated he had ever seen for winding. They are triple expansion, having six cylinders and using steam at 185 lbs. pressure, and are condensing. The cost is such as to preclude their use in this country. Proceeding, the speaker said that when it came to a question of winding 6000 feet, some form of double stage winding would have to be adopted. Whether, as the writer of the paper had suggested, they would stop at 3000 feet, he would not like to say. His own impression was that they would go much deeper than that—probably 5000 feet. After that, whether they put in a winding apparatus after they had struck the reef, or before, did not matter very much, as the operation of winding from moderate depths around a turn of 75 to 100 feet radius was not objectionable. The main question was in the strength of the ropes. If "tail" ropes (which were used extensively in England and Germany, and also in Kimberly) were used, the size of the engine could be kept down to a very small point, that was to say, the size of the drums could be made so that they only had to consider the flexure of the rope. But they had to bear in mind at what weight the rope breaks itself. Mr. Catlin had worked it out roughly from the makers' catalogues, and had calculated that the weight of about 60,000 feet of rope would break itself. The Government here required a factor of safety of six to one at all times. Allowing that the rope had become strained, they would need to start with a factor of nine to one. Eight to one would be 7500 feet as a point at which they could not hoist up a skip or any ore. The question of cost varied very much with different managers, as they had to consider what was encountered in sinking, whether the shaft was large or small, whether three, four or five compartments. He believed that stage winding would have to come in for deep levels, and he thought that the possible depths at which second winding would begin would be somewhat later than stated by Mr. Miller in his paper. As to the question of the most economical and best power for the second stage winding, that was a question they would have to fight out later. He believed that the opening up and future working of very deep levels would be by means of inclines sunk through the property immediately above them, especially where those properties could be controlled by one house, or by several houses working in conjunction. In this conjunction, the question of air for deep levels was a serious one, seeing how many men worked below, and this demanded a very large shaft, possibly larger than those now being sunk.

H. Spengel said he thought it would be a long time before they would reach a depth of six or eight thousand feet. He was rather doubtful if Mr. Seymour was right regarding the development at these depths through the vertical shafts of the third row of deep levels, because to reach a depth of six or eight thousand feet from a point which is now, say, even 4000 feet, would mean eventually 4000 feet vertical depth on the incline. Now, the capacity of an incline shaft was comparatively small to the capacity of a vertical shaft, because it was impossible to hoist at any speed similar to that on a vertical. He knew that at home they were hoisting at a normal speed, something like 3000 feet. —South African Mining Journal.

In the States of California and Washington aluminum wire has been utilized for carrying electrical current, but, viewed in its entirety, the electrical world does not seem prepared to reject copper for the lighter metal. The cost and limited output of aluminum seems to render it immediately unable to compete with copper, the use of which is evidently sure to increase.

The Occurrence of Roscoelite in California.

By H. W. TURNER, in American Journal of Science.

According to H. G. Hanks, at one time State Mineralogist of California, attention was first called to roscoelite by Dr. James Blake at a meeting of the San Francisco Microscopical Society, July 2, 1874. The specimens then exhibited were from the Stockslager mine, which is about one kilometer southwesterly from Lotus, on Granite creek, El Dorado Co., Cal.

At a meeting of the California Academy of Sciences held July 20, 1874, Dr. Blake presented specimens of the same mineral, which he then supposed to be a chromium mica.

At a meeting of the California Academy held August 2, 1875, Dr. Blake read a paper on roscoelite. Samples sent by him to Dr. Genth of Philadelphia were found to contain vanadium. The mineral was named by Blake in honor of Prof. Roscoe of Manchester, Eng., who had made vanadium a special study. Dr. Blake calls attention to the fact that Dr. Hall found vanadium widely diffused in many rocks, generally associated with phosphorus. According to Hanks, the Stockslager vein from which the roscoelite obtained by Dr. Blake was taken, is small and not continuous, varying from 2 inches to a foot in thickness and running nearly parallel with Granite creek. Associated with the quartz is calcite, and there are at least two varieties of iron sulphide present, probably pyrite and chalcopyrite. Hanks states further that the gold occurs only with the roscoelite and is found interstratified with the roscoelite laminæ in pieces from the value of $1 to the minutest microscopic particles. He also states that from 400 to 500 pounds of roscoelite were obtained by the miners, all of which was wasted in extracting the gold.

George W. Kimble of Placerville, Cal., for many years county surveyor, has furnished the California material analyzed by Dr. Hillebrand as well as other specimens. In these specimens the roscoelite is in part embedded in quartz and probably contemporaneous in formation with the quartz, and in part fills little cracks in the quartz and, therefore, somewhat later.

There are given below four localities where roscoelite has been found, according to Mr. Kimble, to whom the author is indebted for the following information about the occurrence of the mineral at these localities.

The Calaveras formation is largely of Carboniferous age, as may also be the augite-porphyrite tuff associated with it. The serpentine is later than the Calaveras formation and earlier than the granodiorite, which is probably late Jurassic or early Cretaceous. It will be observed that all of the localities are at or near the contact of an intrusive granodiorite mass with the surrounding rocks, chiefly sediments and old lavas. This suggests that the mineral may be regarded as in some way due to the mineralizing solutions accompanying the intrusion of the granodiorite. However, the quartz veins clearly fill fractures which formed in the granodiorite and associated rocks after the consolidation of the granodiorite; consequently, the deposition of the quartz and the associated gold and roscoelite must have been also subsequent to the consolidation of the granodiorite. The following are the localities reported by Mr. Kimble. They are all in El Dorado county, from eight to fifteen kilometers northwest of Placerville:

Locality 1.—Thompson hill on its northeast slope about 2.5 kilometers southeast of the Stockslager mine: There are here fifteen or more small seams of quartz having a strike of north of west. As these seams pass through the contact with the granodiorite (augite-porphyrite ?) they contain rich spots of gold and roscoelite. The seams of quartz pass on through the northeast point of Thompson hill and come into the granodiorite again.

Locality 2.—Stockslager mine on Granite creek: Mr. Lindgren informs me that the vein of the Stockslager mine is in a narrow wedge of metamorphic sediments of the Calaveras formation. Immediately east of this wedge is granodiorite, and immediately west is serpentine. Mr. Kimble states that there is here but one vein of quartz. This passes from the granodiorite into the narrow wedge of the Calaveras formation. It does not penetrate the serpentine. As previously stated, it was at this locality that by far the larger part of the roscoelite was obtained, including that analyzed by Dr. Hillebrand.

Locality 3.—South slope of spur about 2.7 kilometers north of the village of Lotus: In micaceous slate, which is part of a contact metamorphic zone of the Calaveras formation. The exact locality is about 500 feet east of the contact. It has never been demonstrated, but Mr. Kimble thinks that this quartz vein extends southeast into the granodiorite.

Locality 4.—Clark mountain on its east slope at the contact of the Calaveras formation and the granodiorite: The occurrence here is identical with that at the Stockslager mine.

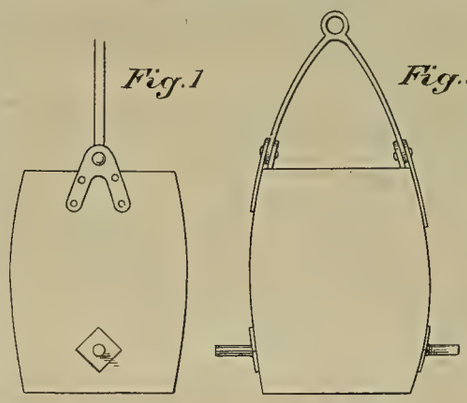
According to Kimble, no roscoelite has ever been found where the seams are in granodiorite, and the latter is not altered; but some has been found at the contact of the quartz with serpentine in localities 2 and 4. All of the quartz seams at localities 1, 2 and 4 dip southwest and have pockets of gold.

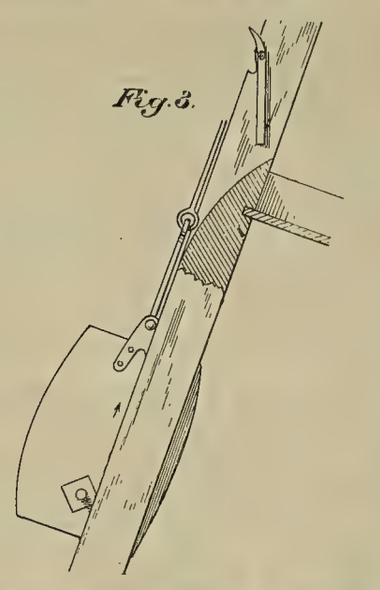
Prof. Hanks states that roscoelite was also found in Sec. 31, T. 11 N., Range 10 E., two miles from the Stockslager mine. This appears to be the Thompson hill locality of Kimble, to whom, indeed, Prof. Hanks was probably indebted for his information. Hanks states that the roscoelite was found here in the bedrock of the Big Red ravine in a dark colored micaceous rock in small seams of quartz with calcite and gold.

The roscoelite from California shows a tendency to crystallize in little rosettes, so that individual scales of any size with the same optical orientation throughout are difficult to obtain. Some scales gave with convergent light a nearly uniaxial black cross, the hyperbolas opening but slightly on rotation, indicating a small axial angle. Like all other micas, it is optically negative. The pleochroism as seen in thin foils is: *c* and *b* clove brown to greenish yellow brown, *a* light greenish yellow. In the scales of the powder analyzed no rutile needles or other inclusions were detected, but in the center of a rosette of roscoelite scales were found dark grains with a metallic luster. These grains are of sufficient size to have fallen with the heavy minerals during the process of separation with the Thoulet solution, and it is not likely that any of them have been included in the powder analyzed, although they were noted in the impure material before it had undergone the final separation. The grains show no crystal form and were not determined.

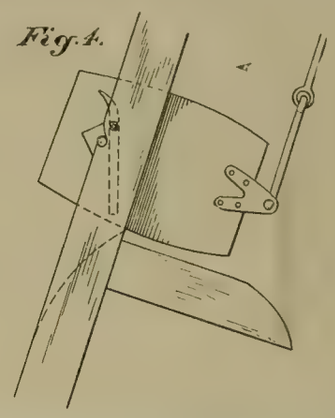
A Self-Dumping Bucket.

That a bucket which can be dumped without the aid of a topman is a desirable thing every miner knows. Various ingenious contrivances of this character have been introduced from time to time, some of which are fairly successful, and others much less so. In British Columbia a self-dumping bucket has been in use at various mines in inclined shafts, and has been employed long enough to determine its value. To Mr. F. S. Robbins, E. M., of Greenwood, B. C., the MINING AND SCIENTIFIC PRESS is indebted for a series of drawings which completely illustrate the operation of this ingenious and economical device. Figs. 1 and 2 show the form and construction

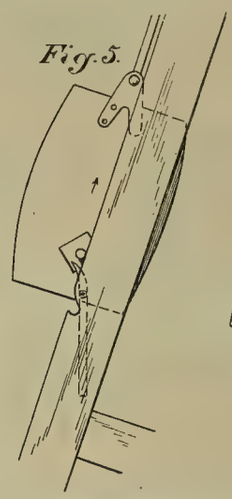




of the bucket, which is provided with substantial lugs projecting from the sides of the bucket, and at a point considerably below its center. Fig. 3 shows bucket, ascending or descending, riding the skids with the lug free. The shaded portion of the skids (Fig. 3) indicates where the inner side of the skid is cut away to allow the bucket to gradually sink low enough for the lug to run upon the rail without a sudden drop. As the bucket ascends and reaches the point thus cut out the bucket sinks between the skids and the lug drops into the notch cut for it. The engineer slacks the rope and the bucket tips by gravity and dumps into a chute, car or bin beneath, as shown in Fig. 4. Having discharged its contents,



the engineer hoists the bucket; the lug rides upon the rail, passes the latch (as in Fig. 5), and is again lowered, the lug being carried over the notch by the pendulum latch, as shown in Fig. 6.



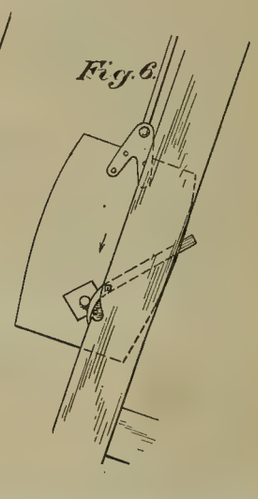
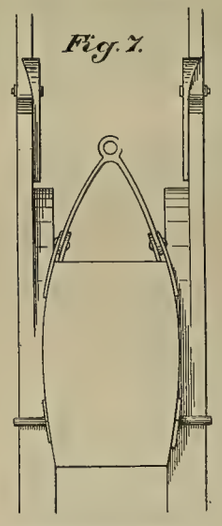


Fig. 7 illustrates a front view of the bucket and runway, showing the half section cut out on the dotted lines shown in Figs. 3 and 4.



There are many shafts where a device of this character may be employed, particularly about prospects and small mines, where it is desirable to work as economically as possible.

THERE is an increasing tendency to introduce auxiliary machinery in mills and mines for special work. These machines are operated usually by electricity or compressed air. Mechanical haulage is also being introduced in large mines, it having been demonstrated that where large amounts of ore or other material has to be transported underground, it is cheaper to do it by electricity, compressed air or rope haulage, than by the old methods of teaming with men or animals.

Mines of the Frontino and Bolivia Company, Colombia, S. A.*

By FRANK OWEN, El Peru, Venezuela.

While the labor in the part of Colombia where these mines are situated is far inferior to that of white miners, it is nevertheless decidedly superior to that available in other parts of the republic, and in the northern mining regions of South America generally. The Antioquenos have been miners for several generations, and many of those employed at the Frontino Company's works have been brought up at the mines, which is a distinct advantage. The ground encountered in the surface workings of that district being very treacherous, they are skillful timbermen, every miner being able to put in his own timber in tunnels, stopes, etc., so that, except for the main shafts, where sawn timber is used, special timbermen are not required. In the shallow workings it is the custom for the miner to come out of the mine in the thickly wooded bush and select and cut the timber he requires, which he will then take into the mine and put in place. That they are not inferior miners is shown by their being capable of overhand stoping, to which the West Indian negroes in the mines of Venezuelan Guyana are trained only with considerable difficulty—though the latter are paid in gold coin and not in depreciated paper. A miner's wages to-day in this district are $2.25 Venezuelan (equivalent to $1.80 U. S), while ten years or so ago, in the palmy days of El Callao, they ran as high as $5 Venezuelan ($4 U. S.).

The rapid decay of timber in the mines is, I think, attributable not to inferior quality, but rather to the hot and damp atmosphere to which it is exposed. The hard-wood timbers of the northern part of South America are indeed noted, even in Europe, for their strength and durability—for instance, green heart, purple heart, locust wood and bullet wood, "balata" (a kind of India rubber), etc. Green-heart timber from Demerara was used for the lock gates on the Manchester canal.

Amalgamation by plates inside the battery would be, I believe, a great improvement at Frontino, such free gold as is met with in the ore being mostly coarse. I remember that in cleaning up the mortar boxes it was no uncommon thing to come across small nuggets, weighing up to 1 dwt.

Transport in Antioquia is slow and expensive, as it is necessarily accomplished entirely on mule back, owing to the mountainous nature of the country; and the roads are always bad, on account of the very damp climate. It is, however, far cheaper, and even in many cases more expeditious, than in this part of Venezuela, where the roads are much more level and the climate is drier, so that bullock wagons and mule carts are in use. Freight from the port of Las Tablas on the Orinoco to El Callao now averages about 3 cents (U. S.), and was formerly as high as 12 and even 15 cents per pound.

It is indeed surprising that hitherto so little attention has been paid in Europe to the development of the undeniably great mineral resources of Colombia. General Marceliano Velez, a Colombian politician of some note, and at one time a candidate for the presidency, has written of the "forests absolutely unexplored, filled with unheard-of wealth, but left in isolation and solitude as complete as if they were shut off from the world, like the regions of central Africa." M. Moulle, a French mining engineer of repute, in a report published in Paris in 1887, says:

"Antioquia is undoubtedly one of the countries in the world where gold deposits of all kinds are to be met with in the greatest profusion. If, thus far, her immense wealth has not attracted the attention of Europe, this is principally due to her position in the center of Colombia, a country which, until the last few years, was, so to say, completely unknown to the European public. After traveling through Antioquia for many months in search of information, I believe I may say that, with some exceptions, the gold beds have barely been worked superficially, and, from the point of view of modern mining industry, they may still be regarded as virgin deposits."

G. Jenner, at that time British Minister to Colombia, wrote in 1894:

"Under the Spanish dominion the gold fields of Colombia were admittedly the richest in the world, and down to the year 1848 they furnished fully one-third of the whole supply of American gold. It is well known that the Spaniards worked the mines in a most primitive manner, and that the gold they extracted was almost entirely derived from the surface of vein or alluvial mines and from washing the sands of the rivers. * * * If this be the case, it can scarcely be denied that with scientific prospecting—of which the Spaniards hardly knew anything—and with scientific appliances, the amount of gold that is still to be gathered from the Colombian soil must be infinitely greater than that which was dug up during the Spanish occupation. The one advantage the Spaniards possessed was cheap labor. For nearly two centuries they obtained gold and silver in return for the lives of Indians, from whom labor was exacted in so unmerciful a manner that, though none of the mines were worked by deep shafts, so great was the mortality among the Indians that whole districts were depopulated, and many mines abandoned on that account alone. * * * Others were abandoned owing to the inroads of the natives, and many more because the Spanish miners were incapable of overcoming difficulties that would offer no serious obstacle to the mining engineers of the present day. Of the richest mines known to the Spaniards many, therefore, remain practically untouched; and it is by no means improbable that careful surveys would lead to the discovery of others of at least equal wealth."

* Condensed from Transactions American Institute Mining Engineers.

Corundum in California.

TO THE EDITOR:—The dearth of well-developed crystallized minerals in the rocks of the central gold belt of the Sierra Nevada has long been noted by mineralogists as well as miners, and no single mineral has so far been less in evidence than corundum. This is the more remarkable when we consider the great belts of serpentine which occur all through the central gold belt, often related structurally to the serpentines of North Carolina, although with us this rock seems chiefly derived from pyroxenites, while the North Carolina serpentines have been recognized as peridotites.

North Carolina has for some decades been noted for its wealth in corundum, even in its purest forms, and from its corundum mines many notable gems have found their way to the centers of commerce and the principal mineralogical collections.

So far I have found no notice of corundum in California, except a doubtful occurrence in Los Angeles county, quoted in the Mining Bureau reports.

During recent studies of the great serpentine belt of Plumas county the writer was fortunate enough to find a deposit of corundum, which may prove to be economically valuable. The deposit is found on the edge of a great pipe or dike of felsitic porphyry, which sets up through the serpentine. Crystals of corundum lie scattered through a white feldspar, which, however, has not yet been determined, and may prove to contain aluminates. The feldspar lies imbedded in a greenish clay, itself an alteration product of margarite, which also penetrates the feldspar, and occasionally the corundum crystals, which are gray or nearly white where much weathered. In the larger crystals zones of the corundum are noted, generally parallel with the faces of the prism or the pyramid, in which latter habitus the larger crystals generally appear. The largest crystal yet found is 2½ inches long, with an average diameter of ¾ inch.

All the specimens so far obtained have been taken from near the surface, but further explorations will be made to determine the extent and value of the deposit. The locality is near Meadow Valley, Plumas county.

Typical specimens of the corundum and its gangue rock have been donated to the Mining Bureau, where they can be seen by the public. J. A. EDMAN.

Number and Area of the Philippine Islands.

Prof. George Davidson of San Francisco has called the attention of the Geographical Society of the Pacific to manifest errors in the United States official documents relating to the Philippines. The number of the islands is far less than is generally supposed, while their area is underestimated. Following is the letter:

In several Government documents the statement is made that the area of the Philippine Islands is something over 114,000 square miles. In the latest one, just received, it is given as 114,326 square miles. This error has doubtless arisen from a hurried examination of the Spanish documents. We find in the "Guia Official de las Islas Filipinas, para 1898, Publicada por la Secretaria del Gobierno General, Manila, 1898," the statement that the archipelago comprises an area of 355,000 square kilometers, without including the Jolo (Sulu) group. It then specifies about thirty-five of the principal islands, and their areas aggregate 298,485 square kilometers. That, of course, leaves a multitude of the smaller islands not specified in the guide, but covered by the larger area. With the relation of one square kilometer equal to one square mile multiplied by 0.386052, the area of the islands specified amounts to 115,238 square miles; and the area of all the islands, less the Jolo group, amounts to 137,057 square miles.

Further, the statement is generally made that the archipelago of the Philippines contains from 1000 to 2000 islands, and the "Guia Official" says the number is more than 1200. But in examining the "Derrotero del Archipelago Filipino, Madrid, 1879"—that is, the Coast Pilot of the Philippines, covering more than 1200 pages—we find that the islas, islitas, isletas, islotes, islotillos and farallones therein described amount to 583. Of course, this does not include reefs, rocks or hidden dangers.

I submit that these figures of the area and of the number of islands and islets be accepted by the society until replaced by Government surveys.

GEORGE DAVIDSON.

An Experiment in Cyanide Poisoning.

By A. MCARTHUR JOHNSON.

At a recent meeting of the South African Chemical and Metalurgical Society, the author read a paper on peroxide of hydrogen as an antidote for cyanide poisoning, which will be interesting to cyanide men everywhere, as non-medical men can resort to this method at a moment's notice. His remarks were in part as follows:

In order to confirm, or in most part dispel, doubts, Mr. Rand of the Simmer and Jack works and myself procured the necessary apparatus:—a solution of hydrogen peroxide (obtained from a Johannesburg chemist), a hypodermic syringe, capable of containing one cubic centimeter, and the necessary animal organism, in this case, a dog, to all appearances in first rate condition. This solution of peroxide of hydrogen was diluted to 2.5 times its strength, a trifle more, perhaps, than necessary, but we were determined not to stick at trifles. The first attempt to make the dog a martyr to science was useless, as he, as dogs will, refused to swallow the cyanide. However, about 300 cubic centimeters of cyanide solution was taken from the reservoirs and when tested was found to be of 0.1% strength. The potassium cyanide contained was thus about 0.3 grammes and sufficient to kill a full-grown man. This solution was taken because it was desired to bring the experiment as nearly allied as possible to probable contingencies. This, after some difficulty, was completely partaken of by the dog, scarcely a drop being wasted. When immediately released the dog stood up, but gradually sank and within a few seconds was stretched out and breathing with the greatest difficulty. The syringe, charged with peroxide of hydrogen solution, was then produced and tried but, unfortunately, the first needle broke owing to the thickness and toughness of the skin. Hastily fixing another needle and making a small incision in the abdomen with a penknife, the solution was successfully injected, fully one and one-half minutes having elapsed between the drinking of the solution and the first injection. By now the animal was to all appearances lifeless, its body stiff and the legs stretched out, while it seemed unable to get a breath of air, trying to gasp and unable to do so. The peroxide was, however, perseveringly injected at intervals of, roughly, about two and one-half minutes, and this was continued for nearly an hour. During this time the animal lay with mouth wide open and tongue lolling out, while the gasps, when they occurred, were prodigious, the lungs expanding fully a couple of inches beyond the usual and being depressed to almost a shadow-like shape. Twice, to all appearances, the respiration had ceased, and it was only by applying the ear that the faintest possible sigh could be detected. This showed that the third and last stage of cyanide poisoning symptoms had been reached by the animal. Thus encouraged, the injection was continued and at the end of three-quarters of an hour the animal began to show signs of returning consciousness and will power. The tongue was gradually withdrawn and the head began to move. The difficulty in respiration continued for some considerable time, but gradually the body began to assume its usual appearance, although the teeth were now and for some time on tightly clenched. The last injection seemed to congregate just where it entered and took a short time before being absorbed by the blood, whereas the previous ones had almost instantaneously disappeared. Arguing from this and from the general appearance and condition of the animal, we desisted and let the dog come to itself. This it gradually did, and at the end of one and one-half hours after drinking the cyanide it was able to stagger up and move away, though very unsteadily. The eyes seemed dazed while the mental equilibrium was wanting, as its movements were very erratic at first. Considering this, we tied it up and offered it water, but this it absolutely refused to drink. In all about thirty injections were made—about 30 cubic centimeters. I learn that, curiously enough, the animal was exceedingly skittish the following day, and latest reports show that, if anything, the experience has left it better than before.

Unfortunately, for the sake of an accurate description of the various symptoms, I had no intention of bringing up this matter before the society, or you could have had a more complete statement; but from the facts I have stated I hope you will agree with me that a practical prevention against cyanide poisoning can be placed in the hands of all men on cyanide works. Should any case of such poisoning occur, I am confident it can be counteracted if the proper restoratives be applied in time, that is—I quote Kobert as authority—before visible evidences of animation have ceased to show, or even one or two minutes thereafter. This latter peculiarity, the same authority remarks, is due to the fact that in cases of poisoning by weak solutions the heart is the last organ to be affected by paralysis. Of course, with excessively strong cyanide solutions, the paralysis, and therefore death, is practically instantaneous.—Journal Chemical and Metallurgical Society, S. A.

Industrial Notes.

—Los Angeles, Cal., will issue $2,000,000 municipal water bonds.

—California's school population is officially reported to be at a standstill.

—The Pacific Coast Telephone Co. has 54,330 subscribers, the Central Union 52,745.

—Seattle, Wash., is to have a permanent exhibit of the mineral resources of that State.

—The Chilcoot tramway over Chilcoot pass has been sold to the White Pass and Yukon Railroad.

—The Floriston, Cal., Paper Co. wants to furnish electric power to the Comstock, Nev., and offers 5000 H. P. at $5 H. P.

—The Kern River, Cal., Power Co. will build a reservoir, erect a power house at Kernville, and construct an electric line thence to Los Angeles.

—The usual railroad rumors now take the form of alleged consolidation of the Pennsylvania and Santa Fe to form a great transcontinental system from the East clear through to San Francisco.

—The Fresno, Cal., oil strikes are considered by the Union Oil & Transportation Co. to be of sufficient importance to justify organization with intent to lay a 6-in. pipe line from Panoche to the San Joaquin river.

—The Gold Belt Electric Co., Cripple Creek, Colo., proposes to furnish power, light and heat in the Cripple Creek mining district; capital stock $300,000. E. B. Moffat is said to be the financial backer of the new company.

—Labor Commissioner Smith of Colorado says he considers the eight-hour law just and favors compulsory arbitration. He says that on the average 25% of the laboring people of Colorado were idle half the time and that higher wages were paid there than in any other State.

—W. L. Woodward of the Randsburg, Cal., Railway Co. has returned to Los Angeles from New York and states that he has secured capital for the building of a short line of railway from Flagstaff, Ariz., to the Grand Canyon of the Colorado—a distance of thirty-five miles.

—Denver, Colo., hears that the Union Pacific has decided to make its Omaha-Ogden line a double-track road to meet the demands of business. The first section of additional track is to be built between Cheyenne, Wyoming, and Laramie over the Sherman mountain—fifty-six miles.

—The Northwestern railroad is building down the Snake river, near Huntington, Or. About 700 men are at work. The road is to be 73 miles long, down the Oregon side of the river, and will terminate at Tramway Junction, to which point an aerial tramway is projected from the Peacock mine.

—Marconi's system of wireless telegraphy is to be put in operation in Hawaii as a means of communication between the different islands of the group. An organization has been formed, capital has been subscribed for the project, and some of the material of the system is already on the way.

—W. S. Stratton and W. H. Colburn have organized the St. Anthony Crystal Mica Co., and it is stated have invested $250,000 in mica properties, 100 miles south of Santa Fe, New Mexico. The product of the mines is to be shipped to Colorado Springs, where a plant will prepare the mica for market.

—The Eastern Oregon Power Co., Baker City, Or., will furnish power to the mines around Baker City; capital stock, $100,000. Among the incorporators are A. Geiser, manager of the Bonanza mine; F. S. Baillee, manager of the Columbia mine and J. T. English, manager of the Golconda mine.

—Immigration arrivals at San Francisco during the year ending June 30th, '99, were 4766—3726 males, 1040 females: Japan 1667, England 1464, Germany 201. Mexico 153, Portugal 138, Ireland 150, Spain 72, Corea 22, Phillippine islands 11. The money brought by these various immigrants was $333,754.

—A City of Mexico report is that Popocatapetl volcano has been sold for $600,000 in gold to General Gesper Sanchez, who for some time owned and operated the sulphur deposits in the crater of the volcano. A cogwheel railroad will be built to the summit and the sulphur deposits mined on more extensive scale.

—A new steel shaft just finished for the Boston Elevated Railway Co. is said to be the largest ever cast. It is to be used in the company's central power station. The engine will be of 4000 H. P. at ordinary speed. The shaft is 28 feet in length and 38 inches in diameter in the center and weighs about 75,000 pounds.

—Omaha, Neb., reports that, as a result of the closing of a number of furnaces of the Omaha & Grant smelter, 1000 men are idle, and the indications are that other furnaces will be closed and other men forced to remain idle. The management gives as an explanation their inability to secure coal as usual from the Illinois and Iowa mines, because of the labor troubles there. When asked why they did not utilize coal mined on the Union Pacific, the manager declared this class of coal was too costly, and that the plant could not be profitably operated with Rock Springs coal.

—Precious stones to the value of $160,290 were found in the United States in '98, as compared with $136,675 in '97. G. F. Kunz, the agent for the Geological Survey, in charge of the collection of data relative to the production of precious stones in this country, deals at length in his annual report with the finding of rock crystal at Mokelumne Hill, Cal., of such purity and size as to rival the Japanese; the successful cutting of these in the United States up to over 7 inches in diameter; the increased output of the Fergus county, Montana, sapphire mines; the yielding of fine blue gems up to two karats each, and the discovery of a new locality where the stones are more varied in color than those heretofore found; the continued output of the New Mexico turquoise mines and the opening up of mines in Nevada; the finding of magnificent green and other tourmalines at Paris Hill, Me., and Haddam Neck, Conn.; the increased sale of the Australian opal; the greater importation of uncut diamonds and the increase of the diamond cutting industry in the United States; the unprecedented increase in the importation of cut diamonds and the revival of the precious stone industry in the United States.

—Chicago reports the development of a rival to the elevator trust. The Frazer Electric Elevator Co., a San Francisco concern that has been operating with a capital of $2,000,000, is invading the territory hitherto monopolized by the Otis Elevator Co. The Frazer corporation, it is understood, will increase its capitalization and extend its facilities in general. G. Crocker, the vice-president of the Southern Pacific, is president of the California concern. J. J. Mahoney is vice-president and general manager. W. H. Coon, formerly the manager of the Crane Brothers' Elevator Co., is the Eastern representative of the Frazer Co.

—An Eastern electrical paper estimates that the waterfalls in California alone have over 240,000 H. P., and that about 45,000 of this H. P. has already been converted into electrical energy and sent to Los Angeles, Sacramento, Fresno, Pomona, Redlands, Folsom and San Diego for lighting and motive purposes. Five more electric companies will have their long distance transmission systems in working order by next September. About 50,000 more H. P. will be developed by them for use in California and Oregon, while still other companies are beginning work on electric power plants that will cost from $100,000 to $500,000 each, and will harness more mountain streams for electrical transmission of their power to distant towns.

Personal.

B. I. WHEELER has accepted the presidency of the University of California.

WM. VAN SLOOTEN has returned to New York City from a professional visit to Mexico.

D. E. BIGELOW of the Union Iron Works has returned to San Francisco from Redding, Cal.

W. A. CLARK says that none of his Montana or Arizona copper properties are in the combine.

J. H. TIBBITS of Redding, Cal., is consulting engineer for a large Nova Scotia mining company.

E. H. COOKE, Supt. United Globe Mines, Globe, Arizona, has returned from El Paso, Texas.

W. A. FARISH is in Salt Lake City, preparing his report on some mining properties recently examined.

ALFRED VON ROPP, Supt. Selby Smelting & Lead Works, Selby, Cal., has returned from a brief Eastern visit.

RICHARD A. PARKER has changed his San Francisco office from the Crocker Bldg. to room 15, 320 Sansome St.

LUCIAN EAVES, consulting engineer for the Idaho Exploration & Copper Co., is exploring the Seven Devils country.

H. H. HENLEY, representing the Vulcan Iron Works of San Francisco, has returned from a business trip to Arizona.

H. KNIPPENBERG, Gen. Mgr. and Pres. Hecla Con. M. Co., will resign September 1 and remove to Indianapolis, Ind.

W. F. ROBERTSON, British Columbia provincial mineralogist, is shipping British Columbia mineral specimens to Ottawa, for the Paris Exposition.

H. E. PICKETT of El Dorado county, Cal., was in San Francisco last week, attending an executive meeting of the California State Miners' Association.

IT is reported that M. J. Flynn, formerly a Supt. at Mercur, Utah, and now Mgr. Boulder Perseverance, in Western Australia, will return to the United States.

W. F. PATRICK, formerly Supt. at the South Eureka, Tintic, Utah, is now Mgr. Osceola mine at Osceola, Nevada. He has recently returned from an Eastern trip.

THEO. F. VAN WAGENEN, E. M., formerly identified with mining in Colorado, has opened an office in Boise, Idaho, for the practice of general mining engineering.

F. R. MILES, formerly of Butte, Mont., who claims to be a couisin of Gen. N. A. Miles, is the Klondike's World's Fair Commissioner, appointed by Gov. Ogilvie of the Yukon district.

L. T. WRIGHT, Mgr. Keswick, Cal., Mountain Copper Co., favors reception there to the 100 delegates on their way to San Francisco to the meeting of the American Institute Mining Engineers.

HEBER HOLMAN succeeds the late P. Kervin as Supt. Best & Belcher and Gould & Curry M. Companies. J. R. Ryan succeeds Mr. Kervin in the superintendency of the Con. Cal. & Va. mine, Virginia, Nev.

R. B. BROWN of California, the mining engineer who was awarded $1,812,000 by the Boer Chief Justice in his claim against the Transvaal government, wants the United States to intervene and collect the amount for him.

WM. MCGILLIVRAY, under date of Jan. 2nd, writes from Kowak river, Alaska, north latitude 67°, that there is little or no gold in that country. Regarding his brother, John D. McGillivray, who many California readers of the MINING AND SCIENTIFIC PRESS will remember, Wm. McGillivray writes: "My brother, John D., has three good claims on Sulphur creek, worth from $30,000 to $40,000."

VICTOR C. HEIKES, the honorary special agent, Department of Mines and Metallurgy for the U. S. Commission to the Paris Exposition, is in San Francisco arranging for the display of the mineral resources of California, and is pleased with the interest taken by the California Commission in making an effort to be well represented at Paris. Mr. Heikes states that the large number of useful commercial minerals which California has, when shown in the United States space under exposition classification, will look very much like a California State exhibit. The space allowed the California Paris Exposition Commission in the Mining Department is practically one-fourth of the whole allotment for the United States representation in ores and minerals.

Commercial Paragraphs.

THERE will be a national export exposition of American manufactures at Philadelphia from Sept. 14th to Nov. 30th, '99. The Union Iron Works of San Francisco will make an exhibit entirely of pictures representative of its ship-building yard. There will be eighteen views in all, each of them occupying 4 square feet. All but three will be pictures of ships, and of those three two will be views of the Wisconsin's engines and the other will show the engines of the Chitose.

IMPROVEMENTS in the Wilfley table occasions a saving of values in the tailings. The feed box is now attached to the table itself, the motion of the table facilitating and regulating the discharge. The wooden launder is replaced with 1¼-inch pipe, having perforations in the upper side, the pipe being stationary. After these changes were made one table in a three months' run at Butte, Mont., is said to have saved 872,882 pounds of material that formerly went to waste, containing 61,627 pounds of fine copper and 3543 ounces of silver.

THE Montana & Denver Reduction Co., through its Gen. Mgr., Arthur B. Brown, has placed the order for their combination mill with the Edward P. Allis Co. at its Denver office. This will be a custom mill, with a sampling mill, twenty 850-pound stamps, copper plates, followed by concentration and cyanide. This mill is to be erected near Coloma, Mont. Frank B. Turner has also placed the order for the machinery for a fifty-ton cyanide mill with the same company at Denver. This mill is for the Nevada & Utah Exploration M. Co., at Norris, Mont. The Allis Co. are also getting out the machinery for a large concentrating mill, to handle the Enterprise dump material at Rico, Colo.

ELECTRICITY is being largely used in gold mining. The Westinghouse Electric & Mfg. Co. are constructing a considerable number of electric generators and motors for operating mines in Colorado and California. The Cripple Creek district secures electric current from points thirty and forty miles distant, using it at the gold mines for hoisting, pumping and ore reduction purposes. The Western States have erected a number of electric generating stations, utilizing waterfalls for motive power, from which electric current is widely distributed. The Santa Ysabel G. M. Co., Quartz, California, is installing a 200 kilowatt Westinghouse generator, and a 200 kilowatt Westinghouse rotary converter, with switchboard and a complete electrical outfit. A large Westinghouse Type "C" motor will be supplied to haul the rough ore to the surface. These motors are virtually automatic and never get out of order, as their construction is of the simplest type. Many hundreds of these Westinghouse motors are in use in Cripple Creek district for hoisting and pumping. The El Paso Electric Co., Colorado Springs, are installing a 180 kilowatt Westinghouse generator. The Pioneer G. M. Co., whose head office is at Boston, Mass., are putting in a 100 H. P. Westinghouse Type "C" motor for working the mine hoist. A new feature is the application of electricity to dredgers, which are used for obtaining gold from river beds. These dredging operations are usually in places where coal is a scarce and costly commodity, which has to be transported by teams to the river bank, over the worst of roads, and then lightered to the dredgers. It has been found far more economical to carry a copper wire from the river bank to operate electric motors, which readily perform every operation on board the dredgers. The Continental Gold Dredging Co. of California, are having a large dredger built at Milwaukee, Wis., which will be equipped with several Westinghouse Type "C" motors, one of 100 H. P., another of 75 H. P., besides smaller ones. The electric power to operate the motors will be obtained from the Yuba Power Co., Cal. The dredger will operate upon the alluvial deposits on the foreshores and banks of the Yuba river.

Catalogues Received.

UNION GAS ENGINE CO., San Francisco, Catalogue No. 12. Whoever got up this catalogue understands his business. It is a model, 36 pp., very little talk, fine paper, good engravings, with just enough accompanying description to indicate what the picture represents, and what it is claimed it will do. Pictures of engines from 3½ to 130 H. P. are given, with the specifications as to weight, floor space required, style of fittings, for what use designed, etc. Any one on land or water interested can get the catalogue by asking the Union Gas Engine Co., San Francisco, Cal., for it.

Obituary.

F. M. ENDLICH, mining engineer, killed himself at Tucson, Arizona, on the 17th. He had been manager of the Saginaw M. Co., and had just been engaged as manager of the Martinique M. Co.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JULY 11, 1899.

628,597.—ELECTRIC ELEVATOR ALARM—H. R. Bruhns, S. F.
628,763—VEGETABLE CUTTER—E. T. Clowe, Woodland, Cal.
628,697.—CONCENTRATOR—Couls & Dohlgreen, Tacoma, Wash.
628,698—MAKING PRESS COPIES—L. D. Craig, Tacoma, Wash.
628,781.—DRILL—Farrington & Copeland, Phœnix, Ariz.
628,600.—COMPASS AND COURSE CORRECTOR—J. M. Fields, S. F.
628,601.—SKIRT SUPPORT—W. Fraser, Oakland, Cal.
628,580—CURLING IRON—B. Gray, Los Angeles, Cal.
628,906—ROTARY PUMP—J. Grindrod, Los Angeles, Cal.
628,625.—SAW FILER—S. W. Gutridge, Granite, Or.
628,540.—BUCKLE—H. C. Keeler, Waterville, Wash.
628,909.—SHADE CUTTER—E. Litten, Santa Ana, Cal.
628,586.—AIR COUPLING HANGER—J. C. Look, Tudor, Cal.
628,183.—SHEARS—F. Macri, Huntington, Or.
628,671.—VALVE—G. O. Newman, Riverside, Cal.
628,605.—HATHOLDER FOR CHAIRS—F. R. Ottenheimer, S. F.
628,606.—STEAM GENERATOR—J. C. Parker, S. F.
628,895.—TAX COMPUTER—W. F. Parker, San Jose, Cal.
628,590.—HORSESHOE—W. E. Shaw, S. F.
628,615.—ERASER CLEANER—J. L. Smith, Riverside, Cal.
628,866.—FRUIT GRADER, ETC.—F. M. Starrett, Silverton, Or.
31,213.—DESIGN PHOTO MOUNT—P. J. Stuparich, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRIC ELEVATOR ALARM.—H. R. Bruhns, San Francisco, Cal. No. 628,597. Dated July 11, 1899. The object of this invention is to provide a means for signaling the approach of elevator cages to different floors or points of danger. It consists of a series of independent signals, each having a circuit closing device and an electrical circuit, a spring projecting into the path of the elevator so as to remain depressed during the passage of the elevator past it, a fulcrumed lever and a push bar connecting one end with the spring, a push button actuated by the opposite end of the lever to close the circuit and a means for compensating for irregularities of movement of the lever and push bar.

HAT HOLDING ATTACHMENT FOR CHAIRS.—F. R. Ottenheimer, San Francisco, Cal. No. 628,605. Dated July 11, 1899. This invention is designed to provide a safe receptacle for ladies' hats, and is employed as an attachment for theater chairs or seats in public places in which ladies usually remove their hats. It consists of a collapsible case fitted to the bottom of the seat and closable against the bottom of the seat when not in use, so that when the seats are turned up it does not project to interfere with the passing of people. When in use, it is extended and the hat is placed in it, and it then depends below the bottom of the seat and forms a sufficient protection for the hat.

WAIST AND SKIRT ATTACHMENT AND SUPPORT.—Wm. Fraser, Oakland, Cal. No. 628,601. Dated July 11, 1899. This invention is designed for the support of ladies' skirts and to form a connection therewith for shirt waists and similar upper garments. It consists of an attachment to be applied to the belt or band of the skirt, and provided with hooks which engage the belt attachment, and also to engage with the tape of attachment upon the band of the waist so as to keep the latter in position and maintain the junction of the two garments. The device comprises a plurality of bent plates attached to the skirt having outwardly and inwardly presented hooks. Loops or attachments are fixed upon the lower part of the waist, and with these the inner hooks of the skirt attachment engage.

COMPASS AND COURSE CORRECTER.—J. M. Fields, San Francisco, Cal. No. 628,600. Dated July 11, 1899. This invention is designed for the correction of errors in the course of vessels, such as may arise where iron and steel enter largely into the construction, or on account of the character of the cargo or from other causes. It consists of a suspended ring or structure, an outer ring fitting and adjustable therein having its surface graduated in degrees each way from zero, a dial concentric with the ring, flanged and fitting therein with clamping screws, said dial having compass readings upon opposite sides and reverse from each other. A central socket opening is made upon one side adapted to receive the standard of the sight bar and a socket for the shadow pin upon the other side. This shadow pin may consist of a single slender pin or a rectangular open frame extending upwardly from the socket piece and having a wire stretched across the opening.

PHOTOGRAPHIC MOUNT.—P. J. Stuparich, San Francisco, Cal. No. 31,213. Dated July 11, 1899. This design consists of a border of raised lines or ribs radially disposed from a central space which may be circular, oval or rectangular. The outer ends of these raised radial lines are made of different lengths so as to present a wavy or serrated outline.

Mining Summary.

ALASKA.

Reports from the Cape Nome region brought by men from the Arctic region are very conflicting. Some claim that the diggings are shallow and immensely rich, others saying that there is gold there but in small quantities, and still others say positively that the rich strikes were "fixed."—that is, salted for the purpose of creating a stampede, by which the transportation companies benefit largely whether gold is found or not.

North of Cape Nome there is said to be a deposit of lead-silver ore, from which one shipment was made for San Francisco some years ago, but the schooner was lost and the cargo never reached its destination and the mine has never been disturbed since. It will probably be brought into prominence again during the present Cape Nome excitement.

ARIZONA.

Dry placer mines said to be rich have been found near Ehrenburg, on the Colorado river. A number of prospectors have gone there. Back some distance from the river are local deposits of cemented gravel in which coarse gold occurs. The gold was no doubt derived from veins in the vicinity. These deposits are much like those worked in western Australia.

The Copper Queen at Bisbee is to enlarge its smelting capacity and install a large hoist at the new three-compartment shaft. Two shifts are working on the Huber-Robinson properties, six miles east from Bisbee. The pay streak continues to a depth of 40 feet, assays running well in gold.

Phœnix *Gazette*: The Harqua Hala mine, in northeastern Yuma county, was sold by its original owners for $75,000, but later sold for $2,000,000, after Hubbard Bowers of Redlands had extracted nearly that amount from its stopes. Soon after the English company purchased the mine the ore body worked out, and for several years the mill has been running on custom work and tailings, the latter being cyanided. August 14th, at the court house in Yuma, the mine and mill site, the pumping plant that once supplied water from Harrisburg, a 40-stamp mill and cyanide plant are to be sold.

Prescott *Journal-Miner*: J. P. Bauder, Mgr. New Hope M. & M. Co., has six men at work on the Mountain Driver group, Eugene gulch, in the Chaparral district. The above company has a bond on the property, which is owned by A. Denny. It shows up well as far as developed. The company will sink 200 feet deeper.

Los Angeles *Express*: A. W. Fisher of Los Angeles has bought another gold mine in Yavapai county, Arizona. Mr. Fisher, who is Pres. and Gen. Mgr. of the Monte Cristo M. Co., has secured from R. J. Holmes the Monarch mine for $20,000.

Globe *Times*: In Yavapai county the two mills at Placeritas, south of Prescott, are running night and day.—The Bordeaux mine on upper Big Bug has a new steam hoist.—A new mill has arrived for M. C. Parmlee for the Dividend and Ticonderoga claims, extensions of the Little Jessie in the Chaparral district.—The Red Rock mill is working day and night on Big Bug.

Prospector: The turquoise mines of Cochise county have been placed under option for sale to New York parties.

Copper Era: The Arizona Copper Co. have completed their elevator wheel for lifting slag into a large flume which will carry it out and over the present surface of the river bed. The wheel has a capacity of 250 tons every twenty-four hours.

CALIFORNIA.

Amador.

There are several miles of mineral land on the main gold belt in this county of which little is known, the prospect holes being only superficial or lacking altogether. The Empire and Pacific mines are near Plymouth and produced several millions. Half a mile north of them is the Alpine. Still north there are only shallow holes until the Bay State mine is reached, a distance of four miles. Near Jackson, one of the richest portions of the lode, it is wholly unknown for a distance of over a mile. This is more remarkable in view of the fact that some of the richest mines in the State are in operation on the same vein near by.

The five-stamp mill at the Jackson Butte mine, which started up a few days ago, will be augmented by five more stamps, which are in course of installation. The mill was shut down some months ago until a tunnel at a lower level could be driven to the ledge which has now been reached. The ledge is 8 to 12 feet thick.

Sutter Creek *Record*: At the Central Eureka mine near Sutter Creek high-grade ore is reported found in the 1300 level and at the bottom of the shaft at 1450 feet.—A crushing of 175 tons of ore is being hauled from the Potazuba mine in Sutter Creek to the Zeile mill at Jackson.—The sale of the Bunker Hill mining property to C. R. Downs and others for $30,500 has been confirmed by the court.

Jackson *Republican*: Work at the Valparaiso mine, south of Jackson, is interfered with on account of bad air. The old Nevill's works were tapped but circulation failed owing to caves which have taken place. One hundred tons of rich ore are on the dump. This will not be hauled to the mill by the lessees until the end of their lease.—At Amador Queen No. 1 the force has been reduced. Sinking has been stopped for the present and only drifting is going on.—The Red Hill mill has started up again, using Blue Lakes water for power. It has been closed down for several months.—Two men are at work in the tunnel on the Belluomini ranch, one mile south of Jackson. The tunnel is now in 60 feet and 400 feet will be required to reach the ledge which shows on the hill west of the entrance and 100 feet above it.—South of Jackson and 1000 feet west of the Moore mine is the claim of the Moon Bros., who have been prospecting here for several years. Some years ago they started a shaft 100 feet south of the present one, and at a depth of 125 feet water was opened by a blast and the mine was flooded so quickly that the men scarcely had time to bring out their tools. The water gained steadily and the shaft had to be abandoned. A new shaft was started.

Jackson *Dispatch*: Gibbons & Horr have started their clay and gravel washer at the Gillespie gravel mine. Much interest is taken in this machine by those who have gold bearing clay claims.—At the Ranlett copper mine the shaft has been unwatered and miners are drifting, upraising and taking out ore. Grading for the smelter is in progress.—At the Amador Queen mine No. 2, south of Jackson, Supt. Phillips reports they have finished changing the hoist from a single to a double one, are unwatering the shaft and will sink deeper. Drifting at the 800-foot level will be commenced as soon as the water is out.

Butte.

Oroville *Mercury*: D. M. DeLong of the North Fork mines has washed from the gravels of that stream coarse gold worth $140, another piece of $100 and so on down to $10 and $20 nuggets. The company is running two pack trains carrying in supplies and machinery. It has an electric lighting plant and is constructing a hydraulic elevator. When the elevator is completed, work will be pushed. Twenty-five men are employed. This company owns ten miles of river bed, and the plant being constructed will be the first of several.

In Butte county the following minerals are found: Gold, silver, sulphides of antimony, arsenic and copper; asbestos, white and long fiber; chrome iron, clay, granite of various colors, iron ores and manganese ores.

Calaveras.

San Andreas *Prospect*: Operations on the Vorlander, near the Middle Bar bridge, are progressing under the superintendency of C. M. Burleson. The shaft is down 30 feet, the new ditch, a mile in length, is completed, and the hoist will be ready for operation in ten days.—C. Tryon, sinking 200 feet in the Brunner mine, has nearly finished his contract. This week a body of ore 30 feet in width was struck. It prospects well.

El Dorado.

At the Griffith mine, near Diamond Springs, they have attained a depth of 750 feet, where another station will be cut and sinking resumed.

The Pacific Gravel M. Co. has been incorporated, to operate mines in El Dorado county, and the principal place of business is Sacramento. The capital stock is $50,000. The directors are F. L. Atkinson, W. A. Desborough, H. U. Prindle, J. T. Martin and J. W. Guthrie of Sacramento.

Placerville *Republican*: The Umatilla mine on the south side of the county near Coyoteville is using a new contrivance for working the cemented gravels of the river channels. The Umatilla mine is on the south side of a ridge between Spanish creek and Cedar creek, and its characteristics are similar to the ancient channels in this vicinity. The company is working the cemented gravel by means of a revolving, hexagonal or six-sided hollow cylinder 6 feet long and 6 feet in exterior diameter. It is faced with heavy iron bars and arranged with screens so that the gravel introduced at one end and mingled with water falls continually upon the bars, the stones assisting in crushing the cement. The cylinder makes 300 revolutions per minute and requires power equal to a 10-stamp mill. It has a capacity of 226 tons of gravel in twenty-four hours. John Rowlands is foreman. An amalgamating attachment consists of a grooved plank, which is rapidly vibrated while the gold-bearing material passes over it. The result is that the sand in the grooves is prevented from packing and the gold and quicksilver are permitted to settle to the bottom.

Placerville *Nugget*: E. W. Chapman has begun development work on the Charles Nelson quartz mine near Henry's Diggings. A steam hoist and pump will be put in.—Twenty-five men are employed at the Mt. Pleasant mine at Grizzly Flat. Ore is being broken in the old workings and the shaft is being sunk to greater depth. It is down 800 feet.—Development work at the Mt. Hope mine, Grizzly district, has been resumed under the superintendency of W. R. Pearson.—At Volcanoville the Gem shaft is 50 feet in depth. They are following an 18-inch ledge of high-grade ore.—F. H. Jermyn, of Scranton, Pa., is the principal owner in the Red Hill quartz mine, Kelsey district. He will begin development work on the property.—The McGraw mine, near Kelsey, has been bonded by McGraw & Roberts to Hayward & Lane for $30,000.—A New York company is unwatering the Pocahontas mine at Dogtown for the purpose of investigation. T. J. Houghton is superintending the work.

Fresno.

The San Joaquin Oil Co. has incorporated at Hanford; capital stock, $50,000.

Inyo.

Los Angeles *Times*: Specimens of copper ore have been brought in from the Copper Bell mine, in the South Slate range of mountains, by W. C. Ross, who, with W. E. Patterson of Los Angeles, owns the property. Assays of the ore showed 16½ copper, $5 gold and seven ounces silver.

Kern.

Randsburg *Miner*: The G. B. mine at Randsburg has changed hands. Powers, McCombs & McCormack having sold it on a working bond to S. Johnson of Cripple Creek, Colo. D. A. Clements is in charge of the property for Mr. Johnson and has put a number of men to work.—Work has been resumed on the Pinmore and men are taking out ore. The Pinmore is a large vein of low-grade ore close to the Red Dog mill.—Henry and Harold Ashford, with a force of men are at work on the King Soloman taking out ore. They will put leasers on the Hector and several other mines owned by them.—The Yellow Aster mill is crushing 130 tons per day.

Los Angeles.

On the 13th inst., in the city of Los Angeles, the Miners' Association of Southern California was organized. The officers are: Chas. B. Boothe, president; C. A. Burcham and C. S. McKelvey, vice-presidents; H. O. Collins, treasurer; Geo. N. Nolan, secretary; G. W. Parsons, G. Borden, A. Richardson, H. B. Botsford, executive committee.

Madera.

(Special Correspondence).—In the vicinity of Mount Raymond five miles east of Fish camp on the Yosemite road from Raymond to the valley, is a number of mines which have been neglected for ten years. At one time the camp was a scene of activity and promised much for this mineral belt in the high Sierra. The mines are at an altitude of 8000 to 9000 feet above the sea, and considerable work of a superficial character has been done. The ores consist of lead, zinc and iron sulphides carrying silver. Some of the ore is high grade in zinc, and some of it runs well in lead. The ore can be worked only by concentration. A large concentrating mill was built here ten years ago but proved a failure. With the present high price of base metals these mines in proper hands might be made valuable. The mill and principal group of mines are connected by wire tramway a mile in length. The ore bodies are large in the Star mine and are opened by surface cuts. No systematic development has ever been undertaken, and the short season has been a drawback. The mill contained rolls, tramnels, jigs and buddles, and the ore was concentrated and shipped. The formation in which these mines occur is diorite, the ore appearing as large lenses without well defined walls.

Fish Camp, Cal., July 15th, '99.

Mariposa.

The Merced *Star* says there was $60,000 in bullion in the safe of the Merced Company at the time of the recent fire in Coulterville.

Nevada.

The Boston Stock Exchange has admitted to the unlisted department 250,000 shares, par $10, of the North Star Mines Co. The company is incorporated under New Jerssy laws with an authorized capital of 500,000 shares. The officers are: J. D. Hague, president; W. L. Bull, vice-president; W. D. Pagan, secretary and treasurer. Directors: A. G. Agnew, W. L. Bull, J. D. Hague, W. D. Pagan, Benjamin Strong. The principal office of the company is at 18 Wall street, New York.

Grass Valley *Union*: The Conlan, now known as the Jefferson mine has been bonded by San Francisco parties. J. Lawrence, representing the company is in Grass Valley arranging for starting work at the mine. The Hermosa plant has been purchased by the company and is on the Conlan ground. The mine will be pumped out and development commenced. The Jefferson is on Osborn Hill, adjoining the Centennial and Osborn Hill mines. An incline shaft was sunk and a good-looking ledge was uncovered.

Nevada City *Herald*: Thieves took $2000 worth of gold from the settling tanks of the Pioneer Reduction Works near Nevada City one night last week.

Nevada City *Herald*: Weissbein Bros. have purchased the interest of the Feeny Bros. in the New York Hill Con. mine at Grass Valley, and with Dr. S. M. Harris and J. Burke will develop the property.

Placer.

The High Point M. Co., Ltd., has been organized to operate at Blue Canyon. The directors are S. F. Bolliet, F. W. Tutin, G. W. Stahl, J. H. Sandholm, W. H. Bisbee, Des Moines, Iowa; P. Henry, Truckee; D. H. Rittenhouse, O. O. De Pew, Blue Canyon; capital, $2,000,000.

Colfax *Sentinel*: At the Washington quartz mine in Old Man mountain, eight miles from Cisco, near Carlisle, ten men are employed. The mine is owned by Bruner & Hirsh, O. W. Bruner Supt. A cable tramway 2200 feet long is being built. A carload of ore will be shipped daily to Selby's at San Francisco. They have 1500 tons on the dump.—Development is in progress at the Mascott quartz mine, two miles northeast of Cisco. The shaft is down 28 feet in a body of ore. The mine is owned by O. W. Bruner of Denver and Freeman & Vineyard of Cisco.—J. Gouldner, owner of the Grant and Kentucky mines near Carlisle in Meadow Lake district, is doing development work and will build a concentrating plant.—A number of quartz locations have been made on the North Fork of the American river nine miles southeast of Cisco. A test of ore taken across an 8-foot ledge returned good values. The claims are owned by W. D. Heaton of Oakland and J. Berry and Freeman & Vineyard.—W. Gray has resumed work in his drift mine below Dutch Flat. Rich gravel was taken out of the channel in the adjoining claim.—The Polar Star mine has closed down after a successful season's run, to be operated again in the fall as soon as the water supply permits.—The hydraulic mines of the Gold Run Gravel Co. have mostly finished work for the season. The force in the drift mine has been temporarily reduced, awaiting development work.—At the Dutch Flat Blue Lead mine the excavations for the mill are about completed and the machinery and building will soon be in place.

Plumas.

Nevada *Transcript*: At the Centennial mine, in Genessee valley, the ore from a 6-foot vein is stoped so that it falls directly into the car, and runs to the mill. Being soft, the ore is not put through a rock breaker, but goes directly from the grizzly to the feeders. One man breaks the ore, while the other delivers it to and attends the mill. Five of the ten stamps are kept running, and at a cost for mining and milling of 50 cents per ton. The mill is a simple but complete affair and is run by water power.

San Diego.

Hoover, Whims & Haines, lessees of the Cleveland-Pacific mines in the Julian district, have cleaned up a run of their ore at the Escondido mill, which resulted in gold worth $1800. Another run made at the mill by F. Roberts from the work of two men during the month cleaned up $1000.

The Owens mine at Julian is being unwatered for the purpose of examination by Pasadena parties.

A. Frary is having a crushing from the Eagle at Bailey's Ready Relief mill at Banner.

Numerous claims have recently been located in Grapevine district in the Julian country. The veins are said to be large and the gold free.

There are some good mines in a prospective stage of development near Pine Valley. The formation is mica schist and the quartz high grade. Some of it carries galena and is rich. The Noble claims have the greatest development. When first discovered the ore was worked in an arrastra, and later a mill was built, but the claims were not sufficiently developed to keep the mill constantly employed.

Shasta.

Through his agent, H. A. Cohen, J. R. De Lamar purchased the Bully Hill copper mine for $200,000 and also bought the Baxter, Callinger, Wentworth and Popejoy mines for less than $25,000. While his agent was negotiating with C. H. Hamilton, representing J. Sallee, H. McDonald filed a suit against Sallee, his one-time partner, for a half interest in the mine and an accounting. The facts are said to be that McDonald and Sallee had a joint option on the Bully Hill three years ago, but the option was allowed to expire. Sallee afterward renewed the option in his own interest, and McDonald now claims that his partner deceived him with the intent of securing it for himself. Sallee gave an option to C. A. Hamilton, who in turn assigned his contract to L. A. Scowden of London. Scowden negotiated with Laidenburg, Thallman & Co. of New York, but, on the report of C. King that a capital of $1,000,000 would be required, they declined to buy. Hamilton secured a new option and sold the property to De Lamar.

Redding *Democrat*: Supt. Shepherd is having a double compartment shaft sunk on the Old Spanish mine near Shasta, and also doing work. A scarcity of water at certain seasons has been a drawback on the Old Spanish claim.—Development work is being done by Geary & Taylor on the original Bunker Hill mine on Middle creek. Encouraging prospects are the result of the work. In early days this mine paid.

Redding *Free Press*: In sinking the new double compartment shaft on the Old Spanish mine water was encountered at 50 feet. Supt. Sheppard is driving a tunnel to carry off the water. The shaft will be sunk 200 feet deeper before a level is run. The second level will be started at a depth of 500 feet. Work is also in progress on the extension of the Enright tunnel, west of the company's offices, and is in 290 feet. In 40 feet the Wiser ledge will be cut. The work of erecting hoisting machinery will be begun next week.—The Sacramento River G. M. Co. has bought two placer claims, one on the Sacramento, near the mouth of Motion creek, the other on Squaw creek. One is the Cottonwood dredger mine, the other the Old Diggings dredger mine. The purchase was made of H. Frickenger, E. Riebe, T. A. Wilson, W. H. Bickford and others.—C. G. Haddock of Los Angeles has purchased the Montgomery claim of F. M. Donovan. The claim is in the neighborhood of the Black Diamond.—It is again reported that a gold streak has been found on Buck ridge, two miles west of North Yalo Bola. There have been a number of reported strikes in that neighborhood.—Nofsinger & Johnson and the estate of J. M. Bryan own eight claims along the ridge near Eagle lake, and have done sufficient work on the Eagle Bird to disclose a good vein of milling ore. After sinking 50 feet they encountered water, and decided to drive a tunnel and went in 110 feet when work was stopped. They will resume the tunnel work. Mr. Nofsinger and his partners have another claim, 3000 feet north and on probably the same ledge as the Eagle Bird, called the Richland, on which they have driven a tunnel 165 feet into porphyry. They have had assays of $8 to $15 a ton, milling ore. They will also continue this tunnel.—The kilns at Keswick were fired recently.

Sierra.

M. W. Mather, Gen. Mgr. of the Crœsus G. M. Co.'s mines, will contract for a new 20-stamp mill for the Plumbago mine and will run another tunnel into the hill, 400 feet lower than this lowest tunnel. At the mouth of it he will build the mill, with power facilities for forty stamps, the other twenty to be added when needed.

Siskiyou.

Yreka *Journal*: Work in the Spencer mine at Humbug is carried on in the upraise from the new tunnel run into the ledge below the old works to reach the works where rich pay was taken out, and suspended on account of water.—The hydraulic miners on the Klamath are short of water and will soon be compelled to shut down. They have had a good season, and realized good pay.—The hydraulic mines at Oro Fino were shut down on the 4th of July, owing to scarcity of water. The company will commence getting ready for the winter, with smaller force.—B. F. Thornton, superintending the development of a quartz mine in Quartz valley for a New York company, reports a new 5-stamp mill completed, and began crushing ore last week.—R. F. Garrett is working night and day hoisting gravel at his river mine near Hamburg Bar. The main

channel is 35 feet deep and the first 18 feet pays for handling, and some of the bedrock gravel pays $10 per tub.——Mr. Van Blunt, purchaser of the Ock mine, near Happy Camp, is working seventy-five men repairing the South Fork ditch, which is over eighteen miles long and will, when completed, carry 4500 inches of water. There will be three miles of flume, which will be 6 feet wide. Seven hundred thousand feet of lumber will be required to equip the mine.

Yreka *Journal*: The Greenhorn Blue Gravel mine has been troubled with caves lately, which interfere with operations, causing men to be laid off until the drifts are cleared——A 10-inch pump has been put in at the Nehrbass ranch, adjoining the Greenhorn Blue Gravel mine. The shaft is down 108 feet, in which there is too much water for the old pump. With both pumps the water will be lifted and furnish a supply for sluicing.——Managers of the Gumboot mine near Scott Bar have put on a force and find quartz, which they believe will pay. They are getting ready to put up a mill and also contemplate building a road to the Scott River divide road, to reach Fort Jones in twelve miles.——W. A. Bantz, working the Cape mine on Greenhorn, finds the rock rich, with the ledge varying from 6 to 18 inches in width.

Tuolumne.

Recent assays of ore from the 200-foot level of the Draper mine, a mile southwest of Soulsbyville, shows gold $475.41, silver $18 85; total $494.26.

Union Democrat: The Mexican mine, owned and operated by the Mexican M. Co., is on Big creek, six miles from Groveland. The property consists of nine locations. The development consists of a shaft 160 feet deep on the vein, with sinking progressing. The quartz is 3 feet wide. Tests show the rock to carry a value in free-milling gold and 1% of concentrates worth $124 a ton. The mine is equipped with a steam hoist, 2-stamp mill, concentrating plant and amalgamator. The Supt. is J. Urquhart.——At the Goldwin mines, on the lower end of North Fork canyon, the new work consists in sinking deeper the winze in the tunnel on the Rhode Island ground. After unwatering this winze, which had been abandoned at 58 feet, Capt. McClintock put miners to sinking. Drifts will be started at 125 feet. It is the intention to turn the winze into a shaft by upraising to the surface—a distance of 94 feet. The ground has been stoped along the vein 105 feet, being the length of the shoot. It is said the rock went $40 per ton in an arrastra.

Trinity.

Redding *Free Press:* A new copper strike has been made a half mile above the Copper Queen mine near Trinity Center, recently purchased by Napa capitalists. The new strike is on Cedar creek, where the ledge shows a width of 200 to 300 feet. A number of locations have already been made.

COLORADO.

H. A. Lee, State Commissioner of Mines, has issued a circular describing a new code of signals which he was required to form in compliance with the new law regulating that department, which reads as follows:

In accordance with the provisions of paragraph 9, section 20, of an act relative to the bureau of mines to establish a uniform code of signals in all mines using hoisting machinery, the following code is hereby established and "shall be securely posted, in clear and legible form, in the engine room, at the collar of the shaft and at each level or station.

Signals:
One bell, hoist. (See rule 2.)
One bell, stop, if in motion.
Two bells, lower. (See rule 2.)
Three bells, men on, run slow. (See rule 2.)
Seven bells, accident; hoist or lower by verbal orders only.
Three-two-one bells, ready to shoot (See rule 3.)
Engineers' signal—Engineers shall after signal three-two-one raise the bucket or cage 2 feet and lower again, and shall remain at his post until final signal is given and command executed.

Rules governing signals:
Rule 1—In giving ordinary signals make strokes on bell at regular intervals. In signals similar to "ready to shoot" (three-two-one bells) each bar (——) must take the same time as one stroke of the bell. Rule 2—When men are to be hoisted or lowered, give the signal for "Men on; run slow" (three bells). Men must then get on bucket or cage, then give signal to hoist or lower (one bell or two bells). Rule 3—After signal "Ready to shoot" (three-two-one bells), engineer must give signal that he is ready to hoist by raising and lowering bucket 2 feet. Miners must then give the signal "Men on" (three bells), then "spit fuse," get on bucket or cage and give signal to hoist. Rule 4—All timbers, tools, etc., "longer than the depth of bucket" or placed within a cage must be securely lashed before being hoisted or lowered. Rule 5—Signals to meet local demands and not in conflict with above may be added by individual operators, but the same must be posted in clear and legible form in connection with above code.

BOULDER COUNTY.

The rich streak of ore in the Virginia mine at Eldora is reported 21 inches wide. It has produced some very rich ore.

Denver *Mining Reporter*: The Utica mine at Ward produces gold ore worth $5000 per car. This ore averages $200 per ton. Last year a fire gutted the mine and closed it temporarily. Before that it had produced on an average of $10,000 per month profit. The Utica is on the Columbia vein. The lode has produced $5,000,000 in gold.

CLEAR CREEK COUNTY.

Denver *Republican:* J. J. May has calculated that the Newhouse tunnel would cut the vein in 100 feet of crosscutting. An agreement has been made for the working of this property through the tunnel when the vein had been cut. The company is drifting east in the lower level and stoping a body of ore that has been opened for 300 feet. This is a lead ore, with gold and silver values. Some of the product is shipped direct to the smelters and the rest is being treated by concentration at the Jackson mill.——J. E. Keefer, Mgr. Golconda tunnel and group of mines, says sinking of the shaft on the Mahana lode will be resumed as quick as the machinery being installed could be started. The shaft will be continued to a junction with two other lodes.

GILPIN COUNTY.

Sinking was commenced at the Fisk mine on Bobtail hill, Central City with three eight-hour shifts at a depth of over 1000 feet. The shaft will be put down 75 feet and if water troubles do not occur a further lift of 75 feet will be sunk. The water has been going down, being drained by the crosscut from the Gregory incline. Sixty-five men are employed and daily shipments have reached seventy tons, nearly all of which is milling ore.

Sinking has commenced at the Great North Danus mine on Swede hill. The shaft is down 100 feet and sinking will continue with two shifts and air drills. Mayor Thompson of Black Hawk is in charge for the Massachusetts owners.

Pumps are going at the Rialto and the water is near the 300 level. The shaft is down 530 feet and is to be sunk 470 feet. C. K. Colvin is in charge for the Ridgeway Co.

HINSDALE COUNTY.

Lake City *Times*: A carload of fine ore has been shipped by Hill & Griffiths, leasers of the Wyoming property at Lake City.——The Guionneau Bros., owners of the Gallic-Vulcan mine, above Capitol City, shipped a half car of concentrates and a half car of assorted ore recently.

LAKE COUNTY.

The Leadville Public Sampling Works is sampling zinc ores for the Vielle Montague zinc works at Antwerp, Belgium. Twenty men are employed, working ten hours per day. The men have been receiving $2 per day, but recently they reqested Mgr. Norton to increase the wages to $2.20 per day. The request was refused and a new force of men has been employed and the mill is running.

Leadville *Miner*: The old Chrysolite mill, located between the American and Bi-Metallic smelters in California gulch, Leadville, which was built in '96 by J. F. Campion and W. B. Page as a cyanide mill, has been started under the management of C. A. Hoyt, formerly of the Moffat cyanide mill at Florence, Colo. Ten men are employed. Some changes will be made in the mill and experimental tests are to be made on Ibex ore.——The Montgomery claim on the California gulch slope of Iron hill, worked under lease by C. W. Lininger, W. Vivian and associates, has opened up a body of iron at a shallow depth, carrying twelve ounces silver, 41% excess iron, pay gold and lead.

Leadville *Miner*: More men were put on at the Arkansas Valley Smelter last week and an addition made to the force on Monday. There are now 150 men at work there, most of whom are in the sampling department.——At the Bi-Metallic there are 160 men at work and the number is being increased.

SAN MIGUEL COUNTY.

Telluride *Examiner*: Work at the Bessie mill is being pushed, and it is expected that the plant will be ready to operate by Aug. 15. Complete tests as to the proper treatment for the ore have been completed and the mill planned accordingly, embracing all the latest improvements used in cyanide plants of this country and at Johannesburg. Lots of Bessie ore covering 250 tons were tested at the Metallic Extraction Co. plant at Cyanide, near Florence, under the management of P. Argall. The ore was found to be adapted to the process, and designs for the mill were made by H. A. Vezin of Denver. Mr. Argall supervised the designing of the Bessie mill plant with Mr. Vezin, and E. C. Englehart has been secured as Supt. of the mill. The mine has a large amount of ground opened up for a steady production when the mill is ready to start.——At the Waterloo the main tunnel of the upper level is in 756 feet on a vein from 3 to 5 feet in width. At the breast the vein measures over 5 feet. The shaft is down 112 feet, and from this point drifts run in both directions. The drift to the west shows 3 feet of vein matter. The one drifting east has a 5-foot vein at the breast, 56 feet from shaft. Arrangements are being made to have a run of 200 tons of the ore at the Butterfield mill. It is the intention of the company to test the ore by different processes and then erect a suitable plant.——H. F. Bosworth is manager.——The sale of the Ajax group of five claims, in Marshall basin, was closed five days ago, and the property passes into the hands of the New England Exploration Co. The Ajax is a continuation of the Smuggler vein, lying across Marshall creek from the Smuggler-Union mine. It has been developed. For a considerable time it has been idle, being owned by Eastern parties. Upon the New England Exploration Co. securing the Smuggler-Union, they set about securing this extension. It is said that $150,000 is the price named in the bond.——The Saw Pit G. M. & M. Co., operating in the Navajo basin side of the Mt. Wilson district, have cut a 3-foot vein of ore in the tunnel which has been run by Dudley Bros. during the past winter. The vein is the Seymour, and there remains 50 or 60 feet to drive to cut the Slide vein, the prominent one of the group and the objective point of the drift. The group consists of five claims, all showing leads on the surface, and this drift will eventually be the outlet for the working of all these veins. The company have decided to build a mill of ten to twenty stamps with concentrating machinery.

TELLER COUNTY.

The Mary McKinney at Anaconda is reported sold to the Venture Co. of London.

A find has been made on the Gold King of the International G. M. & M. Co. on Gold hill, Cripple Creek. A shot was put into the hanging wall of the stope where it was thought to have pinched out, and resulted in opening a vein which carries high values, the ore carrying streaks of sylvanite and calaverite. The high values are scattered through the rock.

A full force is employed at the Lillie mine, and production up to the average being made. The force was curtailed recently on account of the market for Lillie ore being affected. Sinking is still in progress to 800 feet. An underground hoist is being used, and 90 feet of the sinking has been completed. A settlement made on a recent consignment gave returns of 15 ounces to the ton.

IDAHO.

Amended articles of incorporation of the Trade Dollar M. & M. Co. were filed last week in Boise. They change the name of the company to the Trade Dollar Con. M. Co.; increase their capital stock from $2,500,000 to $4,000,000; establish their headquarters in Owyhee county and name J. Hutchinson as their agent in Idaho. This is the company that consolidated the Trade Dollar and Florida Mountain mines.

Boise *Statesman*: D. Coughanour has sold the Iowa and other properties in Boise basin to an English company. The price paid was $215,000. The deal involves the transfer of the Iowa group of five claims and the Yellow Jacket group of two claims. The company paid $115,000 for the Iowa group and the mill and $100,000 for the Yellow Jacket. H. Edlin secured the option last spring and made the deal through Judge Heyburn. Mr. Edlin assayed 268 samples and found the average value to be $15 per ton.——On the Clearwater river, in what is known as the Cove country, eighteen miles from Buffalo Hump, is said to be a rich placer discovery, which is reported sold to Mr. Liggitt and other Butte, Mont., parties for $60,000. The original owners are Grangeville and Mt. Idaho men. There are 160 acres is the claim. The ground is rich.——The discovery of rich copper deposits is reported in the north end of the Seven Devils district, on the range between Rapid and Snake rivers.

Spokane *Chronicle*: The De Lamar bond on the Big Buffalo groups expires on the 15th inst. The payment to be made then is $50,000.——B. Rigley, one of the locators and principal owner of the Big Buffalo group, has been at the Hump since the lapse of the bond given to Clark & Sweeny. When the new bond was given to the De Lamar syndicate, Mr. Rigley decided the ground had not been opened to the best advantage. Since then men have been crosscutting and drifting. Mr. Rigley at Lewiston said that Clark & Sweeny missed the rich shoot and worked the low-grade ledge. The Oro Fino shows two parallel veins 250 feet apart. A surface crosscut has been run and good average value obtained. The ground is clear of snow at the Big Buffalo and practically throughout the camp.——It is not generally known that there is a mine in Idaho county which is not only fully developed in a mining sense, but is a producer, having yielded under unfavorable conditions, the sum of $380,000 in gold. The Little Giant mine at Warrens, in Idaho county, was located in the fall of 1881 by G. Reibold. His first work consisted of a tunnel 430 feet in length on the lead, which was from 2 inches to 4 feet wide. Thirty-three tons of first-class ore returned $425 in gold per ton, and seventeen tons of second-class ore went $180.

Spokesman-Review: Miners are rushing to the Syndicate camp in the Burnt Creek district of Central Idaho. The development of the Syndicate group is the cause of the excitement. Latest reports are that fifty claims were located last week on the mountain on which the Syndicate group is situated. Some are conflicting locations, and there is prospect of trouble. A townsite has been laid out. Supt. J. F. Johnston of the Syndicate has men driving a tunnel on one of the veins, which shows assays of $83.75 per ton. He has a crew prospecting several claims and says that some large veins have been uncovered. In the placers in the vicinity, Mr. Johnston writes that J. Osborne has cleaned up a small piece of bedrock which netted him $700. McGann Bros. are opening new ground, which is proving good.——D. B. Huntley of the De Lamar M. Co., Ltd., has gone to Buffalo Hump. He was joined at Grangeville by J. J. Bennett and they will make an investigation of the Big Buffalo, Oro Fino and Merrimac, the claims developed to some extent by Clark & Sweeny and afterward bonded to the De Lamar Co. for $500,000, $25,000 of which was paid July 15th. Mr. Huntley states that he was not satisfied with conditions when last in the Hump and that the snow was too deep to intelligently judge the mines, though the samples secured by him were satisfactory. He will also examine several other properties on which his company has an option.——In the Jumbo is reported a strike of 4 feet of solid ore which will go $100 in gold. A rich strike is also reported in the Cracker Jack. The report credits the the mine with 13 inches of $100 ore. The lead in the San Francisco was crosscut some weeks past. The snow is gone, and one can ride into Buffalo on horseback over a good trail. The woods are full of prospectors.

MICHIGAN.

Another strike has been made on the Copper Range. Large quantities of copper were revealed from a blast at a pit 900 feet south of the original one in the lode. The showing is the richest thus far exposed.

Some rich copper is being taken out of the old shaft being opened at the Oneco.

Active mining is under way at the Resolute property in Keewanee. Old workings are being unwatered and new mineral belts located.

The recent $6 dividend of the Quincy M. Co. is an increase of $2.50 over the previous semi-annual disbursement. For the first six months of '99 the company produced between 7,000,000 and 7,500,000 pounds of copper. The production for the entire year of '98 was 16,354,061 pounds. The falling off the first half of this year was due to the ore being poorer than usual. For the six months of this year the company's net earnings were equivalent to about $7.50 per share, and the surplus above the $6 paid to stockholders goes into construction. The company has $900,000 cash on hand above the $600,000 to be distributed in dividends on Aug. 15th. The company is arranging to bring its production up to 25,000,000 pounds of copper per annum. In former days Quincy laid its copper down in New York as low as 5.91c per pound. The company does its own smelting, saving $50,000 per annum. The new No. 7 shaft is completed except for timbering which will take another six months.

MISSOURI.

The American Zinc, Lead & Smelting Co. is stated to have made a rich find on one of its newly acquired properties near Joplin.

MONTANA.

The Butte & Boston M. Co. has filed its annual report with county clerk and recorder. It shows that the capital stock of company is $2,000,000. Assets, July 1, 1899, are given at $3,500,000, consisting of real estate and personal property, and liabilities at $1,652,305, of which $1,500,000 are bonds.

The copper output of Montana for the year 1899, it is claimed, will exceed that of 1898, in which year it reached 206,173,157 pounds. The increase, it is said, will be due to new properties and to stimulated output in old mines.

Butte *Inter-Mountain*: It is reported in Madison county that within the next twelve months, twelve dredging machines, each costing $100,000, will be installed by the German Bar and Conrey Placer Mining Companies. These two concerns, which are practically one, began operations in Alder gulch two years ago, and have conducted a series of experiments, some of which have proved successful and others not, but which have demonstrated the values contained in the farm lands at the mouth of Alder gulch, land that for thirty-five years had been used to raise cabbage and alfalfa upon. After the first year's operations the companies quietly acquired the ground from several miles up the gulch to the Ruby river. Then the Maggie Gibson dredger was removed from Bannack and installed there. Now comes the announcement that the company will install twelve machines, similar to the Maggie Gibson.

Bozeman *Chronicle*: R. B. Turner, representing the Nevada and Utah Exploration Company, has made a contract for a cyanide mill with a capacity of fifty tons per day. The mill is to be erected at Norris to work ore from the Madisonian mine, of which Mr. Turner and his brother are the principal owners. The mill will be completed in three months.

NEVADA.

Recent measurements show that since the Risdon hydraulic system has been in operation water in the Belcher shaft in Gold Hill, two miles from the C. & C. shaft, has been lowered 22 feet. This demonstrates that the clay walls of the lode do not act as impervious bulkheads to confine the water within certain limits.

Pumping operations at the C. & C. shaft at the Comstock are making some progress. The last dispatch is as follows:

VIRGINIA, NEV., July 20, 1899.—To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco—Elevator No. 1 has been working continuously. At 6:30 this morning the water was 3 feet and 3 inches below the 1950-foot level station.

The water has been lowered 1 foot and 6 inches in the preceding twenty-four hours.

The Cuyahoga M. Co. of Smith Valley in running a tunnel to prospect the Little Bonanza, one of the company's claims, recently struck an 18-inch ledge of good ore. Assays show the ore to run from $40 to $80 in gold. This company has built a mill, laboratory, etc. The company has not yet decided whether a stamp mill or a crusher will be used. Both will be tried and the method which gives the best results will be adopted. The laboratory will be in charge of A. C. Gleason of Cleveland, Ohio.

The smelter at the Reno Electric Reduction Works is not a success.

H. A. Cohen is at San Antonio, Nye county, where he is sampling a group of mines that have been bonded by him for $100,000. The group was recently located by T. J. Bell and J. G. Court, from which rich ores were taken from the first. Since acquiring the option Mr. Cohen has put on many miners and is following the shoot that is showing high values. Prospecting for water three miles distant has been successful.

The Osceola mine is putting fifty tons of ore daily through the mill, the material showing an average of $12 in gold per ton. An increase in the capacity of the plant is being considered.

Judge Burton and J. F. Cowan of Salt Lake have secured an option on eleven undeveloped locations.

The Dexter mine at Tuscarora has recently shipped bullion valued at $5800 and auro-cyanides valued at $3000.

A strike of high-grade silver-lead ore is reported in Alida district, Esmeralda county.

Two groups of mines in White Pine county, comprising twelve locations in Robinson and West Camp districts, have been bonded in Salt Lake.

Another shift has been added to the force in the northern extension of the Zadig drift on the Sutro tunnel level of the Brunswick lode through Savage, Gould & Curry and Best & Belcher territory.

A reduction plant is to be added to the equipment of the Utah Spur mine at De Lamar, Lincoln county.

Work is to be resumed in the Meadow Valley mine at Pioche. Regular bullion shipments were made from that mine thirty years ago.

The Comstock Pumping Association reports having a balance of about $13,500 in its treasury at the present time.

NEW MEXICO.

A new gold discovery is reported fifty miles northeast of El Paso on the El Paso & Northwestern railroad in the Jarilla mountains, a small range, ten miles in length and from

three to four miles wide, and barren of water. The discovery of gold was made last week. The mineralization of the mountains has long been known, but there was some doubt that there was gold in the mountains. Last week a prospector found twelve colors on the plain, two miles from the mountains and a foot below the surface. Other prospectors went to the locality and found gold. One woman had several nuggets in a handkerchief larger than peas. Heidike is the name given to the entire region known on the map as Otero county, in which the new gold fields are located.

The Colorado Fuel & Iron Co. employ twenty-five teams hauling iron ore to the railroad at Santa Rita.

J. Schlosser is taking ore from his Humboldt and other properties near Hanover, and he expects to make a shipment during the month.

The machinery on the Anson S. is in shape after an idleness of years and the pumps have been started. It will require some time to get everything underground in condition.

Three shafts are being put down on the Hanover mine. The water has been lowered to the top of the drift, 92 feet from the surface, and the pumps are working. G. Kingdom, who was in charge of the mine under the Berry management when it was being worked by the Copper Flat Co. two years ago, is foreman.

OREGON.

Baker City *Republican*: The Red Boy mine near Granite has twenty stamps dropping. It is a regular producer. Its owners are Godfrey & Tabor.——The Congar mine is erecting a 50-ton cyanide plant.——The Magnolia is being developed by its manager, W. J. Vinson.

SOUTH DAKOTA.

(Special Correspondence).—The Cleopatra group of claims, covering 100 acres of ground in lower Squaw Creek canyon, near Spearfish canyon, is being developed by Mgr. R. B. Hughes; 740 feet of tunnels and drifts have been driven on the upper ore-bearing contact in large bodies of ore of good grade, suited to treatment by the cyanide process. A shaft is down 75 feet, sunk with the purpose of exploring the lower quartzite contact, which lies about 100 feet lower. The region in which these mines are situated is very rugged, and a wagon road has been built from the Carbonate road to the mines at considerable expense.

Deadwood, July 11th, '99.

The stockholders of the Homestake M. Co. at a meeting in San Francisco, Cal., have authorized, by a special vote, an increase of the capital stock from its present amount of $12,500,000, divided into 125,000 shares of the par value of $100 each, to $21,000,000, divided into 210,000 shares of the par value of $100 each. The increased capital is to be used in payment for additional property, etc. It is reported that the Higland and other mines contiguous to the Homestake are to be absorbed, also the Black Hills Canal & Water Co. and the Black Hills & Fort Pierre Railroad, which was originally built to deliver timber and fuel to the mines of the Homestake Co. from the timber belt south of the mines.

UTAH.

It is stated that T. A. Edison is conducting a series of experimental tests of the ores of the Boston Con. M. Co., at Bingham, and that some of them have been successful, it being believed that low-grade ore can be treated at a profit of $1 per ton.

Three tons of auro-cyanides were delivered at the Con. Kansas City Smelting & Refining Co.'s works at Salt Lake last Saturday, the Golden Gate at Mercur sending two tons, the Northern Light of Lion Hill and the Wilson Leaching Co. of White Pine, Nev., supplying the balance. The total value was estimated at $150,000.

Mercur *Mercury*: Men are at work on the Golden Gate Extension. A double compartment shaft has been started and has reached a depth of 40 feet. The hill is being graded off for the erection of buildings and an electric hoist will be put on the ground. It is the intention to sink the shaft 1500 feet, it being estimated that at this depth the veins in the Mercur and Golden Gate should be cut.——Two shifts are sinking the new shaft on the Rover, under the direction of the Golden Gate management.

Park City *Record*: A new strike of milling ore has been made in the Lookout group, owned by Jordan & Thomas, in Blue Ledge district, on the east face of Bald mountain. The owners have run a crosscut tunnel 30 feet, cutting the vein, after which they sunk on it 80 feet. The vein is 6 feet wide, with porphyry hanging and quartzite foot. The average shows thirty-five ounces silver and $4 gold, with a trace of lead.

Salt Lake *Tribune*: The management of the Daisy Mining Co., which was the first to begin the production of gold dust on the West Dip, has decided on the enlargement of its plants and plans will be submitted to make the capacity 300 tons daily.——Mgr. Farnsworth of the Horn Silver, at Frisco, says the work there is developing interesting changes. The Horn Silver has always had a defined chute of copper ore. Some years ago there was a cave of the workings. With the mass that came was the copper ore. To the 800-foot level this material was displaced, the ores mixing with the waste. When a market was created for ore by the advance in the metal, Mgr. Farnsworth decided to get it above as well as below the 800-foot level. A recent shipment of this class of ore was made and sold on a basis of 28% copper, 15% lead, eight ounces silver and 75 cents gold per ton. The main workings are at a depth of 1630 feet.——Reports at the offices of the New Pass M. Co., at Salt Lake, indicate that the properties are the foundation for a new camp. The new strike in New Pass territory has continued to improve with development.——T. Bruback, who purchased the holdings of the Morgan M. Co. at Park City for $100,000, says the report that it had been conveyed to the Daly-West Co. is inaccurate.——D. C. Jackling, Supt. of the Golden Gate mill at Mercur, will equip the Mercur mill with machinery to treat its arsenical ores.——The Mammoth mill at Robinson has started up again.——The Washington at Frisco has started up and will begin marketing high-grade ores.——Timbers having reached the Northern Light on Lion hill, the management will re-enter the chloride stope in which the high-grade ores are found and begin shipping.

WASHINGTON.

The Bonanza M. Co. has been incorporated to purchase and operate the Bonanza, a shipping mine near Bossburg. The Bonanza ore carries iron, lead and silver and smelters pay a premium for it. The mine has been shipping 100 to 125 tons per week. It is developed by inclines following the ore at an angle of 45° to the depth of 500 feet. The vein is said to average 10 feet wide with swells in places to 22 feet.

The Black Bear-War Eagle Gold Mines (inc.) is the name of a company which has been formed and is practically under the same control as the Bonanza. The War Eagle and Black Bear claims are on Palmer mountain and their veins will be cut by the Palmer Mountain tunnel.

The Black Bear has a 5-stamp mill built on the property in the days of the first Okanogan boom by S. I. Silverman. There are fifteen extra stamps on the ground at the mine which will be installed in the mill, five of them going in at once. J. Boyd, Supt. Palmer Mountain Tunnel Co., is in charge and is putting in hoisting machinery on the Black Bear. This claim is developed by shaft to a depth of 182 feet with three levels on the ore.

The Palmer Mountain tunnel will cut the Black Bear lead at a depth of 800 feet and the three leads on the War Eagle at a depth of 1300 feet.

The War Eagle has a shaft down 100 feet with a crosscut, which has opened two other leads in addition to the one followed by the shaft.

Spokesman-Review: In the Flat creek district the Solyon and Hercules claims on Mineral mountain, two miles below the Churchill group, a shaft is down 47 feet, following the foot wall of a vein 35 feet wide. It is a copper-gold ore with iron cap. In this district S. Wilson owns the Ultra and Daisy, on the same lead as the Solyon and Hercules. The vein has been traced 2000 feet and has been opened by cuts.——On the Churchill group new machinery has been installed and the property is being developed with three shifts under the supervision of J. S. Bogle. The company has a 30 H. P. boiler, with a pump and hoist, and is equipped to run steam drills, although these have not been put in.——On Boulder mountain the Badger State M. & M. Co. is opening a property. The shaft is down 70 feet in quartz carrying gold and copper. At 20 feet the values were $9.70 in the two metals. The vein fills the shaft and has never been crosscut. The same company is sinking a shaft on the Racine, in the group. The shaft is down 25 feet.——The Golden Zone has nearly 2000 feet of tunnels, four in number, which are being connected by winze and raise; 20,000 tons of ore have been blocked out. They are building a thirty-ton concentrator, and have completed houses for men and residence for manager. Forty men are employed. This company have 500 feet of tunnels and drifts and several hundred feet of shafts. They are putting in a 10-stamp mill, concentrator and cyanide plant, and erecting houses, offices and residence. Fifty employed.——Arrangements are completed to put fifty men at work on the Triune. The mill is to be overhauled and enlarged. The shaft will be put down to 500 feet.——Four hundred feet of tunnels and open cuts is the work on the Q. S. A mess and bunk house is being erected. They have tapped a large vein at 600 feet depth with a crosscut tunnel. Eight men employed.——At the Crystal silver-lead mine, which is being opened near old Fort Spokane, two shafts are sunk 100 feet deep and 100 feet apart on the vein, the Gray shaft passing through solid ore for 45 feet before reaching the 100-foot level. The drift was started from the other shaft, and, after proceeding 65 feet through ledge matter filled with stringers of galena, the drift opened a full face of galena and continued in this for 35 feet to the connection with the Gray shaft. When this air connection had been completed, Supt. Gray cut out a station and resumed sinking. The station is 9 feet high from the floor of the drift and 18 feet to the shaft, every foot in solid ore and no wall. In sinking below the station a lean place was found in the vein—not barren, but carrying stringers of galena. There was 13 feet of this, and then the shaft broke into fine ore. The bottom and sides are in solid galena at 121 feet depth. The iron pyrites, abundant in the ore on the surface, are giving way to copper pyrites. Mr. Gray says the company will sink the shaft to the 200 level, from which another drift will be run on the vein and stoping started.——The Palmer Mountain G. M. & T. Co., at 1000 feet depth, cut a 42-foot vein containing 35 feet of ore, showing $37 in gold. On the surface the vein was several feet wide and assayed $11. The other veins have been crosscut at from 200 to 850 feet depth before this last one was reached, and in no instance was the value less than on the surface.——The tunnel is in 2000 feet and twelve veins cut, ranging in width from 5 to 42½ feet, containing pay streaks from 2 to 35 feet. The mine is equipped with air compressor, steam driven, with blower attached, for furnishing and exhausting air. The company is now developing and bringing to the mine a water power of 1500 H. P. Thirty men are employed.

WYOMING.

The Colorado Fuel & Iron Co., it is reported, has completed arrangements for the employment of fifty miners in the iron mines at Hartville, which have been leased by the company.

It is reported that at Saratoga a dike of phonolite has been discovered, extending through the town, in a southwesterly direction. It has been traced for four miles, and is 30 feet wide where it crops out.

Denver *Republican*: The Doane mine, the pioneer copper prospect of the Grand Encampment district, produced last year a large amount of high-grade copper ore, averaging 50% metallic copper, with some gold.——The Rudefeha mine last year, although equipped only with a one-horse whim and bucket, produced 1200 tons of high-grade ore. The last 400 tons was purchased by the Chicago Copper Refining company and averaged 33% copper. The mine has not been developed to the extent of the Doane mine. The owners are sinking a permanent working shaft. They have refused all offers for the property. The principal owners are George Ferris and I. C. Miller.

Grand Encampment *Herald*: A mine has been opened south of the town of Grand Encampment by D. Boyce. In a shaft only 8 feet deep there is a vein of solid copper carbonate ore 18 inches wide running over 60% copper. The vein is in place.——A copper strike is reported at Kelsey in the Sandstone mining district ten miles from Battle Lake, and near the Douglas mine. It is twenty miles west of Grand Encampment. The sandstone reef is said to carry metallic copper.

FOREIGN.

BRITISH COLUMBIA.

Development work on the Golden Eagle, in Brown's camp on the North Fork of Kettle river, continues. The claim is owned by L. S. Moulton-Barrett of Greenwood. It is situated on the southeast side of Volcanic mountain and has been developed to the 100-foot level with numerous crosscuts, drifts and winzes. As the work progressed the ore became richer, until at the 75-foot level the vein filling became solid ore, carrying as high as 20% copper. The Golden Eagle people are drifting along the lead.

The Philadelphia M. Co., under the management of H. T. Sherrard, has bought land near the Butte mills, six miles below Rossland, on the Northport road, and is building a fifty-ton concentrator. The company owns the Mountain Trail claim on the south slope of Sophia mountain, and is building a wagon road between the mill and mine. The distance from the concentrator to the mine is less than two miles.

It is reported at Victoria that a rich placer discovery has been made on the shores of Wreck bay, five miles from Uclueton, on the west coast of Vancouver Island and 100 miles from Victoria. The beach has been staked for miles by settlers, who have abandoned farming. The sand is yielding good returns, much of the fine gold being lost.

A report is current of a strike at Alberni of a rich quartz ledge.

Spokane *Chronicle*: The California mine on Red mountain in Rossland is to be developed. Two years ago the California was sold by J. B. Jones, J. M. Burke and others to a Canadian syndicate headed by J. P. Graves and S. H. C. Miner. No work has ever been done on the property since. It has been decided by the company to start work on the property, and a ten-drill compressor, hoist and sinking pumps will be installed and the necessary buildings will be erected. Development work has been decided on, and W. Y. Williams, Supt. Big Three properties, will have charge of the California. It is on the southwest slope of Red mountain, 1500 feet from the Le Roi, the Josie intervening. The claim was located in 1894, after the new law as to the size of locations came into force. The California is the only claim on Red mountain that is 1500x1500 feet. A good deal of prospecting work was accomplished by the original shareholders before work was closed down. A main tunnel has been run in 212 feet alongside of the ledge. To the east of the tunnel a 55-foot shaft and to the west a 56-foot shaft have been sunk, and in addition numerous prospecting shafts and tunnels have been sunk and run on various points on the surface.

Victoria *Times*: The Kimberley Con. M. Co., who own a group of claims on Sullivan hill, are working, a number of men being employed. Another shaft is being sunk on the vein. Development consists of a crosscut tunnel in 80 feet, two shafts 48 and 20 feet deep, besides several open cuts.——T. H. Violet, whose claim lies east of the Kimberley Con. property, has a body of pyrrhotite ore carrying gold, silver and copper. The vein is 5 feet wide.——The Carbonate, owned by Chisholm and associates, has had men at work the past month developing. The owners have opened up an ore chute 120 feet long, showing clean galena in all of the openings.——Dickman's property, the Black Bear and Mabel, one mile south of Kimberley, has a 3-foot vein of clean galena.——The Hastings Syndicate will develop their claims lying between the Sullivan group and the North Star.——It is said that the North Star people have thirty-five or forty men now at work on their property.——W. G. Mitchell-Innes, at Windemere, Mgr. New Golden Syndicate, intends developing the properties owned by the company.——Development has been resumed on the Pretty Girl mine, on Boulder creek, owned by the New Golden Syndicate.——Development work has been started on the Red Line group, situated on McDonald creek, and bonded from the original locators for $50,000, but since rebonded for $100,000.——The Sitting Bull group will be worked. It is under bond to R. R. Bruce for $30,000.

Nelson *Miner*: The litigation which has compelled the Molly Gibson mine, at Nelson, to cease work on that property has been settled, and nothing now but the labor trouble is in the way of active development. At a meeting of the directors it was decided to build a road and tramway and to put on a large force of men as soon as the eight-hour question has been settled, so as to allow the mine owners to ascertain their position. Several thousand tons of ore are reported in sight.——In the Nevada tunnel, at Ymir, they have struck 4 feet of solid galena ore.——On the Wilcox, P. White is working in two places, and also on the Fourth of July claim, taking out ore which assays $40.——At the Big Horn group Mgr. T. Woods reports that he is getting out ore for shipment to the Northport smelter.——On the Rio Grande C. Davis and his men are drifting on the ledge. This adjoins the Nevada and is owned by a Rossland company.

Spokane *Chronicle*: Rossland mines shipped to the Trail and Northport smelters during the week ending July 2 ore as follows:

To Trail—	*Tons.*
War Eagle	1560
Center Star	750
Evening Star	30
To Northport—	*Tons.*
Le Roi	1134
Total	3474

LOWER CALIFORNIA.

Los Angeles *Times*: The San Fernando, Peabody, Moromosa and Butler copper mines, the latter three owned by W. M. Freeman of Los Angeles, and the San Fernando by E. C. Humphreys and Mr. Brophy, are reported sold to A. H. Butler and M. S. Tweedie of the California and Oriental Steamship Co., who have resold it to Martin, White & Co., an English syndicate. The mines are said to be rich, one of them, the Peabody, being sixteen miles from the Sierra Pintada placers. The ore contains gold and silver.

MEXICO.

The Santa Rosalia M. Co., incorporated under New Jersey laws, with a capital stock of $800,000, owns a group of mines in the canton of Anthon, State of Jalisco. The principal office of the company will be in Jersey City, N. J. The directors of the company are Ex-Gov. J. T. Werts, J. A. Fitzpatrick, T. B. Adams, J. R. Joslyn, A. G. Macdonnel, W. A. Hoenig, A. B. Flint, J. Cooper, A. Coleman, J. F. O'Connell, A. T. Brennan and H. Henken.

(Special Correspondence).—At a meeting of the stockholders of the Cinco de Mayo M. Co. in Chihuahua on the 12th inst. arrangements for increasing the output of the mines were completed. These mines are in the Escondido mountains in the Sierra Madre country, and produce high-grade silver ore. Gen. Juan Hernandez of Chihuahua was re-elected president. A shipment of high-grade ore was sent to the El Paso smelter from the property this week.

Several Mexicans from Nacori, Sonora, recently discovered placer gold at the confluence of the Latachi and Aros rivers, twenty

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miles southwest of Guaynopa. One hundred and sixty claims have been denounced in the Guaynopa country within the last thirty days.

Another mining deal in the Casas Grandes district is being negotiated. The property is the Roy mine at Pilares, adjoining the Cinco de Mayo, the latter being the mine leased by A. J. King. The Roy is owned by McKim & Benton. The prospective purchasers are J. Q. Williams and L. E. Booker of Casas Grandes Neuva and partners in El Paso. It is understood that the purchasers took a lease and bond on the property several months ago at $200,000 gold, and have deposited $15,000 in the First National Bank of El Paso as a first payment, if the title proves perfect.

In the San Gregorious mine in Guanajuato it is reported a transverse vein has been discovered which assays 20 kilos silver and 500 grammes gold to the ton.

Mexico, July 18, '99.

The *Mexican Herald* says that W. A. Clark of Montana has bought for $35,000 gold the Sultana copper property, State of Sonora, and expects to operate it on an extensive scale.

NEW ZEALAND.

The dredging of rivers and streams in Grey Valley district has attracted attention, and claims have been taken up in various parts, with the view of putting on dredgers. Stillwater creek, from its confluence with the Grey river to Maori gulley, has been taken up and is being prospected. The Grey River Dredging Co. are making plans for a dredger to work their claim at Stillwater, the cost of which will be £25,000, and a dredger, costing $15,000, will be placed near the Little Grey Junction.

The Sulky Gully Water-race, which was subsidized by the Government, is 2½ miles in length and includes 545 feet of tunnelling. At the intake a dam has been built and the work has been completed.

SOUTH AFRICA.

The following figures are from the Directors' report of the Nourse Deep for the quarter ending April 30th, '99: Value per ton, 44s 1.298d; profit per ton, 12s 11.239d; costs per ton, 31s 2.058d; value of yield, £77,663 10s 7d; costs for quarter, £54,885 6s 9d; profit for quarter, £22,778 3s 10d; average stamps, 90; period of run, 81 1-24 days; tons milled, 35,215; recovered from mill, in ounces, 10,580.001; tons of sands and concentrates treated, 25,529; yield from cyanide, 7289.309 ounces; slimes treated, 9240 tons; slimes yield, 829.952 ounces; total yield, 18,649.262 ounces; per ton milled, 10.591 dwts. In all cases the ounces and pennyweights are given in fine gold.

Recently Declared Mining Dividends.

El Dorado mine, El Dorado county, Cal., $10,000; July 20.

Quincy M. Co., Michigan, semi-annual, $6 per share, payable August 15. The former dividend rate was $3.50 per share semi-annually.

Homestake M. Co., South Dakota, regular monthly dividend of 25 cents for June and an extra dividend of 25 cents, both payable July 25.

Hidden Treasure drift mine, Placer county, Cal., 10 cents a share, $3600; July 20.

Montana Ore Purchasing Co., Butte, Mont., $1 per share; payable July 27.

Boston-Aurora Zinc Co., regular monthly dividend, two-thirds of 1% on preferred stock, payable July 25 to stockholders of record at the close of business July 14, 1899.

Alaska-Treadwell M. Co., forty-first dividend of 37½ cents per share, $75,000; payable July 28.

Alaska-Mexican M. Co., nineteenth dividend of 10 cents per share, $18,000; payable July 28.

Recent Mining Incorporations.

McKittrick Petroleum & Development Co., San Francisco; capital stock $1,000,000; subscribed $25; P. B. Donohoo, W. D. Holum, R. H. Jones, J. A. Stephens, H. May.

Oakland Oil & Gas Co., Oakland; capital stock $300,000; subscribed $500; J. M. Merrell, J. T. Hamilton, W. J. Laymance, W. J. Dingee, C. H. King.

Pittsburg Oil Co.; capital stock $300,000; subscribed $500; J. M. Merrell, J. T. Hamilton, W. J. Laymance, W. J. Dingee, C. H. King.

Bonanza Con. G. M. Co., San Jose; capital stock $1,500,000; subscribed $500,000; W. W. Turney, R. W. Hersey, E. H. Wemple, N. I. Jordan, A. U. Chamberlain.

Columbus Development Co., Oakland; capital stock $50,000; subscribed $33,950; W. C. Root, W. J. Patterson, R. M. Clement, R. B. Myers, R. S Reed.

Brandt M. & D. Co., San Francisco, capital stock $100,000; C. W. Hawxhurst, S. W. Nicoll, F. J. Brandt, J. F. Simmons, G. M. Robertson, W. J. Smith, H. E. A. Rilton.

Oak Grove M. Co., Pasadena; C. Kestner, L. T. Chambers, Los Angeles; J. A. Shelhamer, H. A. Perkins, J. F. Eddy, Pasadena; capital stock, $400,000.

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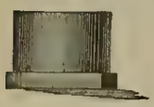
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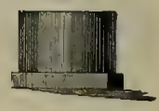
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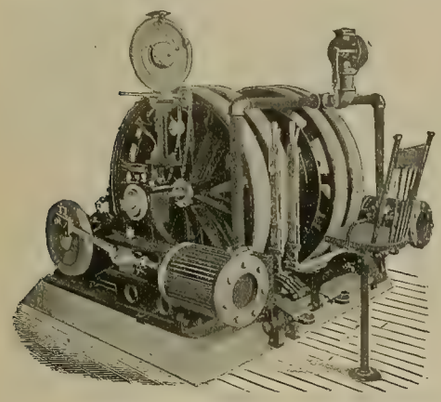
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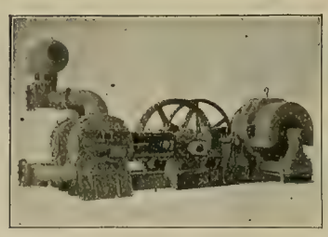


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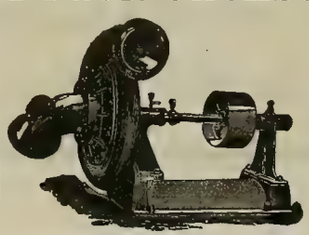
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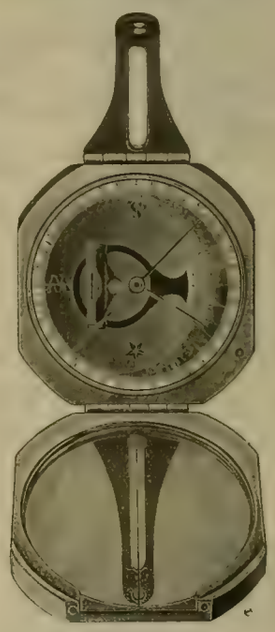
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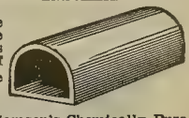


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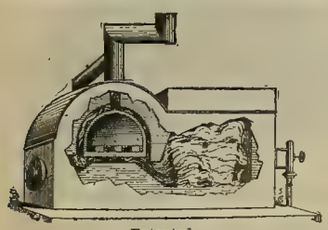

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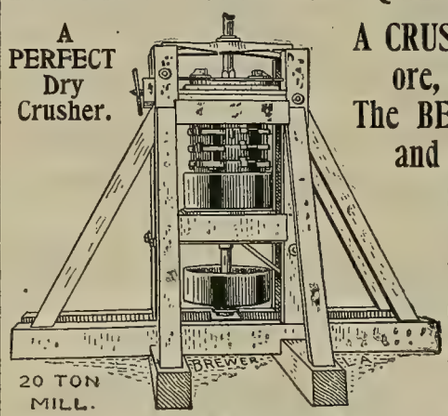
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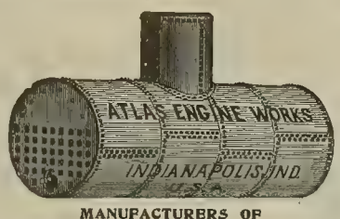
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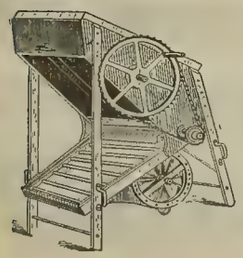
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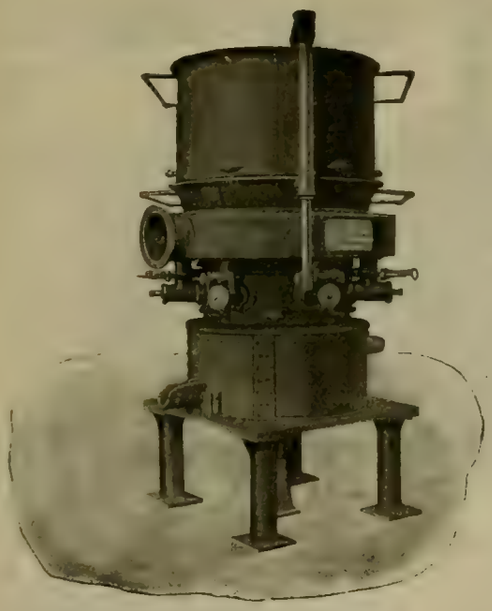
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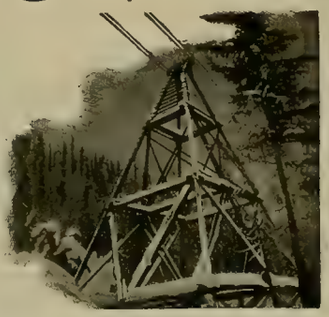
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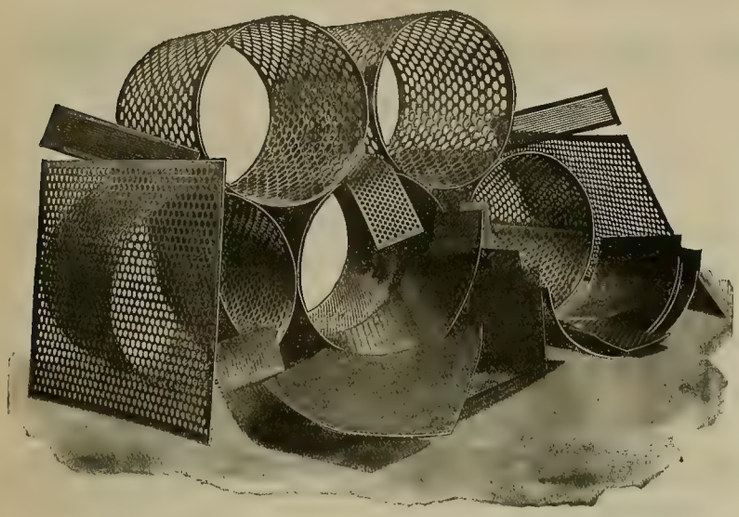
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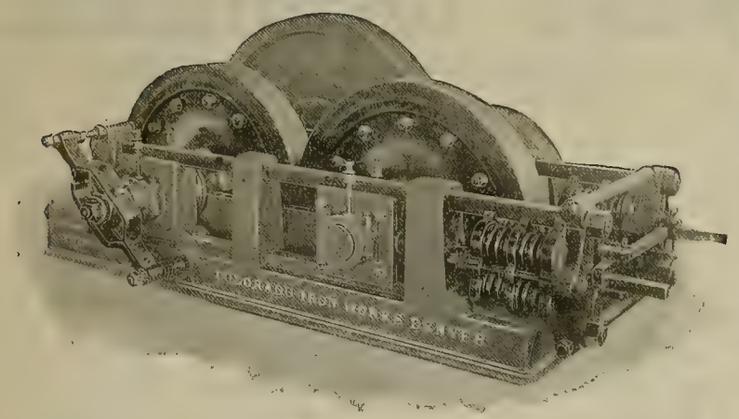
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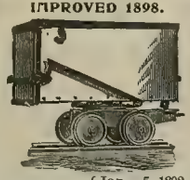
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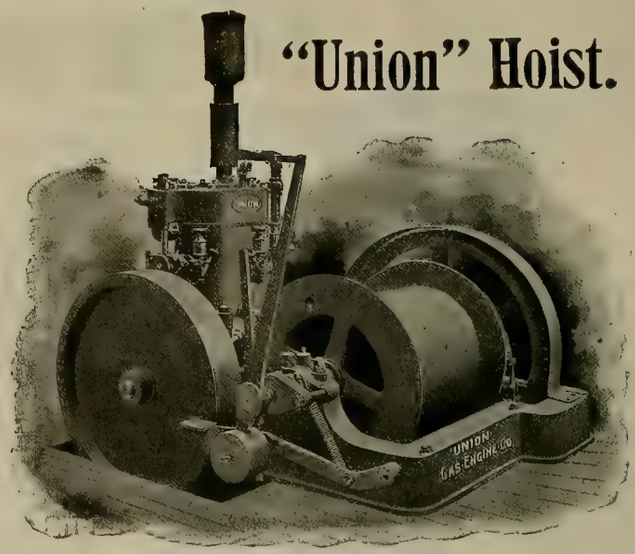
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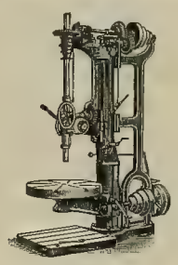
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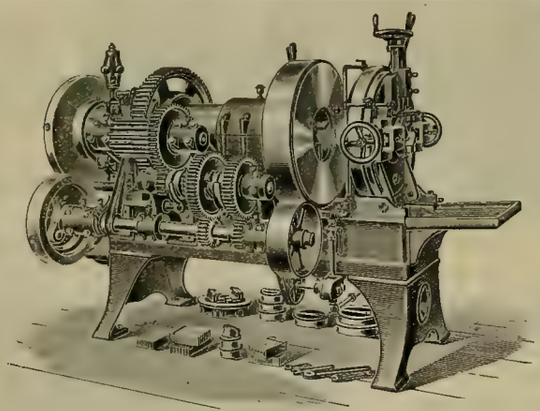
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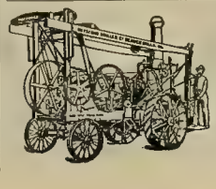


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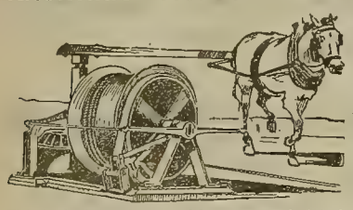
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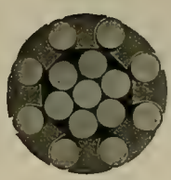
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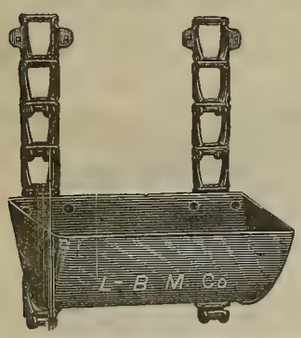
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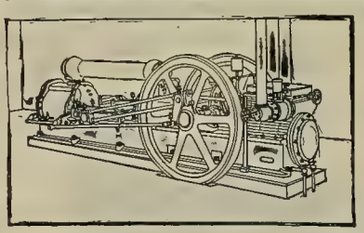


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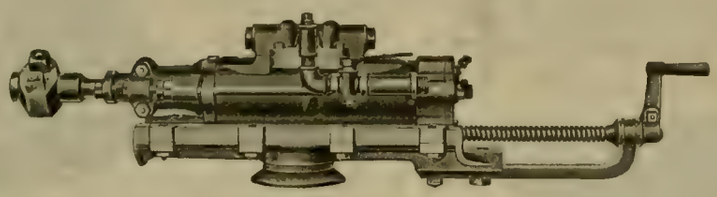
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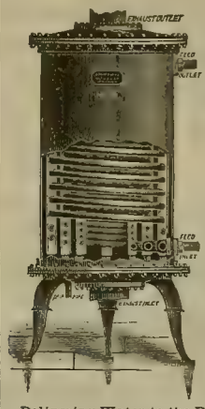
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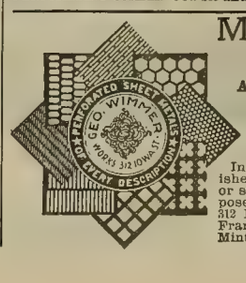
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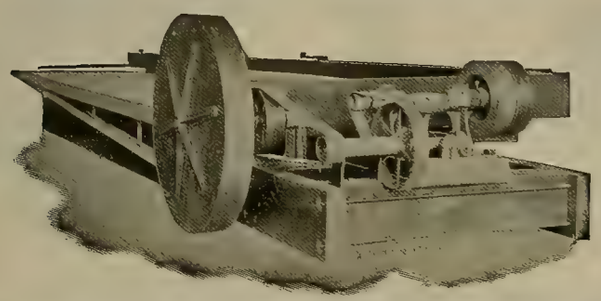
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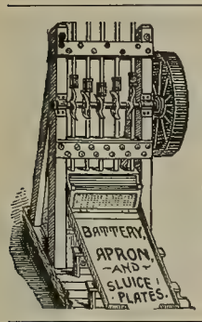
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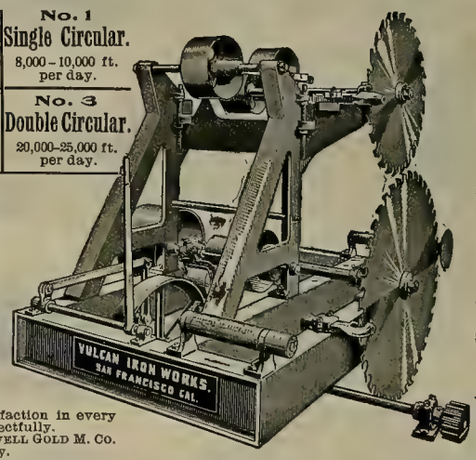
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SACRAMENTO, CAL.

Portable Saw Mills.

No. 0 Single Circular,	No. 1 Single Circular.
4000 - 6000 feet per day.	8,000 - 10,000 ft. per day.
No. 2 Double Circular,	**No. 3 Double Circular.**
15,000-20,000 ft. per day.	20,000-25,000 ft. per day.



Alaska Treadwell Gold Mining Co.
SAN FRANCISCO.
Feb. 20, 1896.

Vulcan Iron Works,

GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully,
ALASKA TREADWELL GOLD M. CO.
A. T. CORBUS, Sec'y.

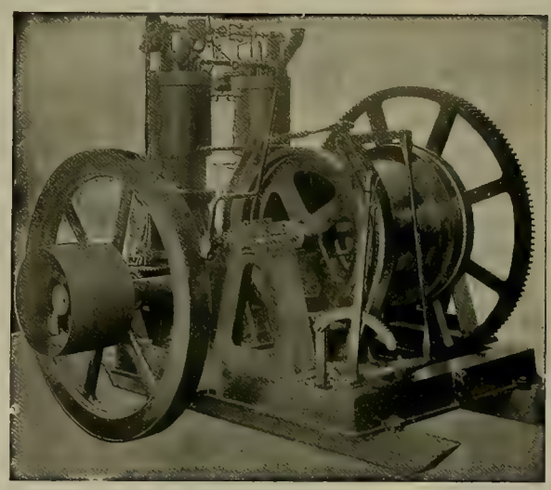
For Mining Companies —OR— Other Consumers of Lumber at Remote Points.

SEND FOR CATALOGUE

Manufactured by

VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

Improved Mining Hoist.



THE Golden Gate Gas Engine
THE MOTIVE POWER.

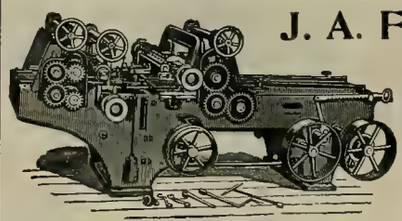
Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS, 211 & 213 MAIN STREET, SAN FRANCISCO, CAL.



Double Cylinder Planer and Matcher.

J. A. FAY and EGAN CO.,

CINCINNATI, OHIO.

Wood Working Machinery
— FOR —
Box Factories, Planing Mills, Sash Door and Blind Factories, Carriage, Wagon and Agricultural Shops

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—

SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.

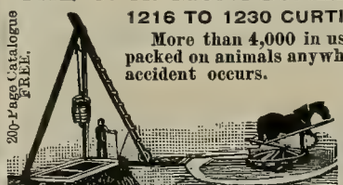
Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

46 FREMONT STREET, SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.

THE J. H. MONTGOMERY MACHINERY COMPANY.

1216 TO 1230 CURTIS ST., DENVER, COLO., U.S.A.

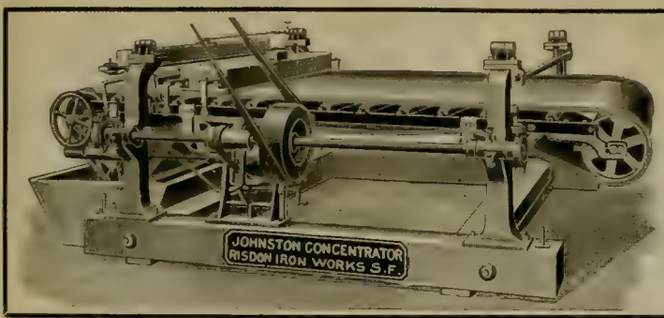


200-Page Catalogue FREE.

More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

Price of One-Horse Whim, complete, with shieves..... $90.
Two-Horse Whims, complete, with shieves..... $150.
Pumping Attachment with Pipe for either..... $40.
Blower Attachment with Pipe for either..... $30

Also Four, Eight and Twelve-horsepower Whims.



THE JOHNSTON CONCENTRATOR.

DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt mach'nes.

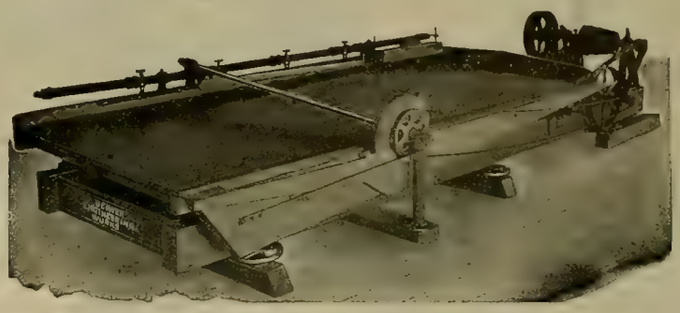
Send for Catalog No. 14. RISDON IRON WORKS, Howard and Beale Sts. San Francisco, Cal., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

The perfect vanner motion given to the pulp by our head motion, together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes. : : : : : : : : : : : : : : : : :

The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings. : : : : :



Thoroughly Protected by Strong Patents. Write for Circular.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,

30th and Blake Streets, - - - - DENVER, COLORADO.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of wator powers by the most modern, economic and improved methods An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

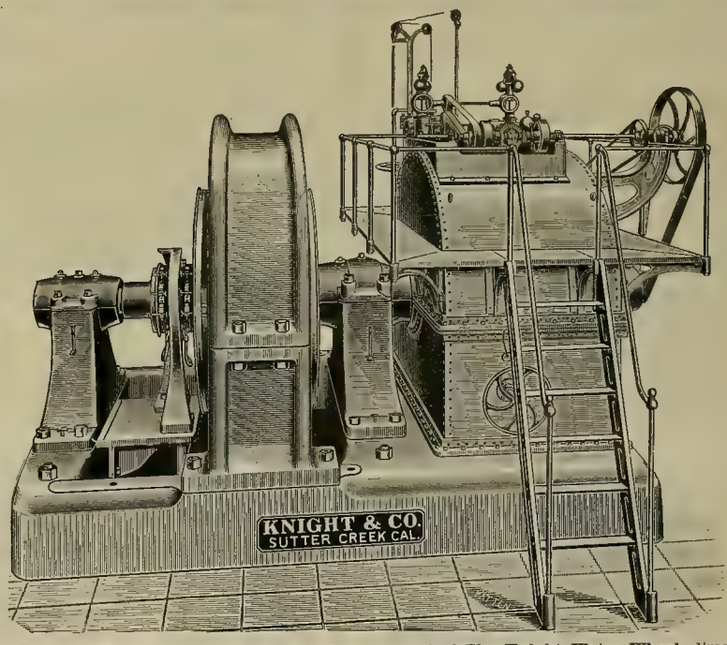
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.

Wheels for mill and reversible hoisting works a specialty.

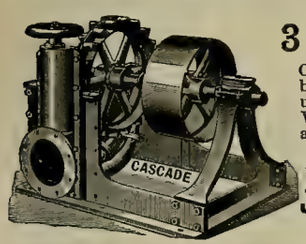
KNIGHT & CO., Sutter Creek, Cal.

For full particulars, send for descriptive catalogue.

TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.

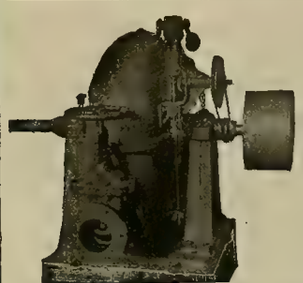


Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.



JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



TUTTHILL Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

Write for Catalogue.

OAKLAND IRON WORKS,
330 Market Street,
Room No. 610. SAN FRANCISCO, CAL.

The · Lunkenheimer · Company

Manufacturers of SUPERIOR BRASS AND IRON SPECIALTIES for Steam, Water, Gas, Air, Oils, etc. WRITE FOR CATALOGUE.

26 Cortlandt Street, NEW YORK.
35 Great Dover Street, LONDON, S. E. GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

Dewey, Strong & Co., Patent Agents,

330 Market St., San Francisco, Cal.

Market Reports.

SAN FRANCISCO, July 20, 1899.

SILVER.—London, 27⅞d; New York, 60⅝; San Francisco, 60⅝; Mexican Dollars, 49¾@50¼; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports firmer, $4.40 bid, $4.65 asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¼c; bar, 6.50c.

COPPER.—New York reports Lake unchanged at $18.50; brokers' price, $18.50; mill copper plates, 23¾c.

The copper market shows noteworthy strength and even at 18¼c there does not seem to be a sufficient supply to meet the strong, fresh demand. It is predicted that the price will go somewhat higher. The bearish tendency of European operators has to a considerable extent fallen short of the mark, and the foreign "bears" have run up against a stone wall in opposing the course of the copper market.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—15@16c per pound.

TIN.—Unsettled; $28.90 bid, $29.25 asked; pig, 31c per lb.; Bar, 35c.

The English market has recently boomed tin up to £120 15s per ton, with sales on Friday last of 1470 tons, which is an advance of £11 per ton inside of two weeks.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8½c; 6s, 14 oz., 7½c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¼c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ...)	11¾	12½
6 and 9 thread (½ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 2,0 1899.

9:30 A. M. SESSION.

300 Best & Belcher	51c	400 Potosi	56c
100 Bullion	10c	300 Savage	26c
100 Challenge	25c	200 Seg. Belcher	08c
200 Chollar	31c	100 Sierra Nevada	61c
200 Gould & Curry	39c	200 Union Con	37c
300 Hale & Norcross	38c	100 Utah	12c
100 Ophir	$1 05		

2:30 P. M. SESSION.

100 Ophir	$1 10	300 Crown Point	25c
200 Mexican	54c	100 Yellow Jacket	34c
100 Con. Cal. & Va.	$2 05	300 Sierra Nevada	60c
400 Chollar	32c	500 Justice	07c
1100 Potosi	59c	600 Challenge Con	25c

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. MONEY loaned, mines, MINING companies organized, their property exported, financed and managed. MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.

Cable address Edtec Codes, Liebel's Bedford, McNiel's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS, AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

Quicksilver

——FOR SALE BY——

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

THE CALIFORNIA DEBRIS COMMISSION, HAVing received an application from H. W. Tangerman to mine by the hydraulic process in the Clinton Placer Mine, at Clinton, Amador Co., and to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on July 31, 1899, at 1:30 P. M.

Quicksilver

FOR SALE IN LOTS TO SUIT.

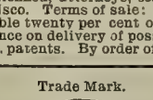
Agents for Redington Quicksilver Mine.

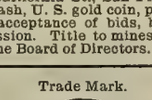
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

Trade Mark. Trade Mark.





Jena Normal Glass,

THE BEST LABORATORY WARE MADE.

Everything necessary for the

Assayer and Chemist

will be furnished of best quality at *reasonable prices.*

UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.

EIMER & AMEND,

205-211 Third Ave., NEW YORK.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

F. B. COOK & CO., MINES AND MINING,

Atlas Block, Salt Lake City, Utah.

Properties reported on and development work superintended for investors.

MICHIGAN COLLEGE OF MINES.

A State Technical School. Practical work. Elective System. Summer term. Every graduate employed. For catalogues, showing occupation of graduates, address *Michigan College of Mines,* Houghton, Mich.

PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.

29-30 Chronicle Building, S. F

The "Stop for Repairs" to Mining Machinery,



Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN CONVEYOR BELT.

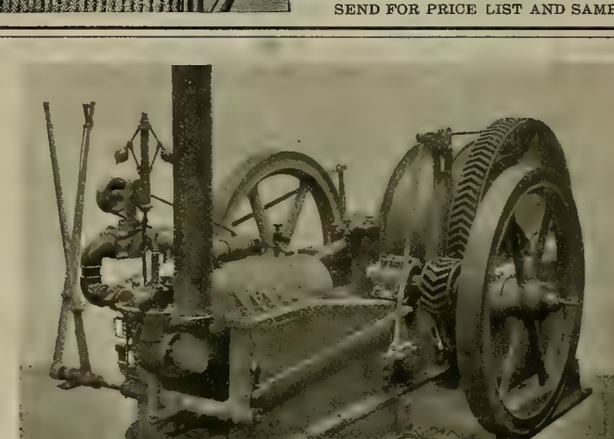
It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,

1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.

SEND FOR PRICE LIST AND SAMPLES.



FRESNO, June 25, 1898.

Hercules Gas Engine Works, San Francisco, Cal.—DEAR SIRS: The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly, TUOLUMNE MOTHER LODE M. & D. CO. Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine.

HERCULES GAS ENGINE WORKS, 305 MARKET ST., SAN FRANCISCO, CAL.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.

509-511 Howard St., - San Francisco.

THE

"Pneumatic" Cyanide Process.

(Patented in United States, South African Republic, New Zealand, Victoria, New South Wales, South Australia; other patents pending.)

Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

Send for pamphlet to THE PNEUMATIC CYANIDE PROCESS CO.,

306 BOSTON BUILDING, DENVER, COLO.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

Dewey, Strong & Co., Patent Agents,

330 Market St., San Francisco, Cal.



Two Styles: STAR and U.S. Made in Brass Also. ★

STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick, reliable action is required.
It will pay you to investigate.
Full particulars from any jobbing supply house, or direct from the manufacturers.

THE WM. POWELL CO., CINCINNATI, O.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2:30 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale rom the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California

SAILOR CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of July, 1899 an assessment (No. 1) of eleven cents (11c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 318 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of August, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 18th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. C. LUND, Secretary.

Office—318 Front street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of July, 1899, an assessment (No. 14) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of July, 1899, an assessment (No. 116) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on FRIDAY, the 18th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 7th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There is delinquent upon the following described stock, on account of assessment (No. 21) levied on the 1st day of June, 1899, the amount set opposite the name of the shareholder, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Frances A. Sackett (N.Y. issue).	41	100	$25 00

And in accordance with law, and an order from the Board of Directors, made on the 1st day of June, 1899, so many shares of said parcel of stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine Street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 8th day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine Street, Rooms 15 and 17, San Francisco, California.

DELINQUENT SALE NOTICE

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Eich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 7th day of June, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. Rehn	77	1,000	$50 00
C. Rehn	161	150	7 50
A. Rehn	176	250	12 50
G. F. Volz	85	1,000	50 00
W. G. Loewe	122	500	25 00
F. B Schuster	139	500	25 00
F. Woenne	154	1,000	50 00
W. F. Hatch	219	100	5 00

And in accordance with law, and an order from the Board of Directors, made on the 7th day of June, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on TUESDAY, the 1st day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

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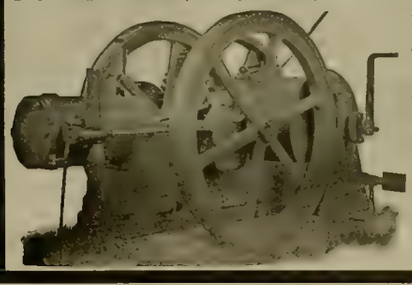
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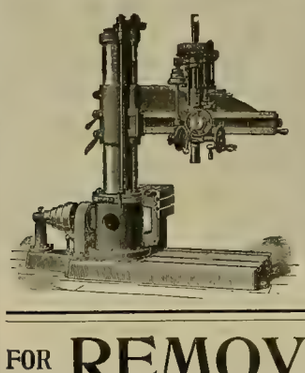
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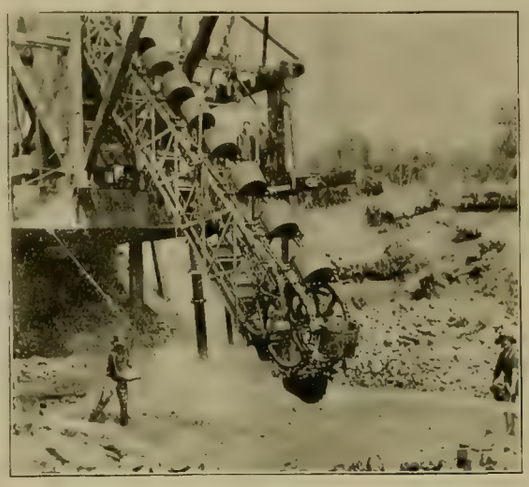
MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2036.—VOLUME LXXIX. Number 3. SAN FRANCISCO, SATURDAY, JULY 15, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Necessity of Foresight in Mining.

This is an age of progress, and particularly is it noticeable in the metallurgical field. The innovations in mining methods are more rare, for miners as a class are conservative—often too much so. The methods employed a century—yes, several centuries—ago are in many places still in use, and in certain instances these methods are good enough, but in others there is room for improvement. The introduction of a higher class of machinery is a noticeable feature, particularly in the newer mining regions. First-class machinery insures larger capacity, and this means economy. No one will dispute the statement that an engine capable of hoisting 1000 tons of ore in twenty-four hours is a more economical investment than one which will raise but 200 tons, if the ore is there to hoist. There is little use in putting a large, first-class plant on a prospect or on a mine in which development cannot be made which will permit the stoping of an amount of ore somewhere near the capacity of the hoist. Nor is it worth while to put in a hoisting engine which can develop a speed of 2000 feet per minute or more when the shaft will not admit of a greater speed than 200 feet. For rapid hoisting the shaft must be in first-class condition, and true throughout. A change in the angle of the shaft necessitates slowing down when the cage or skip passes that point. These facts demonstrate the necessity of sinking the best shafts possible, whether they be large or small, and also the need of opening a mine so thoroughly that there shall always be an abundance of ore available, that hoists and mills may work to their fullest capacity.



Cleaning Bedrock.



Dredging While Afloat.

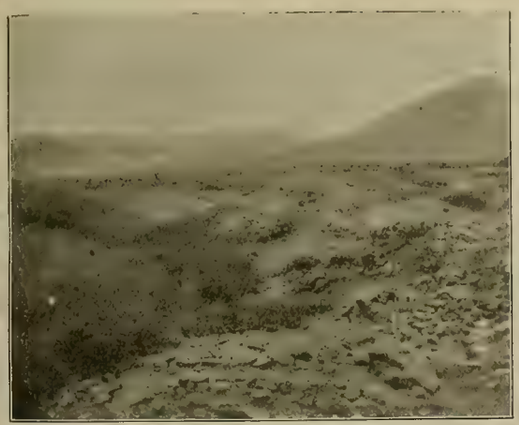


Pit Pumped Out and Cleaning Bedrock.

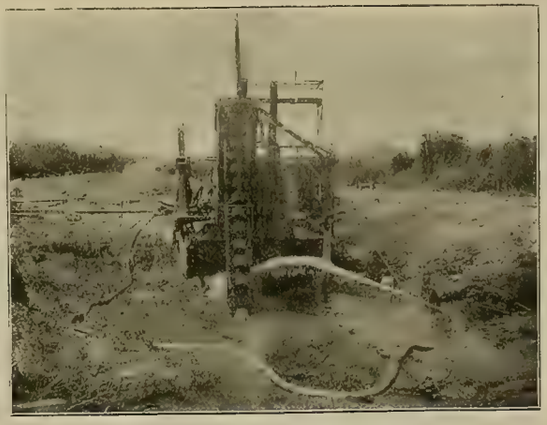


Working in a Meadow 18 Feet to Bedrock

It is much more economical and profitable to open and work a mine out in a few years than to continue at it for half a century or more. This idea cannot be followed out unless the work of development be persistently carried far ahead of the extraction of the ore. The plan requires capital, and owners are often unwilling to invest such large sums when a smaller amount will accomplish the desired result. Haste to secure dividends is the great incentive, and when the mine is profitable on a comparatively small basis it can usually be made much more so on a broader plan of operation. If mine owners and operators would expend some of their first dividends in putting the mine in shape for large production they would find it far more profitable than to work in the small hand-to-mouth fashion so commonly seen. An inexpensive plant may be employed in prospecting the mine and may even pay a profit, but if exploration can be carried on more rapidly than the exploiting of the mine, a time will be reached sooner or later when a larger and more complete plant will be justified.



Old Placers — High and Low Ground.



The Dredger on Stilts.

ILLUSTRATING "GOLD-BEARING GRAVELS OF THE WEST" — *(See page 60.)*

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....Publisher

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Cleaning Bedrock; Dredging While Afloat; Pit Pumped Out and Cleaning Bedrock; Working in a Meadow 18 Feet to Bedrock; Old Placers—High and Low Ground; The Dredger on Stilts, 57. Dredger Afloat and Stripping Bank; Dredger Elevating Gravel and Discharging Tailings 400 Feet Away; Working While Afloat in the Creek; Ideal Section Showing Rough Bedrock, 60. Dredger Working with Small Supply of Water from Reservoir; Large Water Supply from Creek and Returning from Tailings Dump to Creek, 61. Latest Mining and Metallurgical Patents, 63.

EDITORIAL.—The Necessity of Foresight in Mining, 57 Why Mining Is Safe; A Twentieth Century Enterprise; Miscellaneous, 58.

MINING SUMMARY.—From the Various Counties of California, Nevada and Other Pacific Coast States and Territories, 65-66-67.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 82.

MISCELLANEOUS.—Concentrates, 59. Gold-Bearing Gravels of the West, 60-61. Some Experiences of a Working Miner, 61. The Patio Process in Guanajuato, Mexico, 62. Latest Mining and Metallurgical Patents, 63. Cyaniding in Australia, 64. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Obituary; Commercial Paragraphs, 68. Amalgamated Copper Plates; Electrolytic Copper; The Copper Output; The Iron Ores of the Urals; Mineral Resources of Mexico; Oak Bark in Boilers; End of the Golden Marine Co.; An Immense Project, 69. Recent Mining Incorporations; Recent California Dividends, 82.

WHILE there has been no general advance in the price of mining machinery, yet the increased cost of everything that requires metal of any description in its construction, foreshadows a proportionate increase in the price of all mining appliances that are kept up to the present standard of manufacturing efficiency.

CERRO PINTADO, Lower California, as a field for cheap gold is not given a very flattering recommendation by prospectors returning from there. They say the gold is there, but in such small quantity as to render its recovery too tedious an operation for one who has but a single life to live, and the gold fields are deserted by nearly all but the Mexicans and Indians.

DENVER, COLO., has a new stock exchange, starting afresh and freed from the odium that attached to some former ventures in that line. Rightly managed, a stock exchange may be of value to a State's legitimate mining interests, where the object is not to skin the unwary, but admit the speculative tendency to inure to the steady development of the State's mineral resources.

LEGITIMATE mining demands that a mine be worked thoroughly and systematically, but economic conditions do not always permit of working the low grade mineral at first. The advent of railways, a lower cost of materials, improved methods and cheaper labor often make it possible to work a mine at a profit, which, prior to the advent of these conditions, could only be worked at a loss. This has been repeatedly demonstrated in Western mining regions.

THE formation of a gigantic wrought-steel, iron tube and pipe trust is the largest thing of the kind this week. The creation of these modern Frankensteins is the most interesting of any present industrial feature. Great blame is attached by many public writers to those who form these trusts. To a looker-on it does not seem that those who surrender their individuality are to be blamed; they are simply doing the best they can at present. They really are the wisest. This paper thinks that those concerns that put in their plants and draw down ready cash are fortunate. For the crash is sure to come; the whole trust system is certain to go to pieces, and a large percentage of the properties that took trust stock in exchange will have to take their properties back again. Water can be forced up-hill, but its inevitable tendency is down again.

Why Mining is Safe.

Never at any time in the history of mining in America has there been such marked activity in that industry as now, and not only in America but throughout the world. Many rich districts have had their palmy days, when great excitement has followed the discovery of rich mines in new districts. The history of the pilgrimage to California in '49–'50 and succeeding years; the rush to Washoe; the stampedes to Montana, to the Black Hills, to Leadville, Cripple Creek, and a score of less noted places, is well known and remembered. These were typical rushes, by men of every nation in every condition of life. Rich and poor, strong and weak, saint and sinner, all hastened towards the goal of wealth. The present condition of the mining industry is in distinct contrast to those features which characterized the so-called rushes. Mining has of late years become to be looked upon as not only a legitimate but a safe business in which capital may be invested with as reasonable an assurance of success as may be found in any other business, and with a possibility of a far greater gain on capital invested than any other legitimate business affords.

There must be some good reason for this, for not so very long ago conservative business men considered an investment in any branch of the mining industry as extremely hazardous, and outside of mining circles in the Eastern cities of the United States a man who undertook to promote a mining enterprise, no matter how meritorious, was looked upon with suspicion if no worse, and the capitalist when approached by a miner would thrust his hands deep into his pockets as though to protect himself from being robbed. To-day some of the most conservative Eastern financiers freely endorse legitimate mining, and not only endorse it but are large investors in the best class of mining enterprises.

When the reasons for this change are sought, it will be noticed that the success that attends the most prominent mining enterprises is due largely, if not wholly, to intelligent, skilled and trained management. Men of large means have learned that anybody cannot successfully run a mining enterprise, and as the value of the services of scientifically educated and trained mining men became more fully realized, the greater became the confidence reposed in their judgment and skill, until to-day competent mining engineers are in demand and among the best paid men in the world. Numerous instances are of record where a graduated mining engineer with practical experience has succeeded a management which did not possess these requisites, and, though employed at a much larger salary, saved to his company from three to ten times the additional amount paid him for his services. With the leading mines in the hands of such men, capital no longer feels that it is taking an unusually hazardous risk when engaging in legitimate mining. Another reason why mining has come to be looked upon as a perfectly legitimate and, under proper conditions, safe business, lies in the fact that its requirements are better understood, and the mistakes so commonly made a few years ago are not likely to be made now, and will not be made if proper men are engaged to determine the kind of machinery to employ in mining and treating the ore. In the metallurgical field there is little ore which cannot be successfully treated by some milling process, and these processes are constantly being improved and cheapened. And here again appears the necessity of employing skilled men to determine which process shall be selected. Mining has made great advances in every branch, and the innovations and improvements resulting in success are largely due to the scientifically educated engineers.

THE operation of a mine is not unlike the conduct of any other business. If the operation pays with a 10-stamp mill, it will pay better with a 20-stamp mill or with one four or five times that size, if the ore can be mined rapidly enough to keep it supplied. It is a very unwise plan to neglect to provide a paying mine with a better class of machinery before the old plant reaches its limit of efficiency. In California there are a number of mines, at one time prominent and paying, which were shut down because the limit of the capacity of the machinery had been reached at a time when the ore in sight was mostly stoped out, and the manager was unable to sink deeper with the old plant. This illustrates the necessity of having the development work well in advance of the extraction of the ore. When this is done, the condition of the mine will warrant the installation of a new plant.

A Twentieth Century Enterprise.

Among the most noticeable new mining ventures now attracting attention is that of the Century Development Co. of New York, with a capital of $10,000,000, organized to operate mines in Tuolumne county, California. The splendid magnitude upon which this enterprise is to be conducted compels admiration. The company has secured a tract of land lying between the north and main forks of the Tuolumne river, near and including the Buchanan mine. They claim to have secured twenty-two claims and have designs on about 180 others. A large volume of water in the main river will be employed to run electric and other machinery. A mill of 1000 stamps, each weighing 1250 pounds, arranged to drop 110 times per minute, will give a capacity of 3000 to 4000 tons of ore daily. The boarding house is to be 300 feet square and will contain 1600 rooms. At first a small mill of 400 stamps will be built, the remaining 600 to be added later. The total estimated expense for mill, railroad, water power, electric machinery and other surface improvements is $2,500,000, which is provided for by an issue of 6% gold bonds, payable in twenty years, and secured by mortgage to the Knickerbocker Trust Co. of New York.

The above information is taken from one of the local papers, which credits it to the official prospectus of the company. Having a knowledge of the mining section included in the property of the company, it is thought the future career of the enterprise may prove to investors more interesting than prosperous.

As usual with these large enterprises no estimate has been made nor funds provided for developing the 200 claims of the company. At present it is doubtful if there is enough ground open in the entire district included in the company's property to keep a 40-stamp mill employed, though, perhaps, this is an item of small concern to the managers of the gigantic undertaking. The veins of the district occur in the slates, schists and limestones of the Calaveras formation, and are mostly of comparatively small size, ranging from a few inches to 4 feet, though in the Buchanan mine are stopes 20 feet wide in places. The Century Development Co. is well named, though a realization of its dreams more properly belongs to the end of the twentieth than the ninteenth century.

IN the Transvaal it seems that nothing but very radical concessions on the part of the Boers can avert war. President Kruger has been making preparations of a most warlike character, including the strengthening of existing fortifications and the construction of new means of defense, the purchase of abundant war material, etc., while England is not less active, the last step being the sending of several war vessels to Delagoa bay and the Cape, with a view to cutting off supplies to the Transvaal from the outside, though this step is taken rather too late to be very effective. Both England and the South African Republic seem thoroughly in earnest over the matter, and the large financial interests at stake in the gold mines of the Transvaal make the question more difficult of settlement. It is hoped the Boers will see the advantages which will result to them in granting the desired "reforms," for if they persist in refusing the demands made upon them the ultimate end may be easily predicted.

THE brief announcement on page 68 concerning the American purchase of Mexican bonds is of considerable significance, illustrating the advance of industrial Mexico, the unusual circumstance of purchase by United States citizens of foreign securities, and the international importance of this country's money market.

SEVERAL mining companies of the British Columbia region have apparently solved the labor problem to the satisfaction of all interested by operating their mines under a contract system. Each side feels they have made no concession, the miners are at work and trouble has been averted.

Concentrates.

CORUNDUM is an aluminous silicate; it is used chiefly in the manufacture of emery.

THE placer gold of Juarez, Lower California, is worth over $20 per ounce.

SOUTHERN COLORADO coal miners work eight or ten hours a day, at their own option. The pay is 26 cents per hour.

A FULL illustrated description of the "automobile" and its mechanism appeared in the issue of March 4th, '99, page 237.

WITH a pipe 4 inches in diameter, 4000 feet long, delivering 200 gallons per minute, 141 feet head is equivalent to the friction.

PIECES of oak wood—not bark—suspended in a boiler and renewed monthly are said to prevent a deposit of scale on the boiler.

THE mean or average velocity of a stream has been determined to be .81 to .83 of the maximum velocity in the center of the stream.

THE variation of the magnetic needle is different at almost every change in longitude. In California at present it is about 16¼°. This is not constant.

POWER has been transmitted a distance of a mile by steel rope for the purpose of pumping from a well nearly 100 feet deep to supply water to a mill near Calico, Cal.

THE bridge to be constructed across the Gokteik gorge, on the line of the Burmah railway, will be 1500 feet high at one point. It will be built by an American firm.

POSSIBLY the unsatisfactory cyanide returns reported by "Syphax" may be due to inferior quality. Cyanide of potassium must be of standard quality to insure satisfactory results.

IN the Hank Eller claim, on Green mountain, near Kimberly, B. C., an unusual mineral combination is reported, in the occurrence of galena and native copper in a quartz vein 6 feet below the surface.

THERE is a distinction between abandonment and forfeiture of a location. Abandonment is intentional and operates immediately; forfeiture is unintentional and results from non-compliance with the requirements of the law.

A BELT in a coil may be measured approximately by adding the diameter in inches of the hole in the center of the coil to the outside diameter; multiply the number of coils in the roll, and multiply the product by the decimal .1309, which will give the number of feet in the coil.

THE velocity of streams varies greatly on the same grade, owing to difference in volume of water, character of banks and bottom and the number of bends in a given distance. In a straight, smooth channel a fall of 3 inches in a mile will give a velocity of about three miles an hour.

IN Honduras placer gold can often be purchased at the rate of eleven to fourteen silver dollars per ounce from the miners who wash it from the stream. This is only about one-half its value, owing to difference in exchange, but it is difficult to find any considerable quantity at any one place.

WITHIN two years California will have mines over 3000 feet in depth. There are several shafts now down to the 2000-foot mark, or near it, and some below it. When the new Kennedy shaft in Amador Co., Cal., reaches the proposed depth of 3500 feet, it will be about 2000 feet below the level of the ocean.

THE Selby Smelting & Lead Co. of San Francisco has made reduction in refining charges on gold bullion corresponding to the recent reduction in mint charges, making their rates the same as those of the Government. The main reduction is from 6 cents to 4 cents per ounce on bullion 700 fine and over.

NO DAM should be constructed without having a sluice provided in the channel of the stream by means of which the reservoir may be emptied, which is sometimes necessary for various purposes, such as cleaning out, making repairs to the dam, recovering articles of value dropped into the reservoir, etc.

WHEN the right to follow the dip of a vein outside of the side lines of a claim is challenged the owner must establish the existence of an apex within his boundaries, to the extent necessary to cover the disputed segment of the vein and also the identity and continuity from its top or apex within his own boundaries to the point in dispute.

AS TO "libelous" matter published about mines or anything else, it may be said in a general way, that the truth is not libel unless accompanied by malice. The journal referred to did not "libel" the property, though it might have stated the facts in a less exasperating way. In these things Davy Crockett's advice holds good—"Be sure you're right: then go ahead."

THE railway train carrying the delegates to the 77th meeting of the American Institute of Mining Engineers in San Francisco is scheduled to leave New York, Sept. 14th, Chicago, Sept. 16th, thence via St. Paul, Minn., Butte, Montana, and Portland, Or., arriving in San Francisco, Sept. 24th. It is expected that 150 or 200 members of the organization may attend the meeting.

A LIST of the cyanide plants in California is not at present accessible. "The most recently erected cyanide plants in Nevada," so far as this office knows, are a forty-ton plant contracted for in San Francisco last week by Logan & Holley, Dayton, Nev., and a ninety-ton plant to be put in at the Chainman mine near Ely, Nev., to work the tailings recently experimented on by T. T. Lane.

AN alien cannot locate a mining claim in the United States unless he declares his intention to become a citizen thereof, when he has the same rights as a citizen. An alien, however, may purchase a mining claim from a citizen locator, and hold the same until the fact of alienage is authoritatively established by a public officer, upon an inquest held at the instance of the Government.

IN some instances Congress has opened forest reservations for the location of mining claims. The Pike's Peak, Plum Creek and South Platte forest reservations in Colorado are included in this exception. Mining claims duly located and held prior to the creation of forest reservations, and included within the limits of such reservations, are excepted from the force of the proclamation creating such reservations.

THOSE who contemplate engaging in mining who have had no practical experience would do well to employ some competent and reputable mining engineer to assist in the enterprise, to outline the development of the mine and determine the character of machinery and the process to be employed at least. Inexperience and self reliance have proven very expensive to some investors in mines in California and elsewhere.

THE throw of faults is not always at a right angle to their strike. Very frequently there is a lateral as well as a vertical displacement, and this fact may result in deceiving the miner searching for the continuation of a faulted vein, for where the vein is found of the opposite side of the fracture it may not have, on the same level, the same width and other characteristics, in which case it might be mistaken for another vein.

IT is thought that the most effective antidote to cyanide poisoning is subcutaneous injection of a 2% solution of peroxide of hydrogen. Dr. Loevy suggests that in every cyanide plant provision for the administration of such antidote be made by having, say, a half-ounce of pure peroxide of hydrogen in a small, tightly-corked bottle, kept in the dark, with suitable hypodermic appliance, accessible for immediate use if required.

SOME of the volcanic channels of the ancient river system of California carry gold in paying quantities. By volcanic channels is meant channels in which the wash is almost wholly made up of boulders, cobbles and gravel of volcanic material. The gold in these channels has been derived from the veins occurring in the bedrock of the channel or more frequently from a pre-existing channel which the later channel has cut in its course.

A WING DAM is one which extends only partly across a stream and is employed to divert a portion of the water. When it is desired to mine a low bar or portion of a creek bed the wing dam is sometimes resorted to, inclosing the portion that it is desired to make accessible. The dam is then built parallel with the bank of the stream and is connected with the bank at the up-stream end and sometimes also at the lower end. The water in the inclosed area is pumped out and mining proceeds usually by the sluice method.

THE Secretary of the Interior has reversed the decision of the General Land Office regarding the claim of the Mayflower G. M. Co. to the Beaver Springs placers Nos 1 and 2 and the Mayflower and Highland Chief lode claims in Colorado. These claims are contiguous. The land office held that the company could not secure a patent for both placer and lode claims and directed that they retain one and the entry to the other would be cancelled. The company appealed, asking that its entry as originally made for all three claims should stand and be passed to patent. The Secretary has considered the appeal and ordered that the entry be passed to patent as requested.

IN torrential streams where the range of flow varies from a rivulet to a torrent, bank full, a cheap dam which washes out with every flood is about as economical as one calculated for permanency, for streams of this character when up usually carry a large amount of debris, which would quickly fill a reservoir of ordinary character when the purpose of the dam is practically destroyed. A very serviceable dam may be constructed of a cribbing of logs, brush and earth, which may be replaced after a flood. In some cases the larger logs are secured to the bank by chains or cables and are thus prevented from being washed down the canyon, and may be used in reconstructing the dam.

GREENSTONE includes the several varieties of diorite and diabase. Diorite is not always green. Some diorite is much like granite in appearance, particularly the quartz-mica diorate. It is coarse to fine grained and presents a great variety of phases. Diabase is usually green varying in color from light pea green to dark green and almost black. The greenish color of rocks of this class is due to the occurrence of a large amount of fine particles of chlorite throughout the mass of the rock, the chlorite being derived from alteration of the hornblende or augite. Phonolite does not properly belong to this class of rocks, being more nearly related to the trachites.

THE subject of county mining bureaus for the various mining States has been referred to herein before. Each county should take steps to make a typical collection of its valuable ores, rocks and minerals and place them on exhibition in some suitable public place at the county seat. When expositions are held, such as that to be opened at Paris next year, the best of the collection could be boxed, shipped to the exposition and returned when they were no longer required. Once established miners and mine owners would soon take pride in it and frequent additions would be made to it, and the natural result would be in time that each county would possess the best possible exhibit of its mineral resources, collected at the least possible cost and it could not fail to become a source of both pleasure and profit.

"YOUR paper is a positive necessity to miners," writes a southern California subscriber, sending the subscriptions of two others at the same time. "I get enough from any one issue to pay for the whole year," says a Butte, Montana, reader. "It has no superior in the mining world," writes a Kalgoorlie, Australia, subscriber. "The MINING AND SCIENTIFIC PRESS is the only paper that has the real mining flavor about it," is the comment of a Colorado mining superintendent. "I only wish that all my investments were as profitable as the money I pay for the MINING AND SCIENTIFIC PRESS" is the way a Hedges, Cal., subscriber puts it. Such plain praise from practical men is a positive pleasure; many such letters are monthly received and always appreciated, as is adverse criticism on sins of omission and commission, from which no publication is free.

THE Supreme Court of California has rendered a decision determining what constitutes valid assessment work. It says: "A party cannot hold a mining claim for several years without doing in any year the work required, by simply going on the ground at the beginning of each year and doing a few hours' work, with no bona fide intent to comply with the statutory requirement as to the amount of work to be done. It is against the policy of the law to hold quartz claims by merely doing a few dollars' worth of work thereon at or near the beginning of the year next following the year on which the claimant failed to do the necessary work, when such work is not commenced with the bona fide intention of being continued till the full amount is done. Such labor so done is a mere pretense and a sham, and will not prevent the relocation for want of necessary work."

THE requirement of annual labor on unpatented lode and placer locations is imperative. A timely resumption of work may save a forfeiture, if completed, the law contemplates that it shall be completed and if it is not the claim is still subject to relocation for non-compliance with the law. The law is certainly liberal as it requires the work to be done within a year from the first of January next succeeding the date of location, so that a claim located on the first day of January, 1900, may hold good under the present law until Dec. 31, 1901, when it would be subject to relocation by reason of failure to do the required work. Practically the law gives on the first annual expenditure from about one to two years in which to do the work, and one year for the performance of each additional $100 worth of work, yet there is probably no part of the law which is so much abused and evaded as this very liberal provision.

THE terms strike and dip, as referred to veins, have been judicially defined as follows by Judge W. H. Beatty: "The strike, or course, of a vein is determined by a horizontal line drawn between its extremities at that depth at which it attains its greatest longitudinal extent." The dip of a vein, its course downward, at right angles to its strike; or, in other words, if a vein is cut by a vertical plane at right angles to its course, the line of section will be the line of dip. The strike, or course, of a vein can never be exactly determined until it has been explored to its greatest extent; but a comparatively slight development near the surface will generally show its course with sufficient accuracy for the purpose of a location. The dip having an exact mathematical relation to the course of the vein, is, of course, undetermined; but practically the line of dip is closely approximated by taking the steepest (nearest the vertical) line by which the vein can be followed downward.

A locates a placer claim by simply placing his notice on a stake at the head of the location, claiming a certain number of feet down stream together with 300 feet on either side of the center of the stream, and sets no other stakes or monuments, and no natural objects being used to define the boundaries of the claim; he records his claim and does the assessment work; B subsequently locates the same ground by properly staking boundaries of claim and otherwise complying with the laws: does A lose his rights to the claim? The question is, Did A make a valid location? Apparently he did not, as the United States laws require all locations to be distinctly marked, that the boundaries may be readily traced on the surface. This A failed to do. However, had A made his location under the law of California repealed March 20th, '99, that law gave him thirty days in which to perfect his location. If he did not perfect his location within that time it would not have been a valid one, and if made since the repeal of that act it would not be a valid location.

FOR the convenience of cheap and expeditious handling of ore and waste on the various stations of a shaft, excavations are cut out under the floor of the level, sloping toward the shaft and substantially timbered. In the case of an inclined shaft these ore pockets are made in the hanging wall side of the shaft. The ore pocket or bin thus formed is provided with suitable chute, and the skip or bucket is lowered to the proper point and the ore or waste discharged into it. The arrangement is essentially the same as that provided at ore bins on the surface. A space must be provided below the level upon which a man may stand while loading the skip. In shafts having a small inclination from the vertical, cages built to suit the particular angle of the shaft are frequently used, but skips are in more common use, though where practicable cages are to be preferred as it obviates the necessity of dumping and reloading rock: the car loaded in the mine may be sent to the surface. In shafts having steep inclination guides should be provided, whether skips or cages be used, as skips are very likely to become overbalanced and leave the track, when much damage may result.

HAS the proprietor of a regular valid lode location the right to pursue his vein in depth, outside of his lateral bounding planes, into and underneath the surface of an agricultural grant, the title of which grant passed to the grantee prior to the discovery and location of the mining claim enclosing the apex? The question has never been determined by the Supreme Court of the United States, but has been answered in the negative by Judge Sawyer, in the ninth Circuit Court in the case of Amador-Medean G. M. Co. vs. South Spring Hill G. M. Co. The case was appealed to the Supreme Court of the United States, but before it came on for argument both properties in the suit has passed into the hands of the same persons. In "Lindley on Mines," the author fails to agree with the decision of Judge Sawyer. He says: "The land covered by an agricultural patent is conclusively deemed to be agricultural, but this does not necessarily imply that a lode under its surface, apexing outside of it, cannot be reserved without impeaching the patent and changing the legal character of the land. The two classes of grant may exist without conflicting in a legal sense."

THE latest ruling of the Commissioner of the General Land Office regarding mining claims is that when a mining claim has been surveyed and patented in accordance therewith, the land described therein is disposed of so long as the patent is outstanding, and the jurisdiction of the department in regard to that particular tract is terminated. It therefore follows that land thus patented cannot be properly included in a subsequent patent, merely because years afterwards a deputy mineral surveyor in making a subsequent survey reports to have found the true corners of the old survey to occupy a different position from that reported in the survey which was the basis for patent of the old claim. And the same thing is true as to reported discrepancies as to the length and courses of lines of prior approved surveys. Where such a state of things actually exists, the owner of the new claim applied for, who desires to include an area in his claim conveyed in a patent of an older claim, which as a matter of fact is not embraced in the lines of the old claim, as staked upon the ground, should procure the surrender of the old patent by the proper method—through the courts, if necessary—and then show in a new patent of the old claim its true position as staked, and thus eliminate from the patent the areas desired not in conflict.

Gold-Bearing Gravels of the West.*

In the Rocky Mountain and Pacific Coast States there still remains a very large amount of gold-bearing gravel which has never been disturbed. Most of the land on which these gravels are located can be acquired, at the present time, at little cost. Much of it is close to railroads and civilization, a large part is in a semi-arid region where the rainfall is light and the streams few and small, and the season is short in which the placer miner can get an abundance of water for handling large quantities of gravel.



DREDGER AFLOAT AND STRIPPING BANK.

In the placer region, generally, attention is given to the possibilities of gold in the gravels of existing creeks or rivers, or the bars and benches close by, and this is usually as far as the prospector or miner has gone because of the want of sufficient water. There are many plains and valleys away from the watercourses of to-day that were formerly the channels and beds of rivers that changed from time to time as the mountains and hills crumbled, and the streams have now disappeared. There are many such places, where a small stream of water may be forced up to them or drawn from a higher elevation to run some mechanically operated plant. Some of the richest finds in gravel have been on high bars or bench lands, and if some plan of reusing water and working on level ground were adopted pay streaks away from the creeks and rivers of to-day will be found.

There are great flats or meadows in the valleys and old watercourses that were too wet for the early miner which give evidence of pay on bedrock. There is also much flat land containing gold, but not water enough available to work with past methods.

Placer gold in nearly all gravel formation is close to or on the bedrock, particularly so if the gold is coarse, so that in gravel formation that may be 10 to 20 feet deep, 95% of the gold may be found in the lower foot of the gravel and in the crevices of the bedrock itself.

It is sometimes the case that the bedrock consists of a variety of soft, or decomposed, stone, but in nearly all cases it will be found to be mixed with hard and ragged spots, and often it is a hard, slaty formation; but it is generally uneven and full of crevices, and forms the riffles that have caught and held the gold, much as illustrated in the ideal cross-section of bedrock.

Montana Bar, Confederate gulch, thirty miles from Helena, Mont., was one of the richest spots ever found there. It is said four men took out $1,200,000 in 100 days from about three-fourths of an acre of gravel. The bedrock was rough, ragged and hard, and, from a description of how the gold was found in the crevices of that hard rock, no dredger could get the gold on such bedrock, if covered with water. In other camps the richest spots are generally those on hard, rough bottoms, where the gold has to be picked up by hand out of the crevices with small tools, such as knives, spoons, etc.

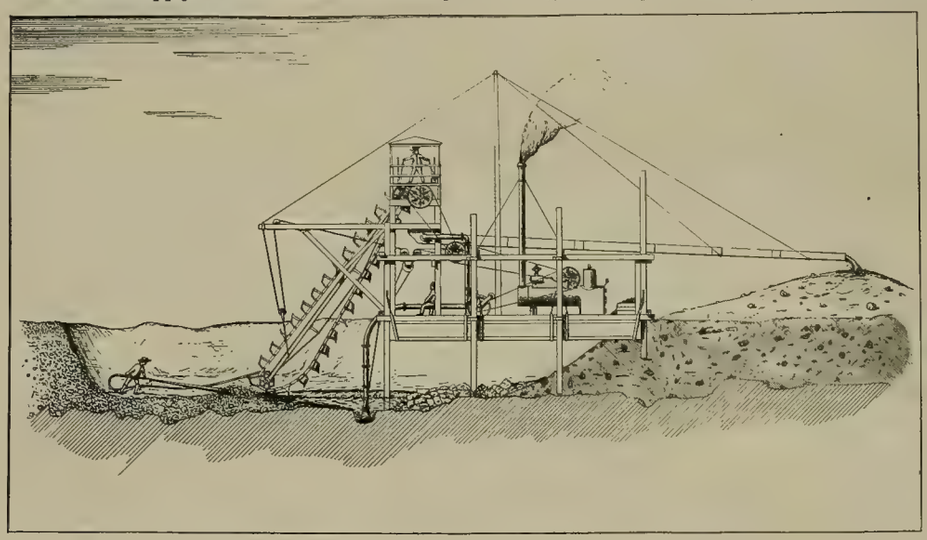
The same would apply to old channels which may now form the dry bars, the meadows, valleys or bench bars that at some time formed the bed of a river.

By this view of bedrock, it will be seen how difficult it is for any dredger to get most of the gold without some other means of cleaning the bedrock than simply dredging. There are instances where good dredgers at work in creek bottoms did not secure 25% of what the ground by careful tests prospected. In New Zealand the gravel and bedrock are unusually favorable.

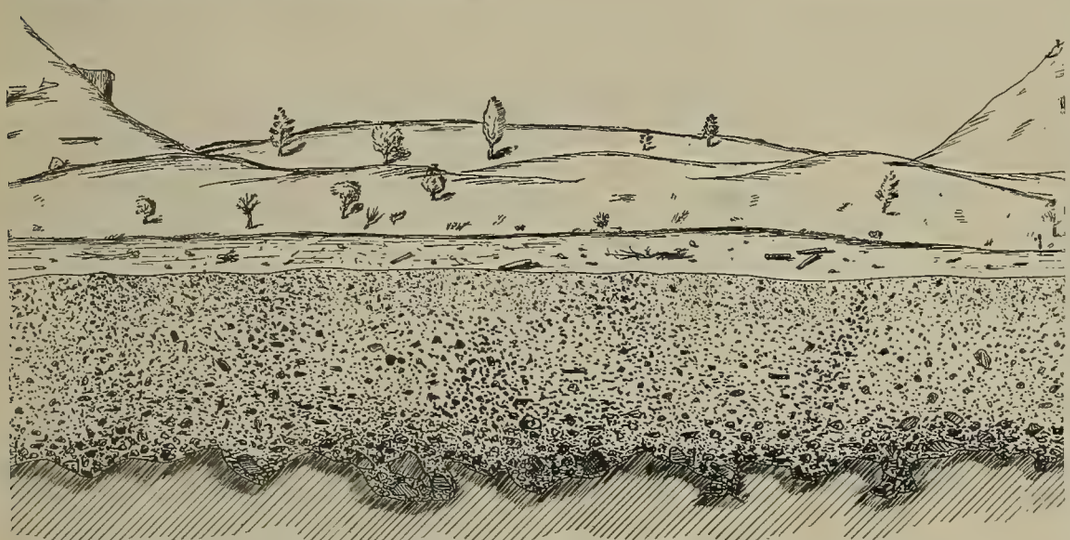
The placer miner, where he has plenty of water and sufficient fall, makes a bedrock flume and cleans off the bedrock by hand, or uses a stream of water, until he gets nearly all of the gold out of the bedrock crevices. The early prospector and placer miner was not able to work on ground that was flat, where the gravel contained great quantities of water, nor in dry, flat ground not rich enough to drift; or far from water, because of the amount of labor and expense. The same is applicable to rich ground which had fall enough, but little or no water.



DREDGER ELEVATING GRAVEL AND DISCHARGING TAILINGS 400 FEET AWAY.



WORKING WHILÆ AFLOAT IN THE CREEK.



IDEAL SECTION SHOWING ROUGH BEDROCK.

Some attention has been given to gravel mining by the machine maker, but ordinarily the miner is not familiar with mechanical appliances, and the mechanic is usually far from the mining regions and has not familiarized himself with its requirements. There may be some gravel formation where dredgers will not work, and there is rich ground where a dredger and combination can work to advantage and yield profits.

The McDougall plant consists of boilers and engines; a large centrifugal pump, with pendulum suction pipe, which raises water to sluice and also lifts sand, gravel, gold, etc. This pendulum drags back and forth and rubs off the pieces of stone too large to enter the suction pipe, and at the same time wears a hole in the rock, particularly if it is soft.

There is an elevator leg or ladder dredger which lifts the sand, gravel, gold, water, etc., depositing it in the hopper into which the large centrifugal pump discharges its material. The hopper is connected with a sluice which is high enough to carry the ma-

* Condensed from "Placer Gold," by Alexander McDougall, Duluth, Minn.

terial back when the scow is part way down in the pit. There is a reversible hoisting engine which operates the pendulum, and also hauls the scow about when afloat.

A second centrifugal pump, smaller than the first, can be used to assist the large pump to flush the sluice box, but its chief use is to force jets of water, when the scow is afloat, against the gravel at the lower end of the elevator to loosen it, or, when the pit is dry, it is used, through hose, to push the gravel to the elevator or pendulum suction, and also to clean the bedrock of gold in the crevices, which cannot be cleaned up otherwise.

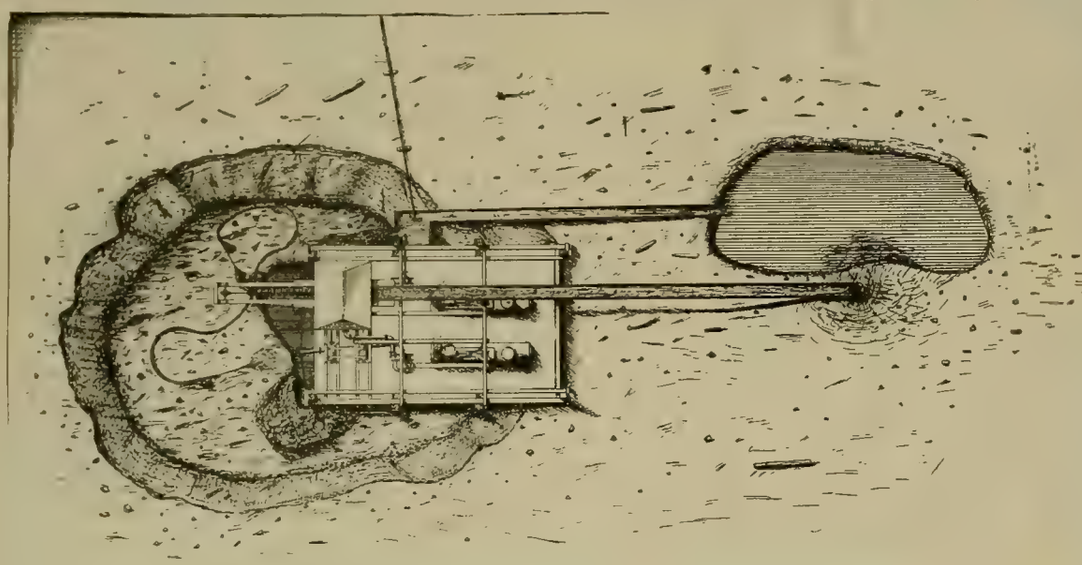
In a meadow alongside a creek, where there is 20 feet of gravel on the bedrock, a hole is dug a couple of feet deep, large enough to float a scow. The machinery and sluice boxes are placed, and water from the creek turned on and the machinery started; a larger and deeper hole will soon be excavated in which the scow can float, the sluice extending far enough astern to dump clear of the pit. This continues until the pit is 50 feet wide and 60 feet long, and dredged close to bedrock.

The scow, which has adjustable legs, or spuds, is lowered into the pit, by shutting off the water supply and pumping out the pit until nearly dry; the scow will then rest on its legs, the after part resting on the bank, and by large screws attached to the legs, the scow is leveled to suit the after end of the sluice box extending back of the scow so that the water and tailings do not run into the pit. Water is turned into the pit to supply the large centrifugal pump, the small pump receiving its supply from the creek.

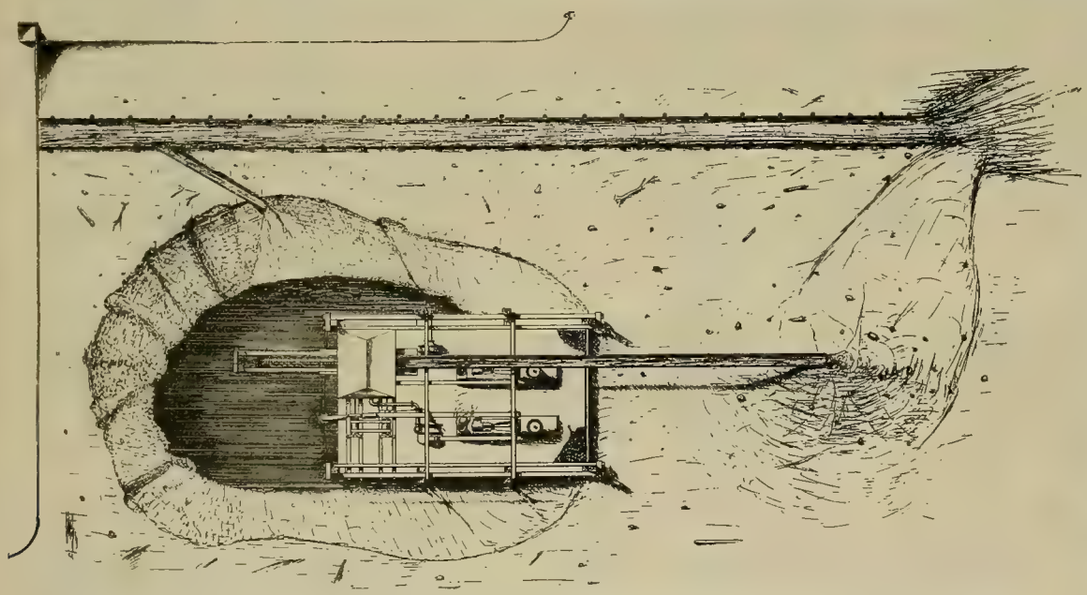
When the bedrock is free of water, a part is cleaned; the large stones, usually found on the bottom, are piled up, and after the first shift can be thrown under the scow, for the new ground will be nearly all ahead of the scow. When bedrock is nearly all cleaned in this pit a spot is selected for the sump, where the pendulum suction is located for the next shift, usually the lowest spot which can be secured, on soft bedrock where the pendulum can work its way down to get a deep sump. When necessary, a deeper hole is made with a small charge of powder, so that water can be kept out when cleaning bedrock.

When the bedrock is cleaned, and the sump is located, the scow is floated and moved ahead. After the first pit has been made, it is easier to excavate, or extend it, as the dredger can be worked against the bank. Always work up stream, if ever so little fall, so that water and tailings will work away from the scow. After the first hole is dug, the tailings are dumped in the last pit.

The discharge of water, sand and gravel from the big pump and elevator dump into the same hopper, which in the fine gravel does not require a screen, but if the gravel is coarse, a bar screen can easily be made; and in a large plant a revolving screen may be necessary. Where there is little water this dredger can work to advantage by allowing the water to run back in the pit for the purpose of using again.



DREDGER WORKING WITH SMALL SUPPLY OF WATER FROM RESERVOIR.



LARGE WATER SUPPLY FROM CREEK AND RETURNING FROM TAILINGS DUMP TO CREEK.

ONE is tempted sometimes seriously to wonder whither the present flowing tide of diamond discovery will carry that branch of the South African industry. During the past few days specimens of blue and yellow ground have been shown, affording every indication of being diamondiferous, from a region of South Africa hitherto virgin as far as these gems, or as metalliferous mining, are concerned. As there is evidence that the actual discovery of diamonds on the surface led to this blue and yellow being located, and as the samples afford the clearest indications of pipe matter, there is likely to be an increase in the already considerable embarrassment of these riches. —South African Mining Journal.

THE first year's work in Cornell's unique hydraulic laboratory has been marked by the completion of an important investigation, for the U. S. Deep Waterways Commission, of the flow of water over dams of various contours. Nothing was known of this, heretofore, and the resulting information enabled the Commission to reduce their estimates for a ship canal from the lakes to the Atlantic by $10,000,000 or so in a single item—the feeder on the Rome summit. Cornell is in a way to save Uncle Sam more than he has given her.

Some Experiences of a Working Miner.

NUMBER XXIV.

Written for the MINING AND SCIENTIFIC PRESS.

The L—— Borax Company had a splendid thing of it some years ago when they found a lake bed, practically dry, in the mud bottom of which they found large quantities of borax in crystals. They dug up, cleaned and sold this mineral, realizing a handsome profit; but cupidity resulted in their undoing. Not satisfied with making about 1000% per annum on their investment, they wanted to increase the income a hundred fold and perpetuate it. Accordingly, they rigged up a well-boring outfit, sunk a 10-inch hole and struck water. They had expected to strike water, of course, that being the object of drilling the hole, and they thought the water would prove to be a saturated solution of borax; but it was fresh and it flowed out in abundance. The fresh water filled the lake bed, dissolved all the crystals and put an end to what had been a profitable business.

* * *

Speaking of well boring, brings to mind the experience of Mr. H—— at P——. He concluded to sink a well and was advised to drill a hole, as he could get artesian water and save the expense of pumping. After the rig was in position and drilling had commenced, I went out to look at it. The drill was cutting its way slowly through gravel and boulders. Mr. H—— asked me what I thought his chances were to find artesian water. I told him I did not consider them good, for the reason that I believed the gravel to be underlaid by crystalline rock, in which he need not expect artesian water. I told him I would come again when the drill had passed through the gravel. A day or two later Mr. H—— came and asked me to ride out to his place and look at the stuff coming up. It was a coarse gneissoid rock, and I again told him he would do well to abandon the proposition and sink a well of the ordinary kind, put in a windmill, etc. He told the well-boring man what I had said, and his remarks were not at all complimentary. He persuaded Mr. H—— that he knew his business—that of boring wells—and assured him of the success of the undertaking. The well borer continued work; at 90 feet he struck water. The bore was put down over 1000 feet, but the water never rose an inch above the 90-foot mark. Gratuitous information and advice is rarely appreciated. A bit of advice in exchange for a good round price is much more effective, and it will usually be followed whatever the result, simply because it cost something.

* * *

A mill man of my acquaintance told me of a little experience he once had with a visitor at the mine when he was head amalgamator. The visitor was interested in the property and asked a great many questions, some of which were not pertinent—at least the mill man did not feel called upon to answer all of these questions; still, as the company was a corporation, he did not wish to offend a prominent and influential stockholder and a director. The visitor came into the mill and looked the outfit over with much interest. The clean-up had just been made and there was a goodly pile of amalgam in the retorts. The stranger was more interested, apparently, in the result of all this operation than in the operation itself. He innocently inquired:

"How many dollars do you think we should clean up next month, Mr. M——?"

Now, M—— knew perfectly well he had no right to answer a question of this kind, as his position was of a confidential kind, as you may say, and still he didn't want to appear rude and give offense. He studied a moment and then, looking very earnestly at the inquisitor, replied:

"I think, if we can get through about the same amount of ore this month as we did last month, and if the ore runs about the same, we ought to clean up about the same as we did last month."

The director stood and stared at M—— for a bit, seeming to be unable to comprehend his stupidity, but finally said:

"You do not understand me, Mr. M——. How many dollars will we get?"

M—— replied that he thought perhaps the superintendent could give the desired information, and the director took the hint and consulted the superintendent.

* * *

At one time the P—— E—— mine was a great concern. Month after month it poured forth a golden stream, but in time the ore in sight diminished, and desperate efforts were made to find new ore bodies. Most of these desperate efforts were

made in the home office of the company by the board of directors, who, with a map of the mine spread out on a large table, theorized where ore should be found and where it should not. The superintendent had some ideas himself, and informed the company of his belief that, by crosscutting in a certain direction, new ore bodies would be encountered. For a time his suggestions were opposed, but, finding nothing in the directions they themselves had selected, they finally gave the superintendent permission to run his crosscut. The work was started and did well for a time, but after awhile the rock became hard and progress was slow and expensive. Finally they gave orders to discontinue this work. Much to his dislike, the superintendent gave it up, and not long after died, but still maintained to the last his belief that ore would be found by driving his crosscut.

A new man took charge, and after a time he concluded that ore must lie off in the direction of the crosscut. He started the old crosscut once more and reported the fact to the company, who promptly ordered him to discontinue the work and gave directions to prosecute work in various other places, equally unpromising. Instead of obeying orders, this man continued the crosscut, omitting to mention the fact in his report. In less than a month he struck an ore shoot which produced millions, and without which the mine would probably soon have been abandoned.

* * *

Shortly after the G—— H—— mill was built I chanced to pass that way and took advantage of the opportunity to look in and see how things were done in that establishment. Twenty stamps were dropping, and the screens were rather coarse. The ore, which was of good grade, contained 2% or 3% auriferous iron sulphide. There were eight concentrators in the mill but none of them were in operation. I wondered at this and ventured to inquire of Mr. G——, the mill foreman, why he didn't run the concentrators. He replied that he was short of water and could not run the machines and do good work. I suggested that if he should hang up ten stamps perhaps there would be enough water to run the other ten and four of the concentrators. He could not see it in that way for the reason that it was very desirable to run the mill to its fullest capacity in order to work economically. There were sixty-five men on the payroll (forty would have been more than a full crew) and to hang up ten stamps would throw at least thirty men out of a job and he hadn't the heart to do it. Well, the usual result followed. The mine was shut down, didn't pay, and was given up as a bad job. Now the mine is paying all right and the tailings are paying, too,—the same tailings that were being sluiced through the screens to get large capacity.

* * *

At the S—— H—— mine I sat one day on a pile of round timber and watched two men frame a post for a timber set. The stick was about 6 feet long and 20 inches in diameter. They rolled it over several times, sizing it up and making up their minds where it would saw out with greatest ease. Having finally settled this important matter, they spent some time in marking off the several cuts they were to make, and at last took a 5-foot crosscut saw and went to work. When the job was finished it had been fairly well done and had taken them just forty-five minutes. One of the two workmen approached me, mopping his brow, and said, "Hard work."

"Yes," I replied, "that was a pretty hard, and, I should think, a very particular job."

"Particular, partner!" said he, "well I should say so. Ever see how such timber looks under ground? You would think it was particular if you could see it. Why, men's lives depend on it."

"Is it possible?" I asked. "I was thinking as I sat here," I continued, "how nice and easy it would be to have a gang saw here and cut that post out and have it all finished in less than five minutes."

He gave me a withering glance and walked away.

This mine employed a large number of men, more, it seemed to me, than was necessary, by half, but the above illustration is a sample of the way in which everything was done there.

MINER.

The Patio Process in Guanajuato, Mexico.*

By ROBERTO FERNANDEZ, M. E.

Want of knowledge on the part of experts from abroad respecting the amalgamation system known as the Mexican or patio process has been the cause in this country of trouble to many foreign mining companies. This process has not been looked upon by their managers as a satisfactory method of treating silver ores, and they prefer to employ others, which, although more modern, and often more profitable in other countries, have not proved to be so under the exceptional conditions of this country, where labor is cheap and paid in silver, while fuel is very dear. The cause of this error of judgment is probably the inexact information which has been furnished by several authors respecting the economical results of the patio process.

This treatment is not suitable for silver ores of every kind. Simple sulphides of silver are best adapted to it, and, next to these, the combinations of complex sulphides, viz., pyrargyrite, polybasite, stephanite, proustite, etc.

Chlorides, bromides and iodides of silver are considered rebellious; argentiferous galena, blende, bournonite, as also argentiferous arsenical pyrites of iron and copper, are absolutely unsuited to this treatment.

Experience has proved that high-grade ores do not give as satisfactory results as those of medium grades, as, for instance, carrying from 1 to 2 kilos per metrical ton.

The patio process, as actually practiced in this district, comprises the following operations:

1. The ore is crushed in a dry state in a roller mill, reducing it to pea size, from which uniform samples, and, in consequence, correct assays, can be obtained.

2. It is then thrown in the arrastra and pulverized (with water) so fine that it will pass through an 80-mesh screen. This operation has a double object—to reduce the ore to very fine pulp, without which a thorough amalgamation is impossible, and at the same time to collect the gold on the amalgamated bottom of the arrastra.

3. The ore is treated in the patio.

4. The pulp is washed to collect the amalgam in the settler.

5. The amalgam is retorted to separate the silver from the quicksilver.

6. The silver is melted and assayed.

Not wishing to make this paper too long, I shall only enter into explanations relative to the third step of the process, namely, the treatment of the ore in the patio. The other parts would be of little interest to the Institute, since any of the methods commonly used in the United States are applicable to them.

Treatment on the Patio.—The patio is a large enclosure, paved with great care, and made as impenetrable to mercury as possible.

After the ore has been finely pulverized it is taken into the patio, where it forms what we call the torta, a mass of circular shape, 30 centimeters, more ore less, thick, and containing from 100 to 250 metrical tons of ore. The torta should contain sufficient water to dissolve the chemicals, but at the same time it must be of such consistency that it will not allow the mercury to settle on the bottom.

The chemicals used are chloride of sodium and sulphate of copper.

The amount of salt used is from 40 to 60 kilos, and that of sulphate of copper from 4 to 6 kilos, per metrical ton of ore. Mercury is used at the rate of 8 kilos for each kilo of silver in the torta.

The salt and sulphate of copper are first applied, after which the quicksilver is added, scattering it in the minutest possible atoms, with the object of distributing it over the whole surface of the torta.

The chemicals are thoroughly mixed with the torta by the treading of mules, an operation which is called repaso. Many attempts have been made to employ machinery in place of the mules, but none have met with success.

Theory of the Reaction.—The reaction at once commences. All the authors who have dealt with this matter have discussed at great length the question, What chemical reaction actually takes place in the torta? But up to the present time no exact and certain determination of this question has been reached.

The chief differences of opinion are whether the formation of chloride of silver takes place or not; whether it is the chloride or the bi-chloride of copper plays the principal part in the formation of the chloride of silver; and whether the bi-chloride of copper produced at the expense of the chloride of copper is the chief factor in the reduction of the ore.

The theory usually adopted here is the one advocated by the learned professor of chemistry in the State College of this city, Don Vicente Fernandez, who, in view of the practical results generally obtained, and the many experiments made with the greatest care by himself, admits the formation of chloride of copper and the chloruration of the silver, but in the form of sub-chloride. The sub-chloride is dissolved in the excess of chloride of sodium and then reduced to a metallic state by the mercury, and chloride of mercury is formed.

Prof. Fernandez recognizes the following reactions:

$$NaCl+CuO,\ SO_3=NaO,\ SO_3+CuCl.$$
$$CuCl+2AgS=S+CuS+Ag_2Cl.$$
$$Ag_2Cl+2Hg=Hg_2Cl+2Ag.$$

Or,

$$2NaCl+2CuO,\ SO_3=2NaO,\ SO_3+2CuCl.$$
$$2CuCl+2AgS=2S+Cu_2Cl+Ag_2Cl.$$
$$Ag_2Cl+2Hg=Hg_2Cl+2Ag.$$

Or, starting from the last equation but one,

$$Cu_2Cl+2AgS=2CuS+Ag_2Cl.$$
$$Ag_2Cl+2Hg=Hg_2Cl+2Ag.$$

This theory of sub-chloruration is in accordance with the practical results obtained. It calls for the loss of only one equivalent of mercury for one of silver, and practically the loss of mercury for 1 kilo of silver is 1.116 kilos, of which 1 kilo is the chemical and 0.116 kilo the mechanical loss.

The most important objection which has been made to this theory is that it cannot be that chloride of copper is in fact formed, since, were it present, it would attack the mercury in preference to the silver, and the loss of mercury would be much greater than it really is. Prof. Fernandez offers the following explanation in reply to this objection:

If chloride of copper, sulphide of silver and mercury are placed together, the last is attacked directly; but if a small amount of quartz powder (which principally forms the matrix of the ore of which the torta is composed) is mixed together with the three above-mentioned bodies, the mercury is then not attacked, and the amalgamation of the silver takes place. He infers that the matrix of the ore prevents the chloride of copper from attacking the mercury, and thereby allows the amalgamation.

Assays.—Three kinds of assays are used to find out how the treatment is working, namely, the tentadura, the assay of the amalgam and the assay of the residue.

A tentadura is made by taking small portions from as many different parts of the torta as possible, and washing them in a wooden bowl, varnished black inside. A rotary motion is given to the bowl, whereby the lighter particles are carried off, and the heavier ones deposited on the bottom in the order of their specific gravity. Three parts will then be distinguishable in the tentadura, which are called respectively el boton (the button), el cuerpo (the body), and la cabeza (the head).

The head contains in its extremity, or exterior part, the liz, which is the quicksilver in a state of powder, part of it being probably in the form of chloride of mercury. In the center it usually contains limadura—that is to say, amalgam of silver in a thick white brilliant powder, which has not yet been mixed either in the torta or in the tentadura with the rest of the amalgam, such mixture having been probably prevented by its peculiar molecular state.

The body is composed of iron pyrites, but it also contains limadura, principally in the parts nearest to the head.

The button is the globule of amalgam, varying in size in proportion to the amount of the pulp with which the tentadura has been made, and more or less liquid inversely, according to the amount of silver that has been amalgamated.

The amount, color and consistency of these parts indicate the state of the torta, what chemicals are still wanting, the amount of silver that has been amalgamated and, lastly, when the treatment is at an end.

The assay of the amalgam is made by weighing a little of it, taken from the torta, and, after having expelled the mercury, weighing the silver that remains.

The treatment is considered at an end when the amounts of silver and mercury contained in the amalgam are in the same ratio as the silver and mercury contained in the torta, allowing for the loss of mercury that has taken place in the treatment, which, as already stated, is 1.116 kilos for each kilo of silver treated.

This assay, however, is not always to be absolutely relied upon. If anything unusual has taken place in the treatment, it will not be exact. The assay of the residue is therefore made.

This is done by washing a little pulp and separating the amalgam. The residue or powder left behind is then assayed; and by comparing the grade of this with that of the torta, it can be exactly ascertained what amount of silver has been amalgamated. When the treatment is finished, the torta is washed, the amalgam retorted and the silver obtained smelted and assayed.

The tailings are concentrated in an apparatus called a planilla—a table upon which the operation is performed entirely by hand.

The whole treatment of the ore lasts from about three to six weeks, the time being longer in winter than in summer.

Costs.—The following is the exact cost of treating the ore in the Hacienda de Luna during a period of six months, in which 2531 metric tons of ore, carrying an average of 1.123 kilos of silver per ton, were reduced.

COST OF PATIO TREATMENT PER METRIC TON.

General expenses of management		$ 0 58
Coarse crushing	$0 69	
Fine grinding in arrastras	1 28	
		1 97
Manipulation in "patio"		0 44
Washing in settlers and retorting	$0 39	
Assays	0 28	
Planillas	0 20	
Direct taxes	0 38	
Sundries	0 85	
		2 10
Fodder for mules		3 93
Quicksilver	$2 34	
Sulphate of copper	0 77	
Salt	1 32	
		4 43
Total cost per ton		$13 45

The average loss of silver in treatment was 6.25% and of quicksilver 1.116 kilos for each kilo of silver extracted.

The consumption of chemicals was 4 kilos of sulphate of copper and 55.5 kilos of salt for each ton of ore.

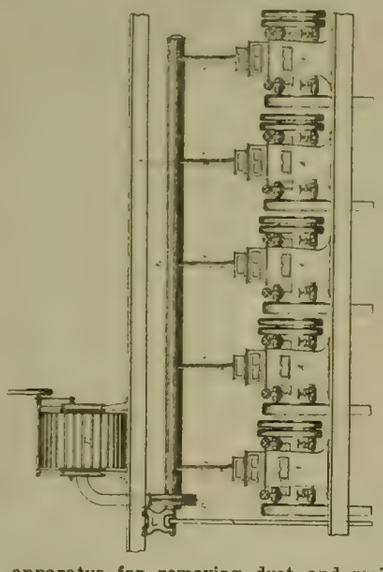
* Transactions of the American Institute of Mining Engineers.

Latest Mining and Metallurgical Patents.

Patents Issued July 4, 1899.

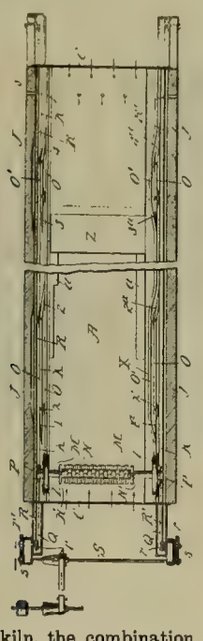
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

EXHAUST APPARATUS FOR ROLLER MILLS.—No. 627,514; A. G. Mather, Milwaukee, Wis.



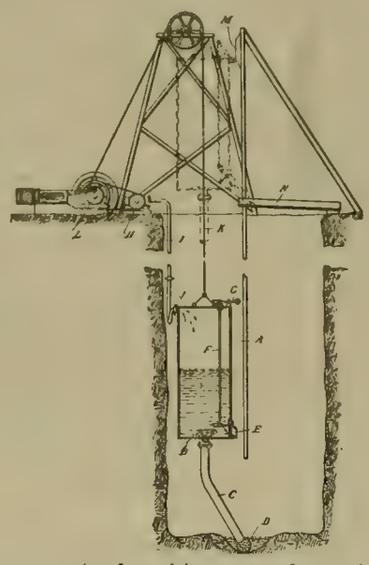
An apparatus for removing dust and moisture from mills, etc. A combination of a series of mills, the circular horizontal trunk, the suction pipe extending from the respective mills and joined tangentially to the trunk at different points in its length, and a suction apparatus connected with one end of the latter, whereby the dust-laden currents of air entering the trunk are caused to act successively to produce and maintain a spiral movement of the air longitudinally through the trunk, whereby precipitation of the solid matters therein is prevented.

ROASTING KILN.—No. 627,609; J. Zellweger, St. Louis, Mo.



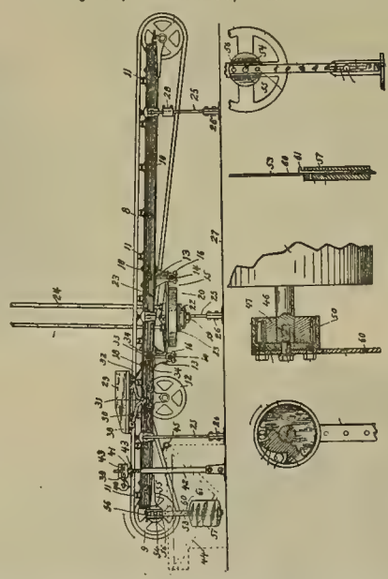
In a roasting kiln, the combination with a hearth, of tracks arranged on each side, a stirrer comprising supporting wheels which run on tracks, a shaft, and suitable stirrer blades, endless tow chains, suitable sprockets or rollers for endless tow chains, which sprockets or rollers are located beyond ends of hearth, traction lines connecting the tow chains with ends of shaft of the stirrer, and means for causing the travel of tow chains whereby, when traction lines are connected to chains above the sprockets or rollers, the stirrer travels in one direction, and when the connection of traction lines to the tow chains passes under sprockets the stirrer travels in an opposite direction; the combination with the side walls *J* and the roof *B*, of a hearth *A*, a stirrer above the hearth, curtain walls depending from the roof beyond the ends of the hearth for forming cooling chambers at each end of the kiln, and means for causing the travel of stirrer over the hearth in both directions under the curtain walls, and into the cooling chamber at each end of the kiln where the stirrer rests before commencing its return movement; a charging opening for depositing the material upon the rear end of the hearth, a raised side track adjacent to the main tracks at a point opposite the charge opening, switch tongues for causing the transfer of the wheels onto the lower main tracks in one direction to force the material toward the discharge end of the kiln, switch tongues for causing the transfer of the stirrer onto the raised side track when stirrer is traveling in an opposite direction, whereby stirrer is elevated above the accumulated material under the charge opening, and means for causing the travel of stirrer.

MEANS FOR RAISING WATER FROM MINE SHAFTS, ETC.—No. 628,219; R. E. Browne, San Francisco, Cal.



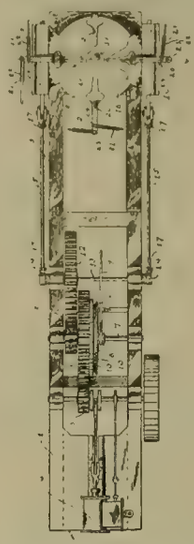
In an apparatus for raising water from mines or shafts, the combination of a frame at the head of a shaft, a tank supported upon the frame adapted to be raised and lowered in the shaft, tank having a suction pipe, and a valve-controlled discharge opening at its lower end, a vacuum generator at the shaft head, an adjustable pipe connecting the generator with the tank, hoisting mechanism for raising and lowering the tank, and means for automatically opening the discharge opening of the tank when the same reaches the discharge point in its upward movement.

ORE CONCENTRATOR.—No. 628,105; A. G. Mather and F. T. Snyder, Milwaukee, Wis.



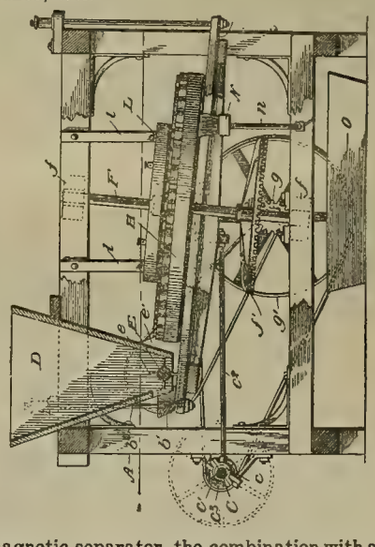
The combination of a frame, flexible supports connected at their upper ends to the frame and at their lower ends to the flooring, and capable of yielding in all directions parallel to the frame, a concentrator vessel or surface mounted in the frame, mechanism for shaking the frame and concentrator vessel, shaking mechanism consisting of a gyrator mounted so as to move about an axis not passing through its center of gravity, a driving-belt pulley mounted on the axis of the gyrator, guide pulleys mounted on one side of the same frame which carries the gyrator, whereby the distance between the centers of the pulleys does not change, and an endless belt passing around the driving pulley, thence engaging the guide pulleys and extending to any suitable source of power. A frame, having opposite side pieces, rods connecting side pieces, a spider adjustably mounted on the rods, a pin fixed in spider, a shaking mechanism consisting of a gyrator mounted on the pin, so that the axis of the pin does not pass through the center of gravity of the gyrator, and an ore-concentrating vessel or surface mounted on the frame. Drums mounted in the opposite ends of the frame, an endless belt passing around the drums, means for imparting a gyratory movement to the frame, a strap adapted to follow the longitudinal movement of the frame and to bend laterally with the sidewise movement of frame, an adjustable retarding and resisting device at the lower end of the strap and clutch mechanism between the upper end of the strap and the journal of the drum, whereby on the thrust of the frame in one direction the clutch mechanism is set so as to clutch the upper end of the strap to the journal of the drum and thereby cause a rotation of drum in one direction, and on the reverse thrust of the frame to cause a disengagement of the clutch mechanism, whereby a reverse rotation of the drum is prevented.

POWER MECHANISM FOR PUMPING OIL WELLS — No. 627,604; C. E. Sutton, Toledo, Ohio.



Means for pumping oil wells comprising a base having an annular upwardly projecting bearing near one end and in its transverse center anti-friction rollers journaled in bearings secured to base, a pitman wheel journaled upon upwardly projecting bearing and resting upon the anti-friction rollers at a point near its periphery, housings carried by base upon each side thereof, rack bars arranged in the housings, means for reciprocating rack bars, toothed segments carried by pitman wheel with which the rack bars mesh, arms secured to and projecting radially from pitman wheel, and pitmen connecting outer end of arms and the pumping mechanism of oil wells.

MAGNETIC SEPARATOR.—No. 628,078; A. Dings, Milwaukee, Wis.



A magnetic separator, the combination with a conveyor of a revoluble horizontally disposed disk lying parallel with conveyor, and a having a portion overhanging the conveyor and a portion extending laterally thereof, a series of magnets carried by disk, circuit controllers for magnets carried by disk and provided each with a stationary and a movable part adapted to make contact with each other, and a stationary device for engaging movable parts of the circuit controllers, for separating the movable and stationary contacts and cutting magnets out of circuit while they are out of line with the conveyor.

What It Represents.

The MINING AND SCIENTIFIC PRESS represents the honest element in the mining world.—Phœnix, Arizona, Republican.

Cyaniding in Australia.

One of the chief difficulties met with in cyaniding dry ore is caused by the fine dust in the ore collecting in layers of slime when the cyanide liquor enters the vat. These slimes are often rich in gold, but they effectually prevent free percolation. A method introduced by Mr. Grayson at the Associated mine in Western Australia is to prevent movement by wetting the ore very gradually, by upward soakage or capillary attraction. The solution enters the vat from a very small pipe, and it requires sixteen hours to saturate the ore. The sorting of the slimes by settling currents seems to be practically avoided by this method. Another method much favored is to altogether remove the slimes from the ore and treat each product separately; the sands in the vat and the slimes by filter presses.

It was natural to expect that the dust in roasted ore would present the same slime troubles as that from the oxidized class. The damping of the ore before charging into the vats was found effectual in preventing slime movement, but the lime ingredients in the ore caused a packing of the vat contents to a degree which caused serious embarrassment and loss.

Lime in the ore is, during the roasting process, in part converted into quicklime, and in part to an overdone plaster of paris. In 100 tons of ore there is, on the average, 4½ tons of the plaster material, and about 8 tons of quicklime. In other words, about 12 tons of cementing mortar in each 100-ton vat exists in a finely divided condition, and well mixed with the ore. After standing in water for a fortnight it was not only a matter of observation that the vatted ore became set and required to be dug out, but that often the percolation was altogether obstructed. Particles of gold also became shielded from the cyanide attack. One method proposed to get over this difficulty was to keep the ore permanently agitated either by means of compressed air or some other kind of stirrer. It would seem, however, that in damping the ore before trucking it to the vat the quicklime and the plaster in it is quenched, and in a great measure deprived of their injurious cementing powers. Possibly if the quenching water was highly charged with air before using, some carbonic acid might be conveyed to the quicklime particles and convert a portion back into carbonate of lime (which is their state in permanent cement) before the vats are charged with cyanide solution. Another proposal was to increase the strength of the cyanide solution in order that the time of contact might be shortened. This, however, is impracticable unless the gold is extremely fine, because the cyanide action is a very slow one. The rate of percolation during fifteen days at Main Reef is, according to the records, equal to 2½ inches per hour.

The amount of percentage of the gold extracted from the ore varies with the time allowed for the cyanide to remain in contact with it. Gold leaf 1–240,000th of an inch in thickness will dissolve in twenty minutes, but a speck as large as a pin's head will require three weeks. A speck four times more bulky will require sixteen times longer. We see at once that unless a company is prepared to have a few acres of vats standing full of ore until their gold contents are exhausted, they will have to be content with the highest percentage extraction possible within a reasonable time. The extraction obtained at the Main Reef approaches 90% with ten to twelve days' treatment.

It is well known that the gold solution obtained from the vats is run through trays filled with zinc shavings, and that in dissolving the zinc the liquid parts with the gold. This reaction must take place at a certain rate, for if it is too slow the gold falls out in such infinitely small quantity that the shavings become plated with shining metal, perhaps intermixed with some lime deposits, but if the rate is sufficiently accelerated it falls down as a black sludge. When the plating takes place it is conceivable that the zinc may be so completely concealed that contact between it and the solution is cut off, and no more gold is thrown down. This often happens with very dilute solutions, in which the gold occurs in very small quantity owing to the poorness of the ore. By using stronger solutions of cyanide, however, the action of the zinc is more active, and plating prevented owing to the rapid eating away of that metal.

In reference to the ball mill as a machine for powdering the ore to a size necessary, if they do all that is claimed for them they have come to stay. If revolved slowly the balls and the ore grind together, the action being a rubbing one. If driven faster the balls and ore will tend to travel round the circuit, and if the speed is correctly regulated to just short of this velocity the whole lot will, before reaching the top, fall clear of the axle, free, with smashing violence to the bottom of the drum.

The action is really that of dry stamping, but the stamp is a simple one, without shank to break or guide to be lubricated. With a 5-foot mill this action is obtained when turning at not less than twenty-three revolutions per minute. In the smashing down of the stone by the balls, and previously by the stone crackers, the stone is broken to a powder so dry that it is difficult to retain it in the works. The large quantities of dust that are seen to emanate at times from some mills would seem to suggest that the practice of drying the ore before crushing may be carried to too great a refinement. The Main Reef plant includes a revolving dryer, but it is unlikely that it will be replaced when it is worn out. It will be a substantial saving in steam power and fuel if it is found practicable to dispense with the dryer.

What grade of rich ore will be found most profitable to cyanide and which grade to smelt is not yet decided. The eating up of the zinc by the cyanide gold solution causes a large quantity of hydrogen gas to escape in bubbles through the liquid. These gas bubbles explode with great violence when touched by a lighted match, and the surface of the whole box becomes covered with a sheet of fire for a moment. Should, therefore, the escape of the gas be hindered by deficient ventilation, or through treating extremely rich ore be produced in such quantity that seven-eighths of the atmosphere in the filter house be formed of it, the introduction of a lighted lamp or ignited match would produce a terrific explosion.

In brief summary it may be said that the experience of working to date shows that the present furnace, which was first fired in February, took six weeks to get heated throughout. Its estimated capacity of 1000 tons monthly on ore containing 8% of pyrites is exceeded by one-half. The richest grade of ore which it will be advisable to cyanide will not exceed 1½ ounces. The extraction will equal 90% of the gold contents. The cost of mining, milling, roasting and cyaniding a 1230-ton parcel just finished is under 38s per ton. At this figure sulphide lodes from half an ounce grade upwards can be profitably treated.—Kalgoorlie Miner.

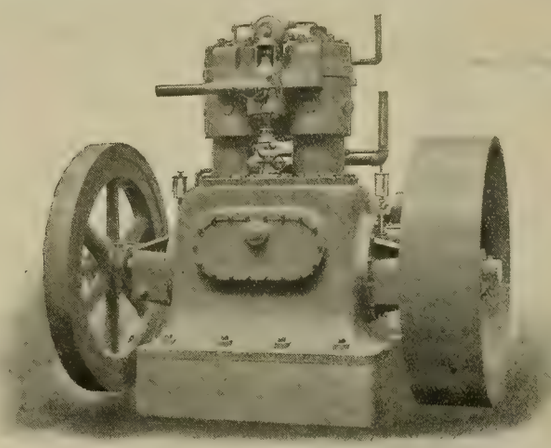
The Commercial Development of the Gas Engine.

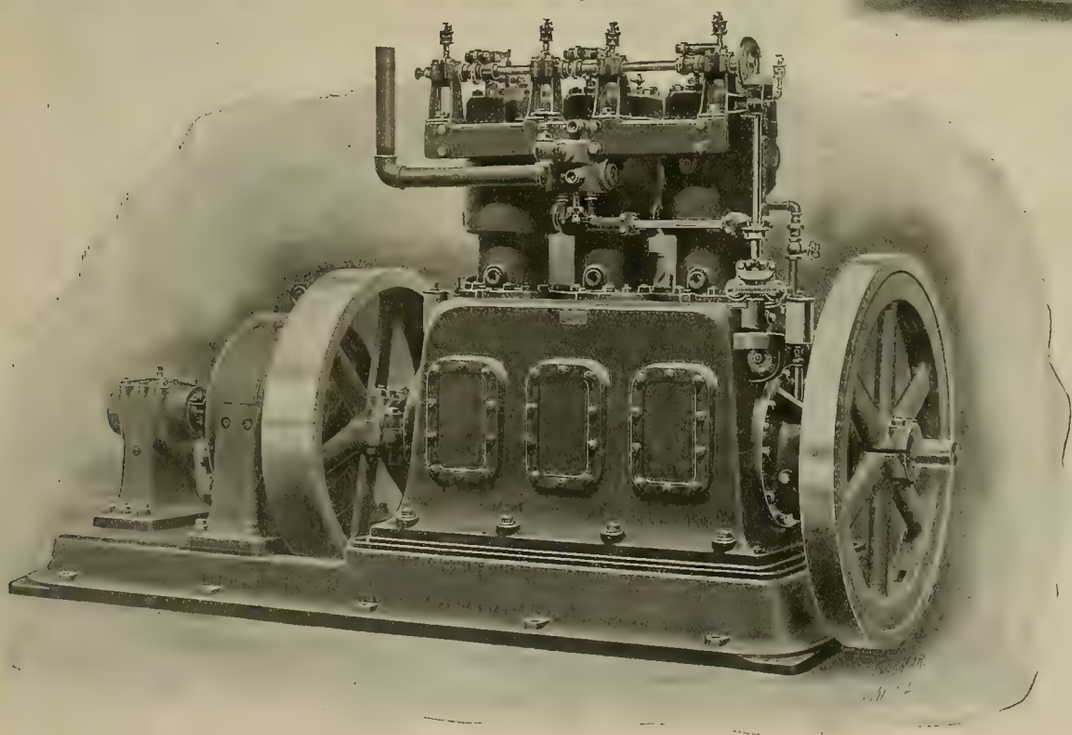
More than two centuries ago attempts were made to build internal combustion engines. A hundred years later further advances were made, but it has remained for the closing years of the nineteenth century to see a thoroughly reliable and efficient gas motor designed. The name of Westinghouse has been connected with many improved mechanical devices, but probably none of them has required so much patient thought and exercise of ingenuity in overcoming difficulties as the Westinghouse gas engine recently placed upon the market.

The name Westinghouse is a guarantee, for it is never used in connection with any mechanical device until the machine has been thoroughly tested by years of actual practice. This is exemplified in regard to gas engines of larger sizes. For nearly two years a Westinghouse gas engine of 250 H. P. has been steadily working at East Pittsburg direct connected to an electric generator, and another of 650 H. P. has been continuously at work for nearly a year direct connected to a 400 kilowatt generator. These machines have been tested in every way and are now confidently offered to the users of power.

The result of these practical tests is so entirely satisfactory that Westinghouse gas engines can be sold upon their proven merits as fitted for all power purposes. Two 2-cylinder, 8x10, 25 H. P. Westinghouse gas engines have been sold to the Niagara Lithographic Co., Buffalo, N. Y., for belt connection, to be run at a speed of 300 revolutions per minute. For the lithographic process, it is of the greatest importance to maintain a constant speed in the generating engine. After thorough investigation it was decided that the Westinghouse gas engine could insure good work, as it was imperative not only to have the speed per minute constant but also the variation of angular speed during each stroke a minimum.

The Bradford Electric Light Co., Bradford, Pa., purchased four Westinghouse gas engines for belt connection to electric generators. Three of the engines are 13x14, 3-cylinder, 125 H. P., with a speed of 260 revolutions per minute. The fourth engine is 200 H. P., with a speed of 225 revolutions per minute. These engines will be operated with natural gas, the regulation guaranteed within 2% on a consumption of 13 cubic feet of natural gas per hour. The boilers of the existing steam plant were heated with natural gas, consuming 52 cubic feet per hour; the new Westinghouse plant will not exceed 13 cubic feet per hour. The first test run showed a consumption of only 9000 cubic feet of gas in 8¾ hours when driving 102 full arc lights. This installation will also include a small engine for driving an air compressor, for charging air reservoirs for starting engines, also a power pump to supply jackets with water. The speed of the small engine is varied by a special device, according to the load on the main engines, so that water may be supplied to jackets as demanded and so reduce waste of water and wear on small engine and pump.





The Suffolk Gas & Electric Light Co., Bay Shore, L. I., has two Westinghouse gas engines running on illuminating gas—one of 50 H. P., 3-cylinder, and the other 85 H. P. Both are belted to single phase, 2200-volt alternators.

The largest plant contracted for is that of the Columbus Electric Light Co., Columbus, Ohio. When completed next fall it will be the most extensive station relying exclusively on gas engines for its source of power. It will be equipped with two Westinghouse gas engines, each with three cylinders, belt connected to Westinghouse generators, to supply commercial lighting. Natural gas will be used. One engine will carry a normal load of 650 brake H. P. Its speed will be 150 revolutions per minute, driving a 375-kilowatt alternator at 400 revolutions per minute. The alternator will be two phase, 2200 volts and 7200 alternations. The other engine will develop 280 H. P. with a speed of 200 revolutions per minute, driving a 180-kilowatt alternator at 514 revolutions per minute. There will also be installed one 11¼-kilowatt and one 7½-kilowatt exciter.

The smaller of the two accompanying cuts represents a two-cylinder Westinghouse gas engine fitted with a pulley for belting to a dynamo; the larger one illustrates a three-cylinder Westinghonse gas engine direct connected to the dynamo, and is of the type referred to—the 280 H. P. gas engine.

Mining Summary.

ALASKA.

The Standard Oil Co., having acquired the Russian title, and a later mineral land grant from the United States Government, to the coal lands at Cook inlet, Alaska, is preparing to develop them. Alfred Ray, manager for the company at Portland, has outfitted a corps of engineers, which has sailed for the north. They will complete surveys partially made and make other surveys for wharves, railroads from the mines to the shore, etc. The Cook inlet coal mines were worked by the Russians years ago, and later by a San Francisco, Cal., company.

Victoria *Times*: Miners who, under E. S. Ingraham of Seattle, were sent north by Prince Luigi, nephew of the King of Italy, report having found gold near Port Clarence. A letter from C. E. Chard says the find has been made on an unmapped creek near Port Clarence, one of the United States Government reindeer stations. Fourteen claims have been staked. In five hours Chard and two others took out $20 from the discovery claim with a rocker.

Juneau *Record*: Mr. Sloan, of Wrangel reports that on Helm bay prospectors Dyer and Smith, after tunelling 40 feet from the place where last year they took out a pocket of $12,000, found the main vein; 40,000 feet of lumber has been shipped there and Mr. Dyer is pushing development work.——Near Sumdum Mr. Sharp has uncovered a 15-foot vein of ore.

ARIZONA.

(Special Correspondence). — The Azurite copper mine, eighteen miles south of Tucson, is steadily producing metallic copper and matte.

The Barnes No. 1 is looking well. In the east drift, 150 feet from the surface, the vein is 10 feet wide and consists of carbonate and black oxide of copper. Some native copper is also found. A number of claims in the district are showing improvement with development.

Tucson, July 5th, '99.

Prescott *Journal-Miner*: Work is to be started again on the Zonia Copper Co.'s property near Kirkland. ——J. H. Hise has brought another bar of bullion up from the Monte Cristo mine.——W. T. Little has shut down the Red Rock mine on account of bad air. A body of ore above average value was recently struck. He is now drifting to connect with a tunnel to obtain air.—— Mr. Gibson, engineer of the Arizona Eastern & Montana Co., which recently took a lease on the Commercial Co.'s smelter on Big Bug, says he will put the plant in repair, and within the next week or two will be ready to buy and pay cash for ore.

Prescott *Courier*: C. Born of Prescott owns a group of claims adjoining the Groom property, twenty miles east of Wickenburg, and has bonded the same to the Phœnix Development Co.

Kingman *Miner*: Dr. Hamilton of Los Angeles has bonded the Keystone mine, at Mineral Park, from J. Uncapher, and will soon have men at work.

CALIFORNIA.

Amador.

Prominent New York capitalists, including the president of the New York Central Railroad, have been looking over the mining field of Amador, and, it is reported, are satisfied that there is enough business to justify the extension of the Galt-Ione branch from Carbondale to Jackson and Sutter Creek.

The new vertical shaft of the Kennedy M. Co. near Jackson is calculated to reach the vein at a depth of 3500 feet vertically below the collar of the south shaft, or more than 1000 feet lower than the present lowest level in the mine. A crosscut has been started eastward at the 1900 level to intersect the line of the shaft. When a point beneath the shaft has been reached a raise will be commenced to hasten connection at that level. The sinking of this deep shaft through the hanging wall country of the lode will give some valuable information concerning the possibilities of that portion of the country penetrated by the shaft, and which up to this time has never been explored excepting in a most superficial manner.

Jackson *Dispatch*: J. Graham of Forest Home reports mining operations will be inaugurated in his district shortly.——At the Centennial mine, near Drytown, Supt. Gross reports that they are working. New machinery has been added to the plant. The shaft is being repaired and straightened preparatory to sinking. The Centennial rock prospects well, showing galena and arsenical sulphurets, also containing gold.

Calaveras.

The Fort Wayne Gold Producing Co. of Indiana. whose works in San Andreas were attached by striking workmen on July 1st, has made an offer through Attorney Solinsky, which has been accepted by the miners. The back pay will be paid within July, the miners to release the attachment and pay costs.

An important strike has been made in the Gwin mine in the main shaft at a depth of 1580 feet. The shaft is vertical and is started in the hanging wall, reaching and crossing the main vein between the 1200 and 1300 levels. The vein and formation dip easterly at angles varying between 70° and 80°. The shaft, having been continued to a point 1580 feet from the surface, unexpectedly encountered a vein, the width of which has not yet been determined. On the hanging wall side it has a dip of 77°, and from a calculation based on the known angle of dip of the main fissure this new vein is 178 feet west of the main vein. On the 700 level a crosscut was run several hundred feet west from the shaft and a small vein encountered, which it is thought may be the one found 900 feet lower. Three drill holes have been made in the new vein and the drillings assayed, giving $9.21, $21.29 and $17.57, respectively. A single piece of ore selected at random assayed $127.13. There is also known to be a vein some distance east of the main fissure, but it, like the new find, is undeveloped. The discovery of rich ore at the depth of 1600 feet in a vein the existence of which was scarcely suspected is considered of unusual importance to the mines of this section as indicating the possibilities of deep mining on the gold belt. The past few months some experiments have been made in milling the ores of the Gwin mine, one battery of five stamps being fitted up for experimental purposes. As a result the capacity per stamp has been increased from 3¼ tons in twenty-four hours to 4.6, and it is thought it can be increased to 5 tons, without material loss in the tailings. The increase in capacity was secured by lining the mortars, which are broad, with iron plates, which may be replaced when worn. As the insersion of these plates converts the mortar to a narrow trough, the discharge is materially increased without changing the height of discharge or increasing the speed of the stamps. This change could not be made to advantage everywhere, as a less free milling ore similarly treated would probably lose. This increase in capacity resulted in overloading the 4-foot concentrators and specially designed 6-foot belt machines have been substituted for the 4-foot machines formerly in use. Two machines are set to each battery, and no sizing boxes are employed. The tailings are worth from 25 to 30 cents on an ore which mills $5 to $10 per ton. A canvas plant was operated for a year on Gwin tailings and produced a small percentage of concentrates worth $30 per ton. The enterprise did not pay and was abandoned.

Mokelumne Hill *Chronicle*: Work at the O'Neill mine on Prussian hill is progressing. Five stamps are running steadily on ore taken out while drifting. Seven men are employed. ——Sinking is to be commenced in the Thorpe mine at Fourth Crossing. This has necessitated a lay-off for about two-thirds of the men employed.

Del Norte.

Crescent City *Record*: Reports from the smelting works to the workers of the Union, from a shipment of ore that was made, return 18% copper, which will pay a margin after deducting expenses of mining, smelting, freight, etc. The work of mining in the Union will be continued.

El Dorado.

The El Dorado County Miners' Association meets at Placerville July 15.

Fifty men have been laid off at the Boulder mine on Webber creek, caused by inability to obtain water to operate the 30-stamp mill at the mine. The water supply on the Gold Hill branch of the El Dorado canal will be needed for the next three months by the farmers and horticulturists in that vicinity. The mine is the property of Welman Bros.

A 10-stamp mill is being erected at the Cambrian mine, Gold Hill district. This property was purchased one year ago by Colorado capitalists, who have developed it.

Placerville *Nugget*: Work is progressing on the new 10-stamp mill at the Cambrian mine, near Lotus. Development work is also in progress.——G. W. Harvey & Co., who recently purchased the P. Philip's gravel mine, near Volcanoville, are driving a tunnel to tap the channel.——Shultz & Root are sinking a shaft on the Gentle Zephyr mine, near Volcanoville. They have a 3-foot ledge. The ore carries galena that assays in gold.——The Old Jones Hill gravel mine, near Georgetown, has been leased by Barklage & Co. for five years. The mine was formerly a large producer, but has been idle for years.——The Van mine, near Georgetown, was recently visited by W. English of Oakland, who with Ex.-U. S. Marshal Baldwin and T. J. Clunie of San Francisco, are the principal owners of the property, contemplate resuming work on the property.——Work has been suspended for the summer at the Oro Fino mine, at Big canyon, below El Dorado, there being no water available for power for the next three months. Forty men will be laid off. The mine is owned by Hayward & Lane and has for a long time been a steady producer.

Humboldt.

Yreka *News*: A San Francisco company, of which Mr. Young is Supt., has bought the mines near Orleans. Several years ago a company patented this land and had it in readiness to begin work when the heavy snowfall of 1890 destroyed the flumes for a distance of twelve miles. The new company built a sawmill and are sawing lumber with which to rebuild the flumes. They have been in course of construction for some time, and giants will soon be piping. There are several hundreds of acres in this placer claim.

Kern.

The Butte mine, at Randsburg, is credited with producing $3300 during June. The mine is to be systematically developed.

Most of the custom mills of the district are kept busy.

Madera.

H. Lindsay of Fresno has sold the Standard mine at Fine Gold to an Eastern firm, and states that he expects to sell two more mines within thirty days.

Mariposa.

The Merced G. M. Co., at their recent meeting, held in Butte, Mont., voted to increase the capital stock of the company from 100,000 to 150,000 shares at a par value of $15 per share.

Nevada.

The San Francisco & Grass Valley M. & D. Co. has been organized for the purpose of working mines in Grass Valley. The first property to be developed will be the Electric or Green Mountain mine, and J. C. Roberts has been appointed Supt. The mine will be unwatered and development commenced. The following is the board of directors: G. W. Root, A. W. Johnson and W. I. Michell of San Francisco; I. Haas and J. C. Roberts of Grass Valley.

The New York Consolidated quartz mine, now being worked by tributers, is to be operated on a more extensive scale. It is owned by Dr. S. M. Harris, J. Burke and the Weissbeins of Grass Valley.

The Champion M. Co. of Nevada City district has recovered the ledge in the Spanish mine.

Grass Valley *Union*: J. G. Cohoe is making good progress at the Gray Eagle mine. Compressors are being operated in the tunnel and ten men are employed.

Placer.

A compressed air plant is being installed at the Red Point mine, near Damascus, on the Forest Hill divide.

Auburn *Republican-Argus*: Development work is being done at the Gold Blossom. They are working toward another pay chute.——A compressor and two compressed air drills have arrived at the Alder Creek mine, Blue Canyon. There are twenty-eight men at work there. Wages are from $3.10 to $3.50 a day. They are taking out ore that yields $25 to $50 a ton.

Colfax *Sentinel*: Air compressors are to be put in at the Alder Creek mine near Blue Canyon, and a mill is to be built. Twenty-eight men are employed. L. Balliet is Supt.

Auburn *Herald*: F. Brye has ore from the Bellevue at the 100-foot level which is very rich.——The old Mayflower claim has been leased to J. De Bon and others. Supt. Geo. McAulay reports that if the Mayflower Co. can buy the Dutch Washington they will get an outlet to a portion of the Mayflower ground that has never been worked.——E. Kavanaugh has picked up a $30 nugget in his claim, the Channel Bend on the Middle Fork.——It is reported that the lessees of the Breece & Wheeler mine are getting pay dirt.

Riverside.

(Special Correspondence).—The Iron Chief mine, thirty-five miles northeast of Walters station, is being worked steadily, water being pumped over a divide from Cottonwood springs, a distance of eighteen miles. The ore is treated by the cyanide process.

San Bernardino, July 8th, '99.

San Diego.

It is reported that a strike has been made in the High Peak mine at Julian. The ores of the district are generally high grade.

Shasta.

(Special Correspondence).—H. P. Posey of New York, owner of the mines at Bingham, Utah, and H. Holmes of Salt Lake City, Utah, have secured a bond on the Mammoth group of mines near Kennett, through J. F. Coleman, from the owners, Saeltzer & Kahney, and have commenced extensive development work.

Kennett, July 10th, '99.

The Black Diamond group of copper mines on Stillwater creek, twelve miles from Redding, has been sold by J. H. Kahny, E. Holden and T. Klaukins for $80,000. The purchaser is the North California Investment Co., the new company recently incorporated. The company will develop the property.

W. R. Russell of the Bon Ton mine in Muletown district it is reported will put in a roasting furnace at his mine. It will have a daily capacity of thirty tons.

Mrs. R. L. Gipson of Keswick has found what may prove to be a mine four miles west of Keswick. The vein is gold-bearing rock the thickness of one's hand. She broke off a piece as large as a walnut which contained $17.45.

It is reported that Captain De Lamar is negotiating for the Bully Hill copper mines, owned by James Sallee, the $250,000 bond held by L. A. Scowden, of New York, having expired July 1st. It is said Sallee has raised the price of the property to $350,000. A German syndicate is said to be negotiating for the property.

The self-shooter at the Pat Holland mine, on the east fork of Coffee creek, is completed and operating. It is located on the upper part of the stream at a place adapted for the purpose, and there an artificial reservoir was constructed by damming the creek. Then a self-opening floodgate 12x14 feet was built on the lower outlet. By this means a great body of water accumulates and discharges itself at regular intervals. Miners with powder and sledges break up the large boulders of the stream, and several hundred feet of bedrock is uncovered in this manner annually.

Shasta *Courier*: Pugh & Menzel's mill, on Clear creek, has started up, and is expected to run steadily this summer. A great deal of development has been done.——Lydiard & Dickey of the Santa Clara M. Co., on Clear creek, have put in a pump to drain a shaft they are sinking near the water's edge. They have taken out and sacked ore for shipment. ——Work on the West Point placer claim on Clear creek has been stopped for the season by C. L. Paige, manager for the Sunset G. M. Co., owing to scant water supply.

Siskiyou.

The Schroeder mine, discovered thirteen years ago, has been sold to a Canadian investor for $100,000.

T. McCauley has made a discovery on the west fork of Deadwood. Open cuts at intervals of 400 feet show a vein 4 feet wide in places.

Yreka *Journal*: The Cherry Hill mine at Cherry Creek is to have a new manager.——J. W. Martin, acting agent in starting development work at the Mabel quartz mine, between Oak bar and Scott bar, has arranged for a road to the mine, located a mill site and making preparations for putting up a mill.—— The Cape quartz mill on Greenhorn, under the supervision of Mr. Adams, was closed down before the 4th, after a run which gave satisfaction. It will be started up after having another stamp and a concentrator added. The quartz is improving.——The Spengler brothers are working with a good force at their placer mine near mouth of Humbug creek, sluicing bedrock gravel uncovered during the winter and spring by ground sluicing. The water supply is getting light.

Scott Valley *Advance*: The Gold Ball mine closed Saturday for three weeks. The mill will continue running.——Phillips Bros.' mine near Seiad has been bonded to G. Dailey of Yreka.——L. Erickson has twelve tons of ore at the Jumbo mill from his claim in White's gulch.——Green & Jones are putting in a discharge arrastra at their claim on Cedar gulch, three miles from Callahans.——A new ditch is being dug at the Bouviere mine on Slide creek to work the ground on the east side of the creek.——Johnson Bros., on Horse creek near Seiad, have built an arrastra and are crushing quartz which assayed $40 a ton.—— The Salmon River Co. have cleaned up after a two week's run, which is reported to have produced $4000.——The Summerville M. Co. are replacing the 150-foot span of flume which recently broke down.——T. Luddy and H. Finley will have a mill test of five tons of ore from their White's gulch claim, at the Jumbo mill.——A cinnabar ledge has been discovered by F. Fradenburg of Klamathon on Jenny creek, a branch of the Klamath river near the Oregon line.——The company represented by F. D. Fraser, developing the Nehrbass and Rostell properties on Greenhorn, near Yreka, has erected a hoisting plant.——Peters Bros. are extracting some high-grade ore from their claim in White's gulch. They are extending the lower tunnel. The vein is 3 inches wide. ——F. Myer and O. Peterson discovered a quartz prospect three weeks since on Tanner Peak near Sawyers, which shows a width of 30 inches at the surface and assayed $30 a ton. ——A ledge which mills $20 a ton has been discovered on the west fork of Deadwood creek by T. McCauley. Open crosscuts have been made, showing a width of 3 feet.——The clean-up for the month's run of two arrastras at the Lanky Bob mine in White's gulch gave $2000 in gold from thirty-eight tons of rock. In the mine the upper and lower tunnels are being extended on the ledge. The upper tunnel is in 300 feet, and the lower, from which the best ore is being taken, is in 200 feet.—— A crushing of nine and three-fourths tons of ore from Johnson & Finley's claim in White's gulch, recently completed at the Jumbo mill, returned $800 in gold. Work was commenced six months ago by Johnson & Russell.

Yreka *News*: The Salmon River M. Co. is cleaning bedrock. Several specimens have been lately picked up—one weighing $28.25. ——The Commodore mine has made the last payment to Humphreys & Quigley. During the seven months' run 60% of the output has paid the purchase price of $26,000.——The Aromas mine, of which Mr. Chalmers is Supt., has a new elevator working satisfactorily. The company has had to rebuild many miles of ditch.——The Golden West mine, near the Black Bear, owned by Hickey Bros. of Sawyers Bar, is paying. The ledge has an average width of 2 feet, between porphyry and serpentine. Thirty tons of the ore crushed avaraged $535.——A. Erno of Quartz Valley has sold his placer ground to Page & Co. An 85 H. P. boiler has arrived for the new company.

Trinity.

A great deal of development work is being done this season in the New River district.

Platinum and iridium are reported being saved in considerable amounts with the gold in placer mines along the Trinity river. The company is the Adele M. Co., and the property the old Chamberlain gravel mine, near Paulson's ranch, where two giants have been operating during the season. Prof. G. E. Bailey is Mgr. of the property.

The Altoona mine has recently shipped 140 flasks of quicksilver.

Tulare.

Porterville *Enterprise*: The Minnie Ellen was closed down last week temporarily by J. MacDonald, pending arrangements with F. Cook and partners for an extension of time. The time is up on the 22nd of this month, at which date the whole of the purchase money is due, or in default of payment the mines revert to the owners. F. Cook offered an extension of time if MacDonald would augment the price. This, it is understood, MacDonald has refused to do.

Tuolumne.

Between Groveland and Crocker's, on the Yosemite road and on the county line dividing Tuolumne and Mariposa counties, the Golden Crown M. Co. of San Jose, Cal., is developing a group of claims, the principal location being the Big Betsy. The main shaft is down 400 feet, and was sunk on the vein the upper 300 feet at an angle of 51°. At this point the vein assumed a steeper angle, but the shaft was continued at the same pitch as above. At 380 feet a small vein was encountered which at the 400 level is reported to be 10 feet wide, consisting of banded quartz (ribbon rock), carrying good values in gold. The foot wall vein contains considerable sulphide mineral. The mill plant consists of rolls for pulverizing the sulphide-bearing ore, which will be roasted in a furnace now completed, and further treated by the cyanide process. This is the first plant of the kind built in California. A 10-stamp mill has been built for treating the free-milling ore.

Yolo.

W. T. Parks, H. A. Mefford and J. C. Ball have filed with the County Recorder their claim to a mine location in Capay valley. It is reported that a lode has been discovered bearing quicksilver, gold and other valuable mineral deposits.

COLORADO.

J. B. Grant, former Governor of Colorado and chairman of the operating committee of the American Smelting & Refining Co., testified before the Industrial Commission at its session on the afternoon of the 12th inst.

B. C. Bell acted as chairman of the meeting and Mr. Ratchford conducted the examination of the witness. Grant's testimony was regarding metalliferous mining and smelting. He reported the mining industry in Colorado as in a satisfactory condition, and said that, owing to most ore containing a combination of two or more metals, the output would be very little more with silver at 90 cents an ounce than at 60 cents. Grant said he favored combinations of capital and regarded concentration as the necessary results of competition. The labor union, he said, sprang from the same cause as the trust. He gave his reasons for refusing to recognize the union in the present smelter strike, but said he did not oppose union labor as a principle.

The Ellers' smelter at Pueblo, one of the trust plants which resumed operations a few days ago, was again shut down on the 8th inst. Members of the Smeltermen's Union induced the workmen to come out. The company claimed to have 350 men working, and all but 50 refused to work. The company at once ordered the fires drawn.

BOULDER COUNTY.

Mgr. Walter of the B. & M. mine has placed more men on the payroll of the company—thirty in all. Two levels are being run—west 200 and 400—and other development work done.

Ward *Miner*: At the Morning Star mine at Ward three shifts are driving the crosscut toward the ground where the prospect drills recently revealed a body of ore.

Eldora *Miner*: While stoping on the 200-foot level of the Enterprise mine last week some $18,000 ore was encountered. Thirty men were recently put to work.——The Ward pyritic smelter has been improved in various ways since it was closed down last fall. It is capable of handling 100 tons per day and will be blown in July 17.

CLEAR CREEK COUNTY.

The 2½ level of the Old Pelican mine of Georgetown, after running a long distance in barren ground, has come into a large streak of rich ore. The drift is 5500 feet long—the longest in the State.

Silver Plume *Standard*: Lampshire & Co. have had a run from their lease on the Illinois lode of the Pelican property, which gave 320 ounces of silver per ton. J. O'Connell & Co. also had a run of five tons from their lease on the same level which returned 226 ounces of silver per ton.——Robeson & Wolfe are having work done on the Stevens mine preparatory to commencing development. They will drive three levels east and west to open up new ore bodies and also crosscut for other lodes.

Idaho Springs *Gazette*: The Texas group, consisting of two claims, is being developed into a mine, the new machinery is in place and a contract let to sink another 100 feet. The paystreak is 10 inches wide.——A 5-foot vein has been opened in the St. Louis lode. The Surprise is producing ten to fifteen tons of smelting ore per day.——Dr. Ashbaugh of Central City has his 10-stamp mill crushing ore from the Lombard mine.——A whim has been erected by M. Ireland on the Free Trade group and a contract let for sinking another 100 feet.——The Atlantic City is showing up well. In sinking a new shaft a vein of 3 feet is disclosed. At 100 feet drifts east and west will be run.——Steele & Schieck, on the Big Clara, claim to have opened the same vein from which the Hawk Bros. are shipping $175 ore.

DOLORES COUNTY.

Rico *News*: Shipments from the Enterprise are increasing. Sixty tons were sent to Durango during the past week; 125 miners are given regular employment, and the property is looking better than for months past.——Campbell and Matthews have made a twenty-ton shipment of ore from their Alleghany lease.——R. Johnstone made a carload shipment of lead ore from his Pay Roll property last week.——J. Haughton & Sons are working the Robert E. Lee and Nebraska on Newman hill, at Rico.——The Black Hawk made a shipment of two carloads of ore during the past week.——The Emma gold mine is now making regular shipments. This week thirty tons of high-grade concentrates were shipped. The mill is working and the supply of water is ample.——J. Spurlock has commenced work on a new tunnel on the Grand View properties.——The Colorado M. & C. Co. expects to have its mill completed by August 1st.

GILPIN COUNTY.

Central City *Register-Call*: During June there were shipped from Black Hawk 280 cars of ore, aggregating 5110 tons.——J. B. Hill of Black Hawk has given a quit claim deed to W. E. Rammel of Denver for a one-half interest in the Monarch lode claim, in Mountain House district.——Doud & Fowler have taken a lease and bond on the Gibson and Hard to Beat lodes, 500 feet on the westerly end of the Star of the West lode, and also the east 100 feet of the Star of the West lode, in the sum of $11,000, and will put up a shafthouse and machinery on the Gibson lode and sink it 100 feet, besides other development work.——W. H. Davis, trustee of Arapahoe county, has conveyed to the Ridgewood M. Co., for $40,000, the Rialto claim, in Gregory district.——R. Rutlidge of St. Louis, Mo., has conveyed to the Blagdon M. Co. the Effie, Blagdon, Ezra White, Gem, North Eclipse and Charter Oak lodes, in Russell district.——At the Gold Collar mine the shaft is 500 feet deep, and drifting is being carried on in the fourth and fifth levels. The management report the ore of milling character, but the vein narrow.——Gurley & Roach are working on the Mammoth lode on Mammoth hill, east of the deep shaft, and taking out ore from a winze 160 feet deep. They are making regular shipments of both milling and smelting ores, principally the former.

HINSDALE COUNTY.

The Ute & Ulay mine at Lake City is shipping two carloads of concentrates per day to the Philadelphia smelter at Pueblo.

Lake City *Times*: B. Smith and T. Reed have started up the Tabasco mine where they will finish a contract.——At the Reynolds tunnel ten men are employed.——J. W. Maxey and H. E. Willson of Taylor, Tex., are interested in property in Burrows Park and will visit that section this week to push development work.——L. D. Hubbard of Colorado Springs, H. Weichman and V. K. Ames of Peoria, Illinois, have started over the range to Cimmeron, to inspect the Roscoe Conkling mine in which they are interested.——The center of attraction in Hinsdale county is the Copper mountain region above Rose's cabin. The Big Horn property is being worked under bond and lease by Hongh, Clevenger & Sheridan. The ore body in the breast of the drift is 4 feet wide and with sorting will run $200 to the ton. A carload shipment will be made the first of next week. There is a streak of silver glance running through the vein 2 inches wide which runs up in the hundreds of ounces.——F. House and R. P. McConathy are getting out copper ore from the J. J. Crooke mine on Copper mountain. The ore is shipping grade.

GARFIELD COUNTY.

The Colorado Fuel & Iron Co.'s mine at Newcastle was discovered again on fire July 1st, and the water was turned in to flood the workings. This is the third time the mine has been flooded within eighteen months. The same reason for the fire is given now as has been alleged each time before—spontaneous combustion. The fire originated in room 73 on the east Allen vein, about one mile from the bottom of the shaft. The coal vein is about 38 feet thick at the point of the fire. The coal in room 73, where the fire is known to be, is mined down for a distance of 500 feet from the bottom of the entry. Thus there is a mass of loose coal 38 feet square and 500 feet high, which is on fire.

GUNNISON COUNTY.

In the Gold Brick district is the Teller and Little Chief group of five claims. The Teller is worked by a shaft 170 feet deep, with drifts, and the Little Chief has a 90-foot shaft and a 200-foot tunnel. Good ore has been found in both shafts and tunnel and several carloads have been shipped to the smelters.

The Woodward G. M. & M. Co., operating the Tom Boy and four other claims located in the Spencer district, will develop more extensively. Machinery was purchased in Denver last week. The shaft is 30 feet deep and has exposed a large vein of gold-bearing quartz. The property is near the Gunnison and Underhill mines.

LAKE COUNTY.

Couriers arriving at Leadville July 8th from Red Mountain district, twenty-five miles Leadville, confirm the report of a gold tellurium strike made in the Chishold property at Bramley. The property is on Star mountain and is known as the Little Alec group. Assays show fifty ounces gold and fifty-six ounces silver to the ton. The strike was made after going in 160 feet on the vein, 10 feet of which show a tellurium mineral. The ore is said to be similar to that of Cripple Creek.

The Fourth of July group of claims near Leadville, embracing forty acres of patented ground on Prospect mountain, 1550 feet north of the Dollie B. gold mines and owned by J. Hopkins, J. McLellan and W. and J. Brady, has been taken on bond and lease by a Chicago man. E. B. Weare of Leadville will be Mgr. The bond is for $90,000 and the lease runs for three years. A contract will be let to sink a shaft 200 feet to develop the first contact. It is in the north end of the undeveloped gold belt.

The Adams-Maid-Wolftone M. Co. has been incorporated, the abbreviated name being A. M. W. The capital stock is $50,000. S. D. Nicholson, L. A. Reynolds, J. Rodman, R. J. Donnen and P. Crowe will direct the management for the first year. They will drain and develop this group of mines through the Wolftone shaft.

Leadville *Miner*: The Iron Mask, at Gilman, on Battle mountain, Eagle county, has developed large bodies of sulphides. Mgr. Harrington of Leadville is shipping to the new Highland Boy smelter, at Salt Lake, Utah.——Bartlett & Son have erected on Mt. Elbert, in this county, at the altitude of 10,800 feet, a stamp mill, W. C. Connor of New York furnishing the money. The mill is 36 feet high, the top of the mill being on a level with the tunnel, which is in 1400 feet, driven to develop the ground owned by the Twin Lakes G. M. Co. The mine workings make enough water to run the mill. The ore is a quartz-porphyry and is free-milling material.

Denver *Republican*: June 1 the output of Leadville mines was the largest in the history of Lake county—2400 tons of ore per day, which was stopped by the smelter shutdown. The mines are gradually starting up again.——On Carbonate, Fryer, Iron and Rock hills the Graham Park and California Gulch sections, Leadville, there has been no let up in development. The Iron-Silver has handled an enormous tonnage up to June 10 from their Moyer shaft. The Marian has been shipping heavily and has put its shaft down 150 feet farther into the lower contact, giving it a depth of 1300 feet. A drift is now being run into the ore body.——The Mahala has averaged heavy shipments throughout the six months, and has done much development and put its interior shaft down 50 feet into the ore discovered by the diamond drill; this gives workings at a depth of 1180 feet. New and richer ore the drill shows extends 70 feet below.——The Greenback preperty has sent its main shaft down 1100 feet and is drifting for the Mahala ore chute. The owners have erected machinery. The Mab people have opened large ore bodies and have shipped a heavy tonnage.——In the gold belt, in addition to opening up extensive ore bodies in some of the old properties, new producers have appeared in the President, Fortune, Big Six, Ballard and others, while the pushing of the Yak tunnel into Breece hill, the development of the ore bodies in the Lida and the New Monarch groups, progress of the Board of Trade shaft in Evans gulch, commencement of work by Boston capitalists on the Comstock group, between the Lillian and Antioch, starting of the Gwyndoline group in Iowa gulch, sinking of a deep shaft on the Chippewa group and other enterprises show that the gold belt has been receiving its share of attention. In this territory the Ibex, Resurrection, Penn and a number of other gold producers have been developing and have blocked out bodies of ore from which they can handle a large tonnage when shipments are resumed.

LA PLATA COUNTY.

The Durango smelter is to be blown in again, J. A. Partridge, Mgr., having been directed to canvass for ores.

MINERAL COUNTY.

A strike was made in the Bachelor mine at Creede last week in the intermediate level No. 2, where a 5-foot vein was encountered.

MONTEZUMA COUNTY.

The North Star mill on the Mancos is turning out $1000 per day from two batteries working on ore from the Sundown and Tenderfoot mines. Two retorts sent to the Denver mint from the North Star brought $3916.65—the result of the treatment of 204 tons of ore.

OURAY COUNTY.

Ground is being broken at T. F. Walsh's Camp Bird mine for the erection of a new mill for the treatment of the lead ores.

Ouray *Herald*: The Wedge mine, which was closed down a few weeks ago, will resume operations with a force of eighty men under Supt. McMahan.—— About $200,000 worth of mining property has recently been transferred in this county.

PARK COUNTY.

Park County *Bulletin*: Near Puma are working the Boomer, East Boomer, Plymouth Rock, L. A. S., Barnaby and Belmont, June, No Name, Twelve-Thirty, Copper Bottom and Outlaw, Redskin, Sunday, Campbell & Carlson's copper glance claim, and a number of other prospects.——Near Lake George a number of claims are being developed, among them the Bunker Hill, Morning Glory, Victor, Charter Oak and High Five groups, by G. W. Frost. Assays from workings on these claims have given as high as 22% copper.

SAN JUAN COUNTY.

Negotiations are pending for the purchase of the Menomie group of claims on Boulder mountain, represented by Mr. O'Driscoll, who is the principal owner in the properties, which consist of seven claims in various stages of development. All of the claims are in ore.

The Crooke concentrating mill is running two shifts on Dives-Shenandoah ore, reducing five into one, under direction of Mgr. Crooke.

G. Abbott, et al., have resumed work on the Independence claim, South Lookout mountain. The property has 350 feet of development, which consists of a crosscut and two drifts on the vein.

T. J. Davis & Bro. have a new discovery in their Gold Wing property, Mastodon gulch. The second level has been started on the vein that is 12 feet in width, 3 of which is good shipping ore.

Frank Spellman recently sold one of his claims in the Red Mountain belt for $2500.

It is reported that Wm. Taggart has made a strike in his Stranger near the Occidental group. This vein is said to be 15 feet wide.

Silverton *Standard*: On Sultan mountain the Atlantis, the northerly extension of the Grand Turk, is being developed by a crosscut. It is said that this claim shows yellow copper and galena in all its workings. It is owned by F. Robbins, T. Annear and J. Graff. It is in the limestone-quartz contact, on which is the Copper Queen, the southerly extension of the Grand Turk, owned by J. Woods and Herr Bros. A carload of yellow copper from the Queen is side-tracked in Durango at the smelter. The claim is developed by a 60-foot tunnel, which shows a breast of yellow copper and iron 4 feet wide. The Mezeppa, another contact location, below the Queen, has 2½ feet of yellow copper. This property has been worked through a shaft.——The lower working of the Baltimore, 3½ miles from town, is in a body of ore 8 feet wide, showing iron and copper in quartz, and carries values in gold and silver—not enough, however, to pay for shipping. Mr. Quinn has worked the property for ten years, mostly alone. He has accomplished 400 feet of development.—— The Bonita is a patented claim on Bonita mountain, on the northerly side of the backbone from the Sampson. The development on the Bonita consists of a 200-foot tunnel driven on one side of the vein, which is 30 feet wide. There has been no crosscutting done on the property—the surface showing of which is good.

Silverton *Standard*: The Gold King mill at the terminus of the S. G. & N. Railroad is to have ten additional stamps. J. Hect has the contract.

SAN MIGUEL COUNTY.

Telluride *Journal*: The occurrence of gold in what is called sandstone in San Miguel is reported. It is claimed that assays show from $5 to $17 per ton.

The Ajax mines, comprising a group of five claims on the Smuggler-Union vein, have been sold.

SUMMIT COUNTY.

On the west slope of Bald mountain, five miles west of Breckenridge, is the property of the Mountain Pride G. M. Co., consisting of seven patented and two unpatented claims, parallel to each other. This company is composed of members of the Illinois Steel Co., J. W. Gates president. For three years development of the property has been in progress. In November last year the miners at the Pride uncovered one of the largest bodies of lead ore in the fifth level ever found in the district. In December there was produced 200 tons of smelting and 650 tons of milling ore. The Gold Pan mill was leased and 150 tons were treated there. A mill is being built designed to treat sixty tons of ore daily and will be supplied with concentrating tables and will contain three 60 H. P. boilers, which will supply power for the mill and do the hoisting from the mine and supply power for electricity for a 100-light plant. When Mr. Foote assumed the management of the mine there was no ore in sight. Since that time the old shaft has been sunk 225 feet, 1800 feet of drifting done, 500 feet of upraises made and a large amount of ore uncovered. The smelting ore runs between $40 and $50 to the ton and the milling about $12.

Under the management of F. Graham the Pennsylvania is doing well, and with the starting of the mill, now under construction, the revenues will be increased.

TELLER COUNTY.

The report of the treasurer of the Elkton Co. recently issued showed a total of $2989 construction expenses, June 1, 1898, to June 1, 1899; $10,429.59 mine operating expenses; $273,384.10 mining expenses; $188,904.69 shipping and selling; $12,315.51 salaries and general expense; and dividends of $120,000.

The output of Cripple Creek district for June was $1,092,000. Added to the five preceding months the gross output for the first half of the year amounted to $8,360,253 50.

Cripple Creek *Times*: The El Paso Co. whose claims are on Beacon hill, have their workings in ore, from the Fannie B. on the south, through to the Orizaba No. 2 on the north. On company account the deepest shaft is 220 feet, and from this point all levels are in ore. The chute at the depth mentioned is known to be 125 feet long and in this distance there is in sight a streak of rock varying in width from 1 to 12 inches that is rich. Alongside is 3 feet of rock the screenings from which show a grade of better than $100.——On the Tillery vein, opened on Orizaba No. 2, the showing is good and the lessee is making money.——The Pueblo people who are leasing on the property at 280 feet have a seam of rich ore.——On the Fannie B. some lessees have been working in the old workings of the Blunt Bros., the work on which was done three years ago, and they are making shipments of $100 ore.——The Raven is reported improving. While the greater portion of the men are engaged in development work, enough ore is being shipped to meet the payroll and leave enough in the treasury to pay a dividend of $5000 a month. Last week twenty tons of $300 and 100 tons of five-ounce ore were sent out.——R. P. Davie of Colorado Springs, has bought the Key West property for $35,000, and will organize a company to develop the claim. The property comprises 7.61 acres of patented ground and lies between the Home Fraction of the Temomj Company and the Lone Star claim of the Arcadia Consolidated. It adjoins the Annie Rooney of the Moon-Anchor and cuts into a piece of the Lillie claim of the Franklin-Roy Co. The claim was staked in April of 1893, and patented three years later. At that time $50,000 was refused for it. The company will be organized with a capital of $1,250,000, of which $250,000 will be treasury stock.——A 25-ton shipment has been made from the Whipp & Glenn lease on the Pinnacle. The ore will average from $70 to $90. Connections have been made with the new shaft, and the old workings at a depth of 98 feet. A contract will be let for another 100 feet of sinking.——Tillery and company, leasing a block of the Orizaba No. 1, have a good showing at a depth of 105 feet in an incline. The vein is 4 feet wide and 3 inches of the pay streak is high-grade. On the Modoc the new vein in a crosscut run east has been opened up at the fifth, seventh and ninth levels. From 3 to 9 inches of the pay streak is high-grade ore. Alongside it there is over a foot of medinm grade quartz.——On Isabella ground lessees have opened what appears to be a large vein. Several assays give it a value of $60.

Denver *Republican*: F. W. Baker, managing director of the Venture corporation, has been visiting Cripple Creek, as a result of which an exploration company, to invest in mining in the Cripple Creek district, will be formed in London. The company will have a working capital of from $1,000,000 to $1,500,000. It will buy undeveloped properties, leases and bonds, provide capital for enterprises which need it, and generally invest in the property of the camp.

IDAHO.

(Special Correspondence). — The cyanide plant at Doniphan, twelve miles west of Hailey, belonging to Wiswall & Frank of Denver, began its season's work in May and is in charge of W. H. Wickham. Forty tons per day are being treated, the material consisting of tailings from the Camas No. 2, which yield $5.50 per ton. It is stated that a saving of 83% of the gold is effected. A recent shipment was made of auro-cyanides to Salt Lake City.

In the same locality Doniphan Bros. are developing the Black Cinder group, which is on the mineralized zone trending in an easterly and westerly direction through this section, on which are located the Camas Nos. 1 and 2, Black Cinder, Tip Top, Golden Star and other claims. The Black Cinder has a 250-foot incline shaft, following the dip of the vein, at the foot of which are crosscuts on the ledge in opposite directions. The workings disclose an irregular vein formation, consisting of quartzite and porphyry, with pay streaks of iron and copper sulphides, some of which is partly oxidized. The values are silver and gold with some copper. The workings are to be carried to greater depth.

The Tip Top, belonging to J. L. Packard of Salt Lake City, and in charge of Supt. J. M. Lusk, is well developed through shafts and tunnels and is a steady producer. The 20-stamp amalgamation and concentration mill on this property has been started up within the last month. A considerable percentage of the values in the ores is in the form of free gold, which is saved on the plates, the

values in the sulphides being saved in the different grades of concentrates. The mill, which is modern in its equipment, is running forty tons per day and is turning out 240 tons of concentrates per month.

The Crœsus mine, four miles west of Hailey, was purchased last year by three Spokane and four Eastern men, who took possession Jan. 1st, '99, with W. G. Page as Supt. The property is equipped with a 10-stamp amalgamation mill and concentrators; the mine has 3500 feet of development work, employing thirty-six men. A tunnel crosscuts the ore body 200 feet from the entrance, at which point a shaft sinks 430 feet vertically and the work now in progress consists in driving on the ledge at this level. The ores are high grade copper and iron sulphides, running 4% to 7% copper, $75 gold and eighteen ounces silver; 50% of the values are saved on the plates, the balance in the concentrates. It is said the saving effected is over 90% of all values. As depth is gained the silver values decrease and those of copper and gold increase. Thirty tons of ore per day are milled. Concentrates are shipped to Salt Lake smelters, the freight rate to that point being $4.50, and the treatment charge $8 with allowance of 15 cents per unit on iron excess.

Adjoining the Crœsus is the Hope group, under the management of J. S. Thompson. It is equipped with shaft house, hoisting machinery and other necessary buildings; and is developed by one main tunnel which enters on the vein a distance of 560 feet, also a 123-foot shaft below the tunnel level. The property comprises four claims and its ore bodies and ore values are said to be the same as those of the Crœsus.

The mining industry generally in the vicinity of Hailey is in better condition than it was a year ago. The results seen at the Tip Top and Crœsus are sufficient to justify the assumption that other equally good mines will be opened on the gold belt of this district.

The properties of the Della Mountain M. Co., comprising five patented claims, six miles northwest from Hailey, were purchased by the company in '95, since which time they have produced $75,000. The country rock is granite, the veins carrying galena are 5 feet wide. The values are said to average 74% lead and over 100 ounces silver. The mine is developed by a system of seven tunnels. Ore shipments amount to two cars per month.

The Red Cloud, being worked by lessees, is located on Deer creek, twelve miles from Hailey, and has a good showing of galena ore. Its first-class runs 65% lead, sixty-five ounces silver and $2 gold; second-class runs 15% lead, twenty ounces silver and small values in gold. WASCOTT.

Hailey, Idaho, July 7th, '99.

At the Tiger-Poorman mine Clark & Sweeny will make surface improvements to cost between $100,000 and $150,000. The principal change will be the substitution of water power for steam, saving a monthly outlay of about $5000 for coal. Mr. Sweeny is arranging to construct a flume which will supply water to run the entire plant ten months in the year. W. C. Miller is in charge.

Cuprum *Standard*: At the Columbia mine, owned by the United Copper Co., in Seven Devils, a force of men was recently put to work. A tunnel will be run which will tap the ledge 200 feet in depth.——The Greenvale, another of the United Copper Mines Co.'s properties, has a good ledge of rich ore. J. Walton, Supt. for the company, will do development work on a number of properties during the coming season.

MISSOURI.

Zinc ore at Joplin is worth $42.50 per ton. Lead is $26 per 1000 pounds. The zinc and lead ore produced in the Joplin district since Jan. 1 is valued at $5,575,310.

Joplin *Herald*: The sale of a one-tenth interest in a lease on eight lots on the land of the United Zinc & Lead Co. for $2000 is reported. This one tract comprises seventy-eight lots, which are all leased to miners who pay a royalty of 20% on the gross output to the United Zinc & Lead Co.

MONTANA.

Sheridan *Chinook*: Ore is being sampled at the new smelter at Twin Bridges.——Black, Norton & Berry will ship ore from the Liberty mine on Sand creek this week.——C. P. Richards, a cyanide man from Reno, Nev., is testing the tailings at the Leiter mine.——Morrison & Krause are shipping another carload of ore from the St. Lawrence mine.——McEvoy & Co. are working on the Largey mine near Brandon and have shipped several loads of ore to Twin Bridges.——J. Olson and A. Fisher have out a shipment of ore from the Big Chief mine near Brandon. They intend having it sampled at the new smelter near Twin Bridges.——Fuller & Lewis have commenced work on the old Harkins mine on Mill creek. They will run a new tunnel to tap the lead, which is of high grade, carrying a good percentage of lead.——The Glendale Transportation Co. is hauling ore from Hecla to the smelter. Last week it averaged eighteen tons to each ten-horse team with two wagons.——C. E. Gable, Mgr. of the B. & G. M. Co., in the middle fork of the Warm Springs district, has returned from an extended trip to Boston, New York, Chicago and other Eastern cities.——A. Engstrom, R. Baumgart and S. Williams have finished running eighty tons of ore from the Gold Coin mine on Indian creek through the mill. The ore ran well. They have a group of mines above the mill, consisting of six claims, upon which they have development work done. The Gold Coin shows high-grade gold, silver and copper ore at a depth of 250 or 300 feet, having been tapped with a tunnel at that depth.

Butte *Inter-Mountain*: Advices from Garnet report the timber and brush cleared away on the site for the Montana-Colorado smelter, and the work of excavating commenced. The plant will be situated a few yards up Deep gulch, off Bear gulch, a few miles below Garnet, and not far from old Beartown. A. P. Browne is interested and has for his associates Missoula men. The plant will treat custom ore from the Garnet, Coloma and Top o'Deep mining camps.

NEVADA.

The new hoisting machinery at the Osbiston shaft on the Comstock lode at Virginia City was completed and ready for operation Saturday last.

On the Comstock pumping operations are continued successfully; the water has been lowered since last week more than 4 feet. Supt. Ross' report by telegraph is as follows:

"*To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco*: Elevator No. 1 has been working continuously. The water rose and fell during the past twenty-four hours. At 6 A. M. to-day the water was 1 foot below the 1950-foot level station."

At Gold Hill general repairs to the north surface tunnel, and also to the west crosscut from that tunnel, are still being continued at the joint expense of the Confidence, Challenge Con. and Con. Imperial mining companies.

In the Belcher mine on the 100-foot level miners are cutting out a station for the purpose of prospecting at that depth. On the 1000-foot level the east crosscut is out 193 feet. The face shows porphyry. On the 1100-foot level they are cleaning out and repairing the Belcher, Crown Point and Yellow Jacket drift. There have been hoisted during the week and stored twenty-nine mining carloads of ore, the average top car sample of which shows an assay value of $12.59 per ton.

The copper-bearing zone of Jackson creek district in Humboldt county is said to be 150 wide. Judge Burton and J. F. Cowan of Salt Lake, Utah, have an option on eleven undeveloped locations.

NEW MEXICO.

Santa Fe *New Mexican*: F. Lucero has made a copper strike on his ranch in the San Andres mining district.——Several fair copper prospects have been staked off in the Caballo range.——Organ mining camp is prosperous. Several houses have been built and the hillside is dotted with tents. The change is due to the success of the Excelsior M. Co.——A camp has been established at Mineral Hill, and Condit and Chambers are working the Dumma B. mine. The ore carries 60% lead, in addition to gold, silver and copper.——J. M. Fritter and R. Worthen have thirty-two men employed on the west side of the Montoya mine. They are taking out low-grade copper ore for Crawford & Derbyshire. At a depth of 50 feet a body of ore has been partially explored by 1600 feet of drifts run in various directions from the shaft. These drifts have produced 3000 tons of ore. The ore runs 6% to 8% copper. Ninety-five tons are taken out every day.—R. L. Powell is putting the 10-stamp mill at Gold Hill, owned by Dr. Woods, into shape for working the gold ore in sight in the California, Nancy Lee, Chief, Little Charley and Standard mines. The ore will average an ounce and a half in free gold, which will be saved by amalgamation on the plates. The concentrates will run five ounces gold per ton.——J. Woodward has three miners on the Big Casino mine at Bald mountain and is shipping ten to twenty tons of ore per week to Silver City. The ore carries twenty to forty ounces silver.——Ashton, Roach & Williams have sub-leased their ground on the Montoya mine. High-grade copper is being taken out.——Ashton, Roach & Hoskins have thirty-five men employed at the north end of the Romero mine at Santa Rita, taking out rich copper ore.——H. Dawson has fifty men employed on the leased ground upon the 100-foot level of the Romero mine, mining rich copper ore.——B. C. Gillette has sunk the incline shaft of the Copper Rose at Hanover to 175 feet. He is developing the property under bond and lease from J. Clark and J. A. Lucas.——Crawford & Derbyshire are running their concentration mill, concentrating ninety tons of ore daily, producing eight tons of copper concentrates. The monthly product of the mill is $25,000.——An $8000 shipment of ore was made recently from the Lookout mine near Hillsboro.——B. Martin will put in a cyanide mill at the Blaine, McKinley and Hanlon mines near Hillsboro.——At Robins & Hilty's Trujillo Creek mine, near Hillsboro, the water has caused a suspension of operations until pumping machinery is secured.——R. Watson, who leased the Richmond, struck a 3-foot vein of $95 ore.——A 50 H. P. gasoline hoisting engine has been placed at the Trippe mine, and it hoists thirty tons of ore a day.——The gold production of the Hillsboro placers amounted to $3000 last month.

OREGON.

(Special Correspondence).—The name of the Union-Companion Mines has been changed to the Cornucopia Mines. The company has commenced to erect a cable tramway from their mill to the Last Chance mine; the distance is two miles over rough mountains. Finch and Comel of Spokane, Wash., have broken ground on a mining enterprise adjoining the Cornucopia Mines.

Graham, Garratt & Co., of Spokane, Wash., have an agent here looking over the mining district of Cornucopia. He has taken the group of J. Arthur, known as the Golden Drop Con.

Cornucopia, July 5th, '99.

Sumpter *American*: The Gold Boy group of five claims, adjacent to the Bonanza, has been bonded to the Spokane Co-operative M. Co. The owners are I. Williamson, J. W. Duckworth, P. W. Rose and W. S. Granel. The bond is for $60,000. The first payment is due in December. A crosscut tunnel is in 250 feet and a contract has been let for 120 feet.

Ashland *Record*: Miners have struck the ledge in the Free Coinage mine in Sampson Creek mining district near Soda springs. The 320-foot tunnel entered the ledge at a depth of 200 feet from the surface. It was 5 feet wide. The ore carries free gold and zinc and lead sulphides. There are specimens exhibiting native silver. This ledge is also known as the Barron and Shepherd and is eight and one-half miles southeast of Ashland, and was the first gold-bearing ledge found in that section of the county.——The Shorty Hope M. & M. Co. is about to sink 1000 feet on their property near Ashland, and will determine the character of machinery that will be purchased. The shaft will be sunk on the line between both locations, and it is now 60 feet below the level of the present workings; 1000 feet of drifting has been done on the vein. The business of the company in Ashland and at the mine is looked after by Pres. H. S. Sanford and Supt. T. James.——Supt. H. Mattern, of the Ashland and Mattern mines, has shipped a carload of ore and concentrates to San Francisco. It was from the new workings in the west side shaft, from which $30 per ton was realized by the last run through the 5-stamp mill in Ashland. The mine is opened by a 400-foot tunnel that struck the vein at a depth of 150 feet from surface. A 500-foot tunnel reached the vein at a depth of 500 feet and did considerable drift work in low-grade ore. The owners are G. F. Reynolds of Cheboygan, Mich., and R. M. Bennett of Minneapolis, Minn. They paid $20,000 for the mine a year ago. Mr. Bennett and Mr. Mattern are the owners of the Mattern mine, from which some high-grade ore has been taken.

Baker City *Republican*: Rich discoveries have been made near Baker City, 2½ miles southerly from the Virtue mine. Another discovery was made northwest of the Virtue by a stranger.——A strike was made a few days ago by two strangers a few feet from the old Wilson claim on Dalles military road, in Malheur county, seventy miles from Baker City. It was considered outside of the mineral belt, and was discovered years ago by Wilson, who, after development work, gave it up, not finding gold in paying quantities. Now two strangers open up the richest quartz seen in years. The rock is quartz, full of gold.

SOUTH DAKOTA.

Deadwood *Pioneer-Times*: Day and night shifts are working in the Golden Slipper shaft in the Harvey Peak region. The ledge has been encountered in the shaft again.——The water has again risen in the Sunnyside mine and work had to be suspended.——The Ella Eldon M. Co. has awarded a contract to A. C. Tippy and H. Brasch of Deadwood and J. F. Gilroy of Lead to sink a shaft upon its Grizzly gulch property to the depth of 100 feet.——I. Dowing and associates, who have a lease on the Belle Eldridge and adjoining claims on Spruce gulch, belonging to A. Dunn, H. A. Tortat and J. W. Allen, are taking out eight tons of ore daily, and are shipping to the smelter. They have opened up a good-sized body of ore and the property is paying.——Allen, Small, States and Souley have the building for their cyanide plant at Ragged Top enclosed and are building their vats. Their engine and boiler are in place. They have a new crusher and rolls.——The diamond drill run by the American M. Co. in the Dacy shaft is in mud shale and making slow headway, it being hard to core, but has gone more than 200 feet since starting. The drill is approaching the upper quartzite.

Custer *Chronicle*: Men at the Russell mica mines, five miles east of Custer, are clearing the mine of water preparatory to resuming work on the same. The property is owned by the St. Louis Mica Co.

UTAH.

BINGHAM DISTRICT.

(Special Correspondence).—W. H. Coolidge, E. A. Clark, C. H. Cole and associates, who purchased the Old Jordan & Galena, Old Telegraph, Niagara and other properties at Bingham, organized the United States M. Co., which took over the entire properties, consolidating them under one management. The holdings comprise 750 acres. The Old Jordan is said to be the oldest location in the district, if not in the State, and is extensively developed. Its ore zone is over 250 feet wide, being a contact between lime and quartzite, the ore being iron and copper sulphides, carrying gold, silver, copper and lead.

The Old Telegraph group is also well developed, having been worked by lessees for years, who took only the high-grade material, leaving great bodies of low and medium grade ore blocked out. The properties are equipped with machinery, including a 200-ton concentrator and 100-ton cyanide plant. Changes are being made in the mill and other preparations are making for extensive work. Jas. W. Neill is general manager of the company and A. P. Mayberry mine superintendent.

Bingham, Utah, July 1st, '99. WASCOTT.

TINTIC DISTRICT.

(Special Correspondence).—Figures accurately compiled by the Tintic *Miner* show the following shipments from the district for the week ending this date, the Tintic district comprising the mines of Eureka, Mammoth, Robinson, Silver City and Diamond:

Bullion-Beck	10
Gemini	9
Godiva	5
Uncle Sam & Humbug	6
May Day	2
Northern Spy	1
Star Consolidated	4
Mammoth	5
Grand Central	11
Swansea	12
South Swansea	5
Sunbeam	2
Joe Bowers	1
Dragon Iron mine	50
Total cars ore	123

The Mammoth also shipped five cars concentrates.

By the above figures it will be seen that the old shippers are keeping up their pace and that some of the new ones have increased of late. A marked feature of the district is the new work in progress. Not less than twenty-five new hoisting plants have been set up in the district within the last six months on that many new properties. The result will probably be the addition of a number of shippers by the close of the year. Especially around Silver City is this new work noticeable. At Diamond the same condition prevails. At the Eureka end of the district work is progressing on a chain of new properties extending northwesterly five or six miles, on which it is designed to catch the zone of ore trending through Mammoth and Eureka. Among these new properties are the Ridge & Valley, Illinois, Raymond, Black Warrior and Jefferson. On some of these ore is said to have been encountered.

The Diamond locality is interesting by reason of the development of the Joe Bowers, Buckeye, Blue Bird and others.

The Grand Central, in charge of Supt. P. Donnelly, has its new double-reel hoisting plant in operation over the two-compartment shaft. A new ten-drill compressor is also installed and ready for use. The shaft sinks to 900 feet depth, from which levels are run at different stations to the vein, the latter being opened a distance of 450 feet vertically. It is stated that the ledge is 60 feet wide at some points. The ore values are in gold, copper and silver, the copper running as high as 15%. The main shaft is to be sunk 200 feet deeper.

The Emerald, in charge of Supt. M. L. Oglesby, did 1400 feet of development the past year. Its shaft is 700 feet deep and drifting is in progress on the fifth, sixth and seventh levels.

The Tintic M. & D. Co. are making steady progress with the Sioux-Ajax tunnel, being driven from the upper Mammoth side of the Tintic range, crosscutting the formation toward the Northern Spy, on the opposite side. It is in over 5000 feet. The work is in charge of W. J. Craig.

The Dragon Iron mine is under bond and lease to S. Newhouse and associates, the sum named in bond being $300,000. It seems certain that the sale will be consummated. The main workings consist of two crater-like quarries, on the slope of the mountain, reached by a tunnel from without, through which the ore is carried by wagons. A second tunnel connects the open cuts. The face of the workings disclose large ledges of black and brown oxide of iron, with streaks of talc and lime. It is used as fluxing material. The ore body thus exposed is 200 feet vertical by 1000 feet laterally. At another point on the same group the operators are sinking a 1000-foot shaft, machinery for which has been set up.

Within the town of Silver City the Cleopatra has set up hoisting machinery and sunk a shaft over 200 feet, from which crosscuts run to the ore, presumed to be the same lead as that opened by the Swansea and others farther north. W. W. Chisholm, R. T. Dart, A. S. Day, J. A. Bard and C. J. Pence are interested.

Paxman, McGlynn and others are developing the Sea Swan, north of Silver City. A 240-foot shaft is sinking to catch the Swansea vein.

The Rabbit's Foot, east of Silver City, is shipping from its 350-foot shaft an oxide of copper and iron, carrying gold and silver.

The Hope mine, in charge of J. G. Sawyer, is developing through a 175-foot incline shaft, from which crosscuts lead to veins on each side.

The Martha Washington expects to start shipping this month. It is developed through a 500-foot incline and various levels connected by winzes.

The Bullion-Beck mill is operating on second-class ore from the dump of that mine, which runs from 5% to 7% lead and 8 to 12 ounces silver. It is partly carbonate and partly sulphide ore. This mill is equipped for concentration. The dry siliceous ores from the Bullion-Beck, carrying little or no lead, are to be milled at the Farrell mill at Robinson, which is equipped for amalgamation as well as concentration. This class, of which 6000 tons have accumulated, will run 20 ounces silver.

The Eureka Hill mill—the largest in the district—is temporarily idle, pending the present exploration of the mine for additional ore bodies.

L. C. Doty is in charge of the work of the Apex M. Co., which is opening a property between the Godiva and the Uncle Sam. A tunnel has been driven in 2000 feet, where a body of low-grade ore was cut at 700 feet vertical depth.

The Bullion-Beck Tunnel Co. (not identified with the Bullion-Beck mine) have made a regular tunnel location east of the Godiva and Humbug, and have driven a tunnel, crosscutting the formation 1400 feet toward the Humbug. In the course of the work a natural cave, with porphyry and limestone walls, was discovered. It is 150x200 feet laterally by unknown vertical dimensions.

J. Earle has resigned the superintendency of the Mammoth mine.

The Four Aces, near Silver City, is now equipped with one of the best hoisting plants in the district. The property has thus far produced sufficient to pay for improvements and operating expenses. WASCOTT.

Eureka, Utah, July 1st, '99.

(Special Correspondence).—The Ontario at Park City is operating with sixty-five men, shipping fifty tons of ore per day, which comes chiefly from stopes between the 1400 and 1500 levels. This ore is high grade, being silver, gray copper and galena, zinc blende and pyrites.

The Daly-West has recently been shipping at the rate of one hundred tons per day, though its normal rate is sixty-five tons. Its ores run approximately sixty ounces silver and 15% to 25% lead. At their mill concentrates run 40% lead.

Park City, Utah, July 3rd, '99.

(Special Correspondence). — The Bingham Tunnel Co., A. G. Lamson Mgr., are driving a tunnel from the valley side of West mountain, in a westerly course, cutting under the New Mammoth, Fortune and Wall-DeLamar groups, coming out in Bingham canyon, above the town of Bingham. It is now in one-third

of a mile, size 9 feet vertically, by 8 feet wide. It is designed for drainage and transportation of ores to the valley side, where a smelter is contemplated. Parties concerned in this enterprise are in control of the Jordan Narrows electric power plant, and electric ore haulage through the tunnel is one of the contemplated features. WASCOTT.

Bingham, Utah, July 3rd, '99.

(Special Correspondence).—A. G. Bast is developing a number of mining properties in the State Line district, reached by a sixteen-mile stage ride from the Utah & Pacific Railroad, which has been built seventy-two miles in a southwesterly direction from Milford. Mr. Bast says the ores there are free milling in character and the country affords plenty of wood and water. WASCOTT.

Salt Lake City, July 3rd, '99.

The Horn Silver mine, at Frisco, is producing about 1200 tons of ore per month.

Utah's mines distributed $280,000 dividends in June.

The strike at the Highland Boy smelter is over. The dissatisfied men were paid off and new men employed to fill their places.

It is reported in London that Capt. J. R. DeLamar is about to sell his entire Mercur property to a syndicate of French and English capitalists for $14,000,000. H. A. Cohen, who is looking after the DeLamar interests in Utah, denies the report.

Salt Lake *Tribune*: For the entire holdings of the Star Con. M. Co. at Tintic, an Eastern syndicate, represented by local parties, has made an offer of $500,000, or $1 a share for the stock. It is willing, on the same basis, to take 400,000 shares, but unless that number can be delivered the right to withdraw the proposition is reserved. The bid has been referred to the shareholders.

Bingham *Bulletin*: As a result of developments occurring in the consolidated mines of Bingham this spring, announcements have been made by the United States, Boston Con. and De Lamar managements that they will erect reduction works for treatment of their ores.

WASHINGTON.

In the Mount Stewart section of the Cascade mountains, a tunnel on the properties of the Spokane Copper M. Co., consisting of a group of four claims, is in 60 feet, the face of the tunnel being in ore, with neither wall in sight. The ore is sulphide of copper and iron, running in gold and silver. In this camp the following properties are being worked and shipping ore is being extracted: The Maud O., Lynch, Eureka, King Solomon, Grand View and Ida Elmore.

The Acme mine, fifteen miles down the river from Marcus, has been sold to California parties, who are at work on the property.

D. C. Clark, who has charge of the Silver Chief property in Stevens county, near the Cleveland camp, has arranged for sorting ore as it is taken out.

C. D. Lane and A. Hayward of San Francisco have purchased a group of seven gold claims at the head of Slate creek in Whatcom county, from M. Curtis, their discoverer. The ledge is 25 feet wide and runs through several claims. The property was discovered in 1895.

Republic *Pioneer*: Preparations for building a mill on the Mountain Lion have begun. The plant will include stamps and cyanide plant.

Spokesman-Review: Development of the Insurgent has demonstrated that the cross vein which was followed by the Lone Pine Co. to the Insurgent line, and then followed by the Insurgent people into the latter property, does not run into the Last Chance. The Insurgent is a wedge-shaped fraction lying between the Lone Pine and Last Chance. The latter claim is the property of the Lone Pine Co. A series of cross veins running east and west constitute the ore chutes of the Lone Pine. These run into the Insurgent. In following the one mentioned it has been found to turn to the north, following the slate at the point where the formation changes. It will not enter the Last Chance ground.

WYOMING.

Grand Encampment *Herald*: Articles of incorporation have been filed with the Secretary of State for the Hercules M. Co., a Nebraska corporation, which will develop mines in Grand Encampment district. The incorporators are Omaha men and the principal office of the company is at Omaha.——W. C. Ledbetter has opened up a vein of ore on a claim at the head of Cow creek. The ore runs in silver and copper. The vein is large.——At C. A. Finley's claim, near Grand Encampment, the quartz has given place to a red, decomposed iron similar to the capping of the Ferris-Haggerty mine, and the walls are impregnated with copper sulphides.

FOREIGN.

BRITISH COLUMBIA.

It is reported that the only developed iron mine on the Pacific coast has been sold to John D. Rockefeller, the purchase being made by the Monte Cristo M. Co., which Rockefeller owns. The mine is situated on Tuxedo island, off the British Columbia coast. The price is said to have been $150,000. The mines lie within 200 feet of tidewater.

The trouble between the miners' union and the Ymir mine has been overcome by means of contract work. Nearly all the work on the mine will be let by contract henceforward, and it is understood that the contractors will pay their men $3.50 for eight-hour shifts. The stamping operations have been uninterrupted by the strike, and 300 tons of concentrates have been shipped to the Hall smelter at Nelson, to which also a contract has been let for smelting the output of crude ore for one year.

P. J. Hickey, Mgr. of the Fontenoy mine in Camp McKinney, says the shaft is down 100 feet, and 20 feet deeper they will drift on the ledge, which is 9 feet.

The Sunshine Co., Ltd., which owns the Silver Cup, Sunshine and adjoining properties in the Trout lake division, has received from the Trail smelter $16,948.34, being the proceeds (after deduction of freight, duty and treatment charges) of 160 tons of ore, one carload being from the Sunshine claim and the balance from the Silver Cup.

Work has commenced on the Nelson-Poorman group, at Ymir. The work will be done by contract. Twenty men are employed.

CANADA.

Copper ore has been found in the Barry Sound district. The discovery was due to an American mining expert named Forbes, who has organized two companies, one composed entirely of St. Paul capitalists and the other composed of Canadian and St. Paul men, which have secured all of the claims in the neighborhood and have commenced operations.

LOWER CALIFORNIA.

Attorney L. A. Wright of the Fortuna and La Republica companies reports from San Diego, Cal., the starting of the second stamp mill of La Republica.

SOUTH AFRICA.

At the Jagirsfontein diamond mine a cave of 1000 tons of rock from the rim of the crater-like cut killed and injured a number of workmen.

THE KLONDIKE.

Ex-Postmaster Lewis of Chico, Cal., writes: "I want to again warn any and all persons that have an idea that they can come here and make a fortune, that they are taking the chances of being one out of a hundred. Stay where you are. All the gold that has come from the Klondike would not pay men to go through the same experience that I have seen them go through. There is a party of eleven men from Boston living next to me who have the reputation of being the best workers in camp. They have sunk forty-two holes from 28 to 89 feet in depth, and drifted over 150 feet. The gross returns for all this labor, besides building cabins, hauling their grub from one camp to another, with the thermometer ranging almost 40° below, were $1.35. This is only one party—the are dozens more in the same boat."

G. T. Hall and associates of Seattle, Wash., have sold 540 acres of mining land on the Yukon to Boston and London capitalists for $240,000. The land lies back of Eagle City. A hydraulic plant will be put in.

Industrial Notes.

—Coulterville, Cal., will be rebuilt.

—Prescott, Arizona, is being rapidly built up.

—American capitalists will buy the new Mexican bonds.

—A $700,000 sugar beet plant is projected at Santa Fe, N. M.

—There are 953,138 acres public land in Los Angeles Co., Cal.

—Nelson, B. C., will put $60,000 into public water works, etc., this season.

—Since annexation to the U. S., 12,000 Japanese have emigrated to Hawaii.

—Montana and Wyoming are going in for irrigation projects on a very large scale.

—The Southern Pacific Co. talks of a $50,000 California display at the Paris Exposition.

—There is great demand in Salt Lake City, Utah, for additional labor at mines and smelters.

—A mortgage given by the Kootenai Railway & Navigation Co. for $2,400,000 has been filed at Rathdrum, Idaho.

—"Tons of gold" are reported arriving from the Klondike, but they never get farther than the incoming steamers.

—The Cygnet Petroleum & Development Co., with $90,000 subscribed, will develop the 2566 acres in the Fresno, Cal., oil belt owned by the company.

—At Visalia, Cal., is being placed a large electric motor at the city water works for pumping. The Mount Whitney electric system is in operation.

—The Colorado Springs & Cripple Creek Ry. Co., has incorporated at Colorado Springs, Colo., capital stock, $2,000,000, to build a short line between the two places.

—A flying machine to weigh 10,057 lbs. and operated by compressed air is a projected feature of the exhibition at the next fair of the San Francisco Mechanics' Institute.

—At Marysville, Cal., 200 men are making roads leading to the new site of the Yuba Electric Power Co.'s light and power plant at Dobbins' ranch, forty miles from there.

—A. J. Coram, Prest. Cochiti G. M. Co., is arranging to put in a $250,000 electric plant at Bland, N. M., and transmit power thirty-five miles to the company's works in Calla canyon.

—The United States Smokeless Powder Co. will put in a new $500,000 plant at Point San Pedro, Cal. Two hundred men will be employed. In addition to powder, nitroglycerine will be manufactured.

—A formal contract has been signed whereby J. P. Morgan & Co., S. Bleichroder, the Deutsche Bank, the Dresdener Bank in Germany, and J. S. Morgan & Co., London, undertake the conversion of the entire foreign debt of the republic of Mexico.

—The British survey steamer Egeria is at San Francisco from Esquimalt, B. C. The English and Canadian governments are to establish a cable between British Columbia and Australia, which will touch at Samoa and Hawaii. The Egeria is now engaged in surveying the route. She will go to Honolulu, taking soundings on the way, and after coaling there will proceed to Apia. From Apia the soundings will be taken to the nearest point on the Australian continent.

—In New York, Pennsylvania and Ohio the purchase of forsaken and wornout rust piles, called "iron works" or "rolling mills," at a low price, rubbing up of the old machinery and with a hurrah putting it into a stock company at an enormous advance and selling it in stock to the gullible public, who have taken the money from legitimate places to get rich suddenly, is a fashionable mode of some people to get rich. It will furnish chances for lawyers to get rich over the wreck, and the certificates will be found by the executors in boxes, as old mining certificates are now.

—Bids on the new boilers for the lighthouse tender Madrone were as follows: Union Iron Works, San Francisco, $14,500, time three months from receipt of material at yard in San Francisco; W. J. Brady, San Francisco, $16,750, time May 1, 1900; Wolfe & Zwicker Iron Works, Portland, Or., $16,966, time 180 days; Moran Bros. Co., Seattle, Wash., $17,049, time 120 days; T. J. Moynihan, San Francisco, $17,990, time nine months; P. F. Dundon, San Francisco, time seven months; Risdon Iron and Locomotive Works, San Francisco, $20,980, time six months; Fulton Engineering and Shipbuilding Works, San Francisco, $21,190, time 150 working days.

Personal.

JAS. DONAHOE is the new Supt. Mammoth, Utah, mine.

J. A. EDMAN of Plumas Co.. Cal., is visiting San Francisco.

LOUIS JANIN JR. has returned to San Francisco from Australia.

V. V. CLARK is the new Supt. at the Albemarle mill, Bland, N. M.

THOS. TEAL has been engaged as assayer at the Twin Bridges, Mont., smelter.

F. F. THOMAS, Supt. of the Gwin mine, Calaveras Co., Cal., is in San Francisco.

W. O. FROST of San Francisco, Cal., has gone to his mines near Downieville, Sierra Co., Cal.

CHAS. G. YALE will have charge of the California mining exhibit at the Paris Exposition.

L. S. J. HUNT, formerly of Seattle, Wash., is amassing wealth in mines at Chambulo, Korea.

W. S. THYNG has charge of the mining department at the Pullman, Wash., school of science.

A. C. KYLE succeeds the late Roger Prendergast as Supt. Bullion M. Co., Virginia City, Nev.

ROSS BROWNE has returned to San Francisco, Cal., from a professional trip to El Dorado Co., Cal.

E. H. BENJAMIN has returned to San Francisco from a trip to the Ralston Divide, in El Dorado Co., Cal.

F. M. WIGMORE, representing John Wigmore & Sons Co., Los Angeles, Cal., is visiting San Francisco.

LETSON BALLIET, Mgr. Alder Creek mine, in Placer Co., Cal., has returned to the mine from an Eastern trip.

MR. J. L. WETMORE, JR., is foreman and assayer of the Azurite Copper & G. M. Co., near Tucson, Arizona.

E. N. WALTER of Denver, Colo., is preparing plans for a copper smelter for mining companies at Bingham, Utah.

F. CHAPPELLET, SR., of San Francisco, Cal., has gone to the Eureka Con. mine, near Forest Hill, Placer Co., Cal.

JOHN PENBERTHY, late manager of the Real del Monte, Huanchaca, goes to Siam to take charge of a mining property.

GEO. H. EVANS has returned from South America and is in present charge of mining operations at Breckenridge, Colo.

E. I. PARSONS, representing Jno. A. Roebling Sons' Co., San Francisco, has returned from a business trip through the Northwest.

J. E. JACKSON has resigned the presidency of the Salt Lake, Utah, Mining Exchange; going to the City of Mexico as Mgr. Mexican Ore Co.

W. H. BREVOORT, Pres. Victor M. Co., Cripple Creek, Colo., has been in Tintic district, Utah, examining the Carissa mine. He is now in California.

ON the 28th inst. E P. Ripley will succeed Claus Spreckels as Pres. S. F. & S. J. V. R. R., consequent upon the absorption of that road by the Santa Fe.

MARCUS DALY denies reports of his intended relinquishment of active interest in the Amalgamated Copper Co., and says he will remain in Montana.

FRED HOWE BOSTWICK, representing the Hendrie & Bolthoff Mfg. Co., Denver, Colo., was in San Francisco last week en route to Salt Lake City, Utah.

Mr. W. W. OLIVER left Denver, Colo., last week to take charge of the Dwight Furness Co.'s mill, built by the Edward P. Allis Co., at Guanajuato, Mexico.

THE Pretoria, South Africa, *News* says that John Hays Hammond "has a retainer of close on £50,000 for putting the Randfontein group of mines on a proper footing."

GEO. E. HOGG, M. E., of New York and San Francisco, sails for Cape Nome and Golovin Bay in the interests of several San Francisco companies, who have locations in the above named districts.

WILLIAM FRANCIS of Soulsbyville, Cal., who has been in charge of the Shakespeare M. Co.'s property, near Lordsburg, N. M., has returned to California and is succeeded as Mgr. by A. Logan of San Francisco, Cal.

DEAN P. MITCHELL, who has been in Western Australia for the past two years, is in San Francisco, Cal., recuperating. He will visit several of the mining regions of the Southwest before returning to Australia.

HON. NILES SEARLS has been re-elected Pres. Society of California Pioneers; Vice-Pres., E. W. McKinstry and J. Palache, San Francisco; W. Van Dyke, Los Angeles; G. Hagar, Colusa; D. O. Mills, New York.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JULY 4, 1899.

628,430.—PAPER FILE—Bireley & Simms, Los Angeles, Cal.
628,219.—WATER LIFT—R. E. Browne, S. F.
628,267.—WINDOW SASH LOCK—W. A. Hawthorne, Carson, Nev.
628,223.—FARE REGISTER—S. C. Houghton, S. F.
628,224.—ROPE CLUTCH—S. C. Houghton, S. F.
628,178.—MACHINE FOR FILLING PACKAGES—J. M. Howe, S. F.
628,104.—WINDOW—J. B. Marshall, Fresno, Cal.
628,250.—PLATE HOLDER—G. & M. Maybell, S. F.
628,185.—FINGER TOOTH BRUSH—C. W. Richards, S. F.
628,212.—FRUIT DRIER—E. F. Schneider, North Yamhill, Or.
628,360.—STOCK FOR FIRE ARMS—O. O. Scripture, Prescott, A. T.
628,127.—IRRIGATING SYSTEM—W. H. SHINN, Los Angeles, Cal.
628,149.—SPRING MOTOR—C. Sinclair, Hawthorne, Nev.
628,375.—STAPLING MACHINE—N. S. Wakefield, Pomona, Cal.
628,055.—TRACE CLASP—I. Whealdon, Planview, Or.
31,149.—DESIGN, SHAFT IRON—F. L. Lowe, Orting, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FINGER TOOTH BRUSH.—C. W. Richards, San Francisco, Cal. No. 628,185. Dated July 4, 1899. This invention relates to a brush for cleansing the teeth. It consists essentially of a removable tip which may be fitted upon the finger or upon a handle of any description, this tip having bristles or like cleansing devices affixed to the exterior end and adapted to cleanse the teeth. The points of the bristles are made converging so that they will enter crevices between the teeth and the rubber or elastic tip protects the teeth from being struck by the handle when used therewith, and when used upon the finger it gives a very convenient and flexible means for cleaning the teeth.

MACHINE FOR FILLING AND FOLDING PACKAGES.—John M. Howe, San Francisco, Cal. No. 628,178. Dated July 4, 1899. This invention relates to an apparatus which is designed to form packages from long strips of paper and fill the packages with powder or other material. It consists of a stationary table or carrier, a slide, a crank shaft and pitman connecting with the slide to reciprocate it, and connections by which the feeding mechanism is reciprocated from the main slide. A vertically reciprocating folding plate is actuated by a bell crank lever connected therewith, and a pin on the crank shaft engages the lever and depresses the plate at each revolution of the crank shaft. Material to be filled into the packages is supplied from a suitable hopper and the edges of the strips are turned up and folded over the material.

Commercial Paragraphs.

F. A. HUNTINGTON has this week shipped four Huntington roller mills to the Western Iron Works, Basin, Montana; also one mill to the App Con. M. Co., Jamestown, Tuolumne Co., Cal.

CHAS. B. BOOTHE & Co., 126 South Los Angeles street, Los Angeles, Cal., Schaw, Ingram, Batcher & Co., 27 Main street, San Francisco, Cal., and 219 J street, Sacramento, Cal., are agents for the Jackson Drill & Mfg. Co., Denver, Colo.

CONTRACTS were closed by the Denver office of the Edward P. Allis Co. last week for a 100-ton concentrating mill for the Colorado Milling & Concentrating Co., Rico, Colo., and for a 50-ton cyanide mill for the Nevada & Utah Exploration M. Co., Norris, Montana.

Obituary.

PATRICK KERVIN, a well-known mine operator, died at San Jose, Cal., on the 11th inst., aged sixty-one. He had for some years been Supt. of Con. Virginia, Best & Belcher, Gould & Curry and Utah mines in Nevada. For a number of years he was Supt. of the Ontario mine at Park City, Utah. He returned to the Comstock in '88.

Like A Home In Oakland?

A nice home for your family in a choice part of Oakland. Good schools and churches. Forty minutes from San Francisco. Climate perfect. A cosy cottage built with special view to convenience for the owner's own use. Five large rooms and large, well-lighted attic and servant's room. Good laundry separate from house. Large grounds and fruit trees. Price $3500, or to rent for $25. Three adjoining lots very cheap. Easy terms. This is a very sunny, cheerful place. Address A. L. T., this office, or call at 1601 8th Ave., East Oakland.

Amalgamated Copper Plates.

TO THE EDITOR:—I desire to call your attention to the fact that the article on "Amalgamated Copper Plates" credited to me in your issue of July 1st was written and first printed in 1871, when silver-electroplated copper plates had just begun to be used, and when many mill men thought them too expensive and, frequently, "no good." But, wherever applicable, the methods and results therein set forth are just as true and valuable to-day as then.

Especially is this the case where, as far too often seen, the coating of silver has been worn or peeled off and the base copper exposed, or only covered with an exceedingly thin film of mercury on a smooth, hard surface, occasionally heightened by the too liberal application of solution of cyanide of potassium. It seems almost superfluous to say that ignorance and laziness are the causes of these conditions.

Either replace the old worn plates with newly silvered plated plates or give them such treatment as will cause them to hold more mercury and amalgam.

A word or two as to the preparation of silver amalgam: In 1871 it made little difference in cost of the amalgam whether coin, granulated or sheet silver was used. But now an equal weight of silver in coin costs twice as much in gold as it does in the other shapes. The copper in the coin does not get into the amalgam. It is a pure amalgam of silver and mercury, if the latter be pure.

After dissolving the silver in nitric acid it need not be crystallized, but the mercury may be submitted to its action by putting it into the vessel containing the silver solution, or vice versa.

The action is this: Some of the mercury, the chemical equivalent quantity, displaces the silver by appropriating its NO_3 and entering into solution to form mercuric nitrate ($Hg2\ NO_3$), and the precipitated silver is absorbed by the free, unappropriated mercury. About equal weights of silver and mercury thus change places. There must be enough free mercury present to form the liquid amalgam, from which the surplus mercury may be strained. If during the action a yellow deposit of mercurous nitrate forms, add a little nitric acid to the solution and stir with a rod of glass, or wood, to dissolve it.

After the silver has been all precipitated the solution should be put into another vessel, and the mercury recovered from it by suspending scrap copper in it. The copper will enter into solution and set the mercury free.

I notice a typographical error in the article. The sentence beginning at the bottom of the second column should read: "The worst form of discoloration of plates proceeds from the action of sulphates *of* iron and copper present in many ores from the natural decomposition of the pyrites."

N. S. KEITH.

San Francisco, Cal., July 3d, '99.

Electrolytic Copper.

A large amount of copper produced in the United States is now refined electrically, and is known as electrolytic copper. Some of the Western works turning out this product, especially where water power is obtainable, are very large. One of them at Great Falls, Montana, has nine dynamos of a total of about 2500 H. P., all driven by the Missouri river, which there rushes through a deep gorge. The copper is ground up and cast into pigs, and the pigs are then hung in large tanks filled with a solution consisting chiefly of copper sulphate. A heavy electric current at low pressure is passed through the series of tanks, decomposing the copper pigs, and the metal is electrolytically transferred by the solution to sheets of copper hanging in each tank, so that practically the sheets are copper plated. The metal obtained is very pure. The refuse, which falls to the bottom of the tanks, is rated at $2500 a ton, and it is said that the gold and silver obtained from it pays the cost of the electric process. —Electricity.

The Copper Output.

The Marquette *Mining Journal* says: "The production of copper in this country for May shows an actual decrease compared with that for the same period a year ago. The production from Jan. 1st to June 1st has increased 1380 tons over that of the same period a year ago. The figures are significant in view of the belief that production had been greatly stimulated by the high price. Thus far the increase in this country over last year is shown to be about 275 tons per month and it is now clearly evident that the 10% increase in the Lake product which has been maintained for several years will not be met the current year. The country's output of copper for May was 22,082 tons, against 19,954 tons in April. The increase is largely due to Anaconda output. It is claimed that the consumption of copper this year has increased 20%, while stocks of spot copper, both in this country and Europe, have been greatly depleted. In fact, all the leading copper mines are said to be sold ahead at least until September 1st. The supply of copper in London has become a serious question, as it would only fill the normal demand for a few weeks, and instead of the price now worrying the manufacturer, it is the question of keeping supplied, as copper is being used in enormous quantities to-day in America in telegraph and telephone circles, and in the event of any large and important extension of lines being undertaken the question as to where sufficient copper to meet the requirements could be obtained is said to be a serious one. Copper is shipped from the local smelters as fast as turned out and no supplies are kept on hand."

The copper situation at this time differs widely from that of 1887. The production of copper in the United States in 1887 was 81,017 tons; in 1888 it was 101,054 tons; in 1889, 101,239 tons. In 1898 the production of the United States was 235,790 tons; the net foreign imports (free of duty) were 14,114 tons. The home consumption in 1898 is estimated at 114,000 tons, and the exports of domestic copper were 134,387 tons, making a total of 248,381 tons, leaving on Dec. 31st an apparent stock on hand of that year's production and imports of only 309 tons, while the average rate of consumption was 2192 tons per week. The advance in the price was the natural sequence of the discovery that the demand was in excess of the supply. To what extent production will be stimulated by the higher price of copper is unknown. The output of the American mines increased from 81,017 tons in 1887 to 101,054 in 1888, but this gain was nearly all made from mines already opened and in operation. It takes a year or two to open any good mines, and it is believed in the trade that production cannot grow faster than consumption.

THE Coolgardie district, in Western Australia, has organized and incorporated a chamber of mines, the objects of which are stated to be as follows: To protect and promote the mining industries of the West Australian gold fields; to consider all questions connected with the mining industry, and to promote public discussion thereon; to promote and oppose legislative and other measures affecting the mining industry; to collect and circulate statistics and other information relating to the mining industry; to communicate with and exchange information upon mining matters with chambers of mines or Government departments of mines in Western Australia or elsewhere; to establish and maintain a library and museums of models, specimens, designs, drawings and other articles of interest in connection with the mining industry, or for the use of members; to act as arbitrators in the settlement of any dispute arising out of mining.

THE Massachusetts Institute of Technology receives, under the will of the late R. C. Billings of Boston, a bequest of $100,000, and an additional $50,000 to establish a fund to assist students who do not use liquor or tobacco.

The Iron Ores of the Urals.

The more progressive commercial policy of the Russian Government, which has for its object the opening up of the latent resources of the empire, has recently invited attention to her mineral wealth in directions which have not hitherto attracted very much notice. Among these may be mentioned the iron ore deposits of the Urals, which have hitherto, to a large extent, remained untouched, owing both to the inaccessibility of the regions in question and to the supremely backward state of metallurgical practice, as it has, until very recently, existed in the interior of the empire. In both these matters a considerable improvement has recently taken place.

One of the leading features of the new departure in Russian policy has been the extension of the Imperial railway system, and with the attention of the foreign mining engineer and the influx of foreign capital, a rapid advance is sure to take place in this particular section of Russian industry. The richness of the ores varies a good deal, from 45% to 50% on the western slopes to 60% and 65% in the interior districts.

In the middle Urals the ore deposits are in a higher state of development than elsewhere, and the district has, moreover, the additional advantage of having its mineral richness concentrated within a narrower area. It will easily be imagined that the appliances in use in the mines on the Ural mountains are not of the highest and most modern order. Some few of them are, indeed, fitted with fairly modern mechanical appliances, but the great majority are of a very primitive character, and horse and hand power remains the principle of operation. In times of agricultural depression the peasant takes an occasional turn at mining, a fact which is striking evidence both of his adaptability and of the rough modes of operation in use in the Russian mineral fields. Should the European capitalists take an interest in the development of this promising industrial territory it will not be long before a considerable and far-reaching change has been worked in the methods adopted there for winning the iron deposits which exist in such rich abundance.—London Mining Journal.

Mineral Resources of Mexico.

There are in Mexico 8644 mining properties, says *Modern Mexico*, divided among twenty classes, as follows: Gold, 828; gold and silver, 1675; gold and copper, 54; silver, 4024; silver and copper, 156; silver and lead, 1035; silver and iron, 42; silver and manganese, 2; copper, 501; copper and lead, 6; copper and iron, 49; lead, 19; lead and iron, 7; iron, 99; antimony, 19; tin, 8; mercury, 85; sulphur, 20; opal, 13; rock salt, 2.

These mines are divided among twenty-five States and Territories as follows:

STATES AND TERRITORIES.	Total number of mines.	Gold	Gold and silver	Gold and copper	Silver	Silver and copper	Silver and lead	Silver and iron	Silver and Manganese	Copper	Copper and lead	Copper and iron	Lead	Lead and iron	Iron	Antimony	Tin	Mercury	Sulphur	Opal	Rock salt
Aguascallentes	74				30	10	2			31			1								
Chiapas	1			1																	
Chihuahua	923	43	171	6	376	30	248	12	1	12		4	2	2	6	4		6			
Coahuila	319	30	27	5	81	25	133	3	1	5	4	3	1	1							
Durango	1,375	18	407	4	637	19	228	7		20			1	1	23		4	2	4		
Guanajuato	532	1	244		271	2	9								1		2	2			
Guerrero	258	41	25		119	4	46	3		6					1			13		1	
Hidalgo	499	6	4		435	3	39	1					7		4						
Jalisco	336	32	80	12	168	12	1			13	2				15			1			
Mexico	198	14	17		142	1	9	2		6					4			1	1		
Michoacan	234	19	45		113	7	5	4		31		4			2			2		3	
Morelos	37		1		34										2						
Nuevo Leon	188				45	1	121	4				3	1	3	10						
Oaxaca	304	78	94		117		3			4		3			5						
Puebla	46	8	4		22	1	7			2			1		1						
Queretaro	50	1	12		17		5	2				1			3					9	
San Luis Potosi	230	2	2		100	13	47			5					12	1	47	1			
Sinaloa	350	89	113	3	127		16								2						2
Sonora	1,128	286	245	17	414	17	45			115					5			2			
Tamaulipas	158	2	10	5	22		8	1		108		2									
Veracruz	14	2			1							8			3						
Zacatecas	996	17	152		643	9	60	3		89		9			4		1	9			
Territory of Tepic	86	4	12		59		3					8									
Territory of Lower California	299	155	9	2	50	2				54		1			12				14		
Federal District	9				1							8									
Totals	8,644	828	1,675	54	4,024	156	1,035	42	2	501	6	49	19	7	99	19	8	85	20	13	2

Oak Bark in Boilers.

Though oak bark does to a certain extent prevent scale, yet it requires to be used with very great caution indeed, or serious injury to the boiler may result. The tannic acid of the oak is very apt to settle in quiet places where the circulation is deficient and cause pitting. A case is recorded where oak bark was used and the boiler on being opened up a month afterwards was found in many places to be covered with patches of holes varying in diameter from ¼-inch to ⅝-inch. These holes were round, just as if they had been drilled with a drill, and were filled with strong corroding acid from the oak. Of course, the holes were thoroughly cleaned out and filled up with Archangel tar and cement. This shows the danger of oak bark as a scale-preventing medicine. A far safer and better remedy for scale is just common soda crystals. For every 100 gallons of water use ¼-pound of the soda. This is perfectly safe for the boiler, and prevents the scale from increasing to a dangerous thickness. A thin scale not more than about $\frac{1}{16}$-inch in thickness is beneficial to the boiler and assists in protecting it from its most dangerous enemies—rust and pitting. —Mechanical World.

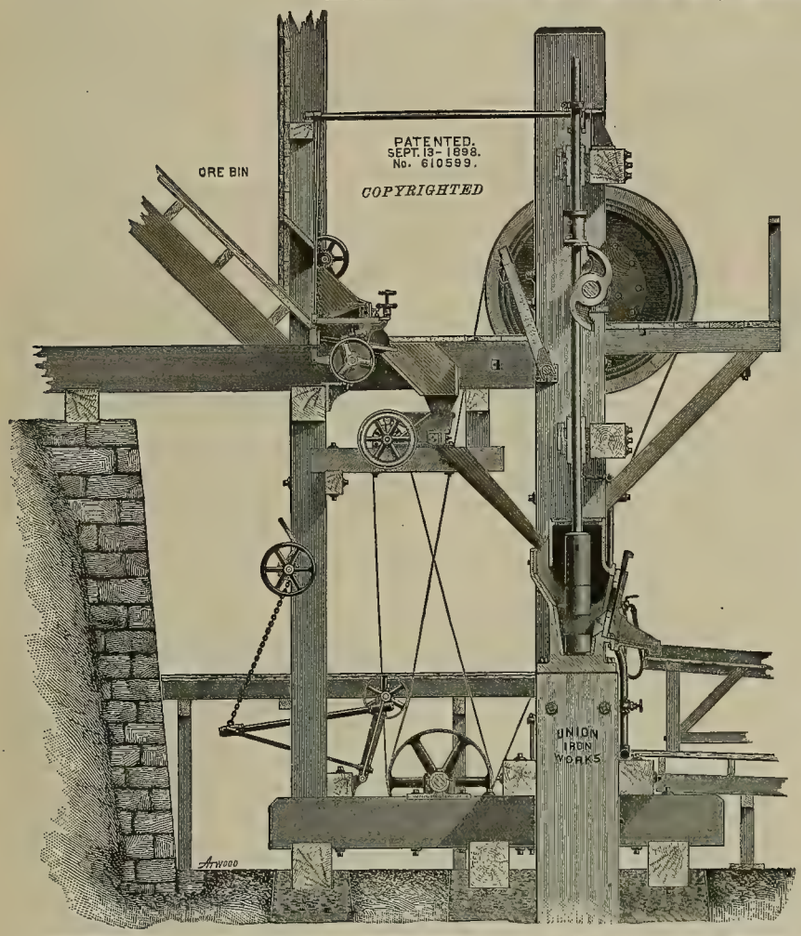
End of the Golden Marine Co.

It is now stated in Boston that the discouraged stockholders in the Electrolytic Marine Salts Co., as the Rev. F. P. Jernegan's sea water gold concern was called, who sold out their holdings for 10 to 20 cents a share, now wish that they had not been so precipitate. The committee appointed to adjust affairs have discovered, so it is alleged, assets enough to pay one dividend of 20%, to declare another of 10%, and to hold out good expectations of another of 5%, to be paid early in the fall. The committee has also succeeded in selling the property at Lubec, Me., where the alleged secret process of transmuting sea water into gold went on, to a resident of the Hub who will convert it into a summer resort. This latter enterprise will undoubtedly prove more remunerative in the long run than the sea water gold scheme. This is a more happy ending to a gold-from-sea-water scheme than might have been anticipated.

AN immense project has just been undertaken by the Lake Superior Power Company. Is is the developing of 60,000 H. P. at Sault Ste. Marie, Ont. Contracts for the power stream have recently been awarded to the Mason-Hoge Company of Chicago, Hubbell & Co. of Saginaw, Mich., and E. D. Smith & Co., of Philadelphia, Pa. The contracts already let aggregate $2,000,000. The power stream will be one mile and a quarter in length, 200 yards in width, and the water will be 19½ feet in depth. Already 500 men are employed in the undertaking. A manufacturing establishment covering an eighth of a mile of ground area will be erected at once.—Electricity.

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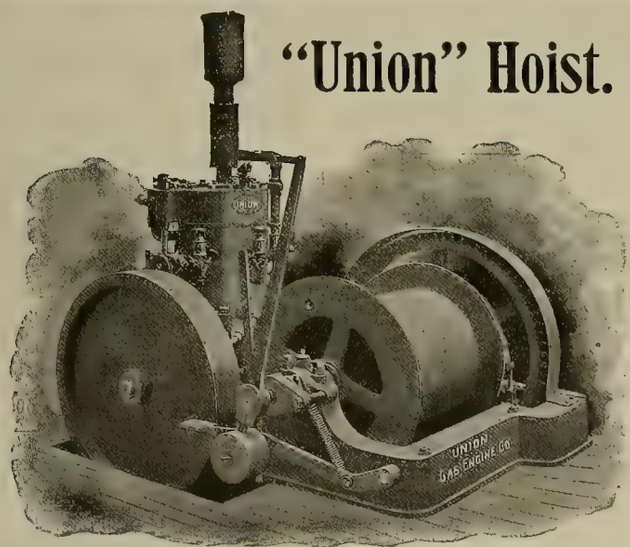
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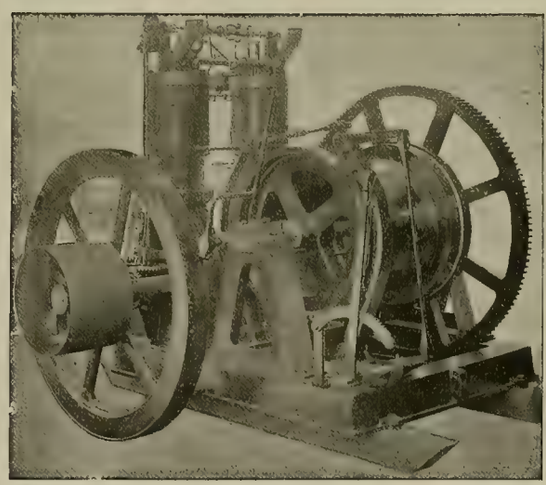
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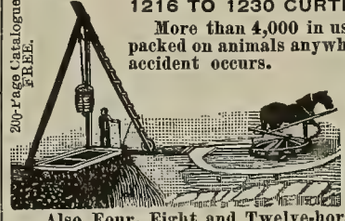
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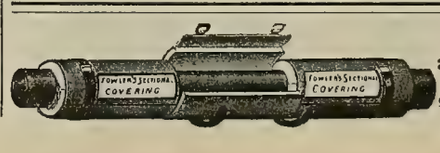
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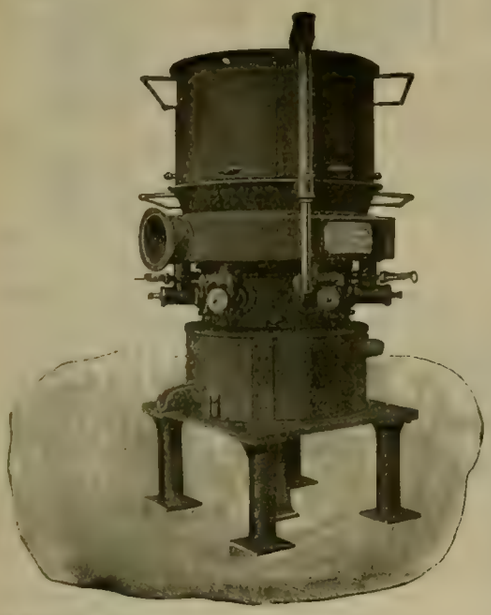
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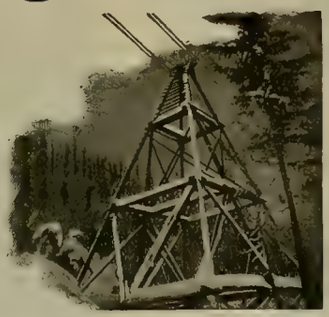
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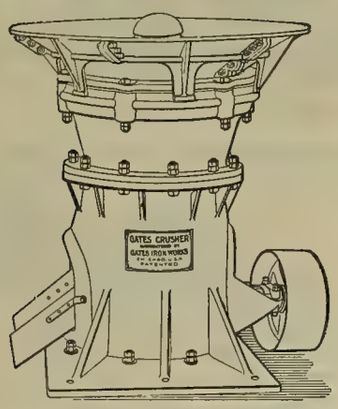
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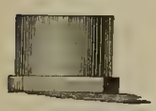
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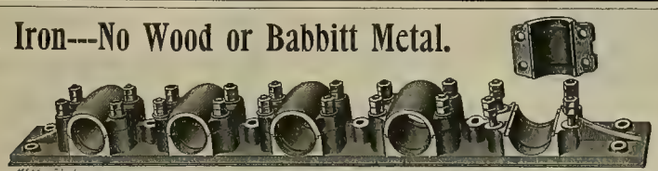
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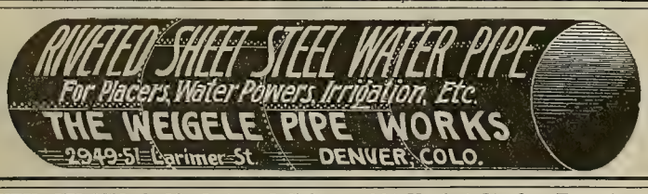
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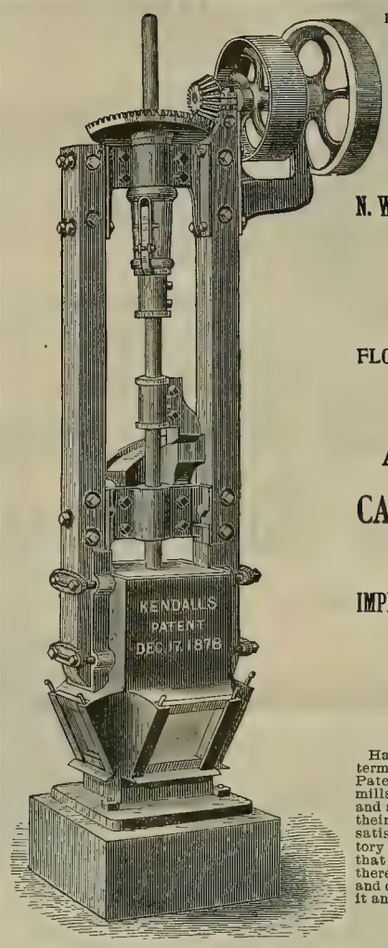
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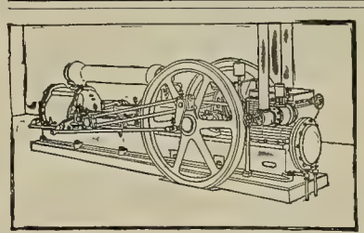
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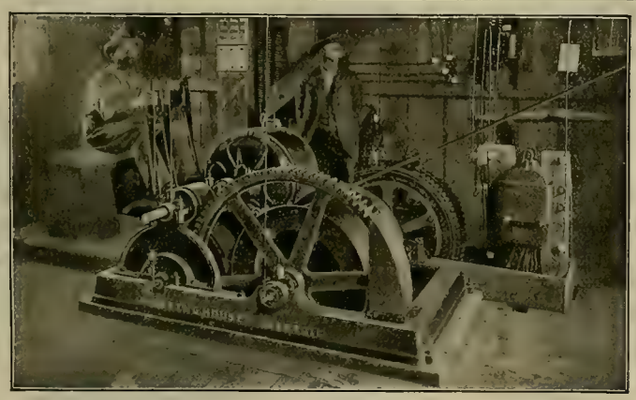
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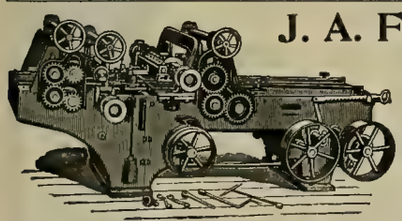
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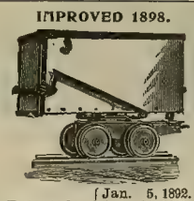
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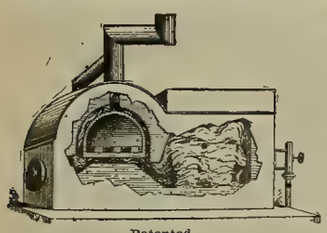

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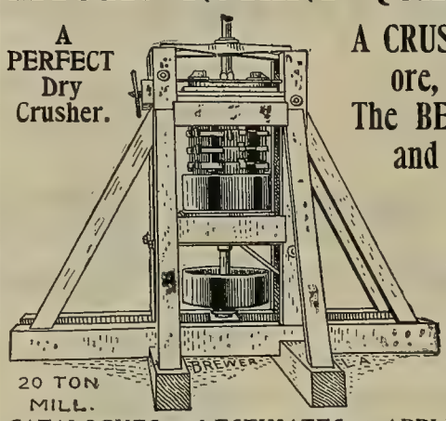
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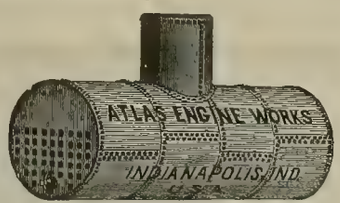
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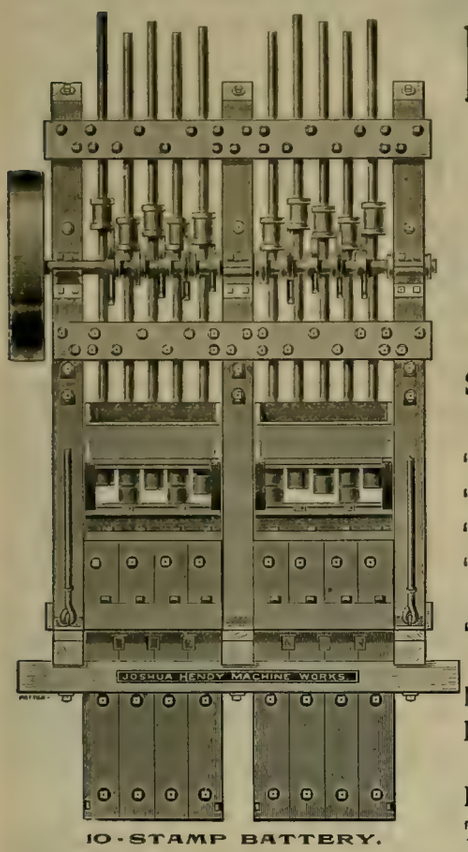
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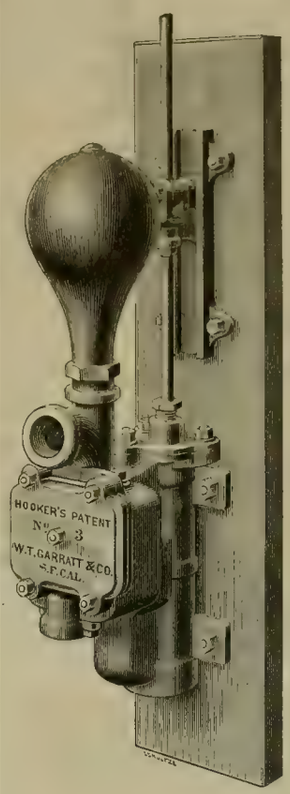
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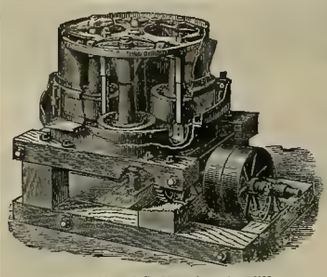


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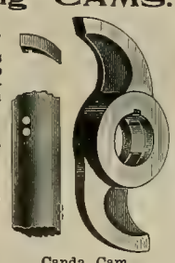
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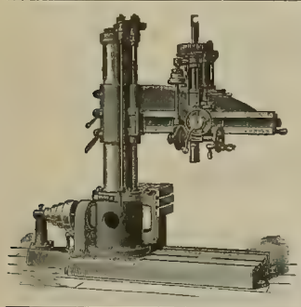
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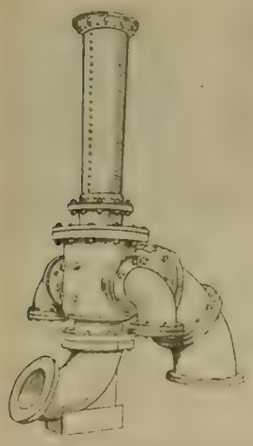


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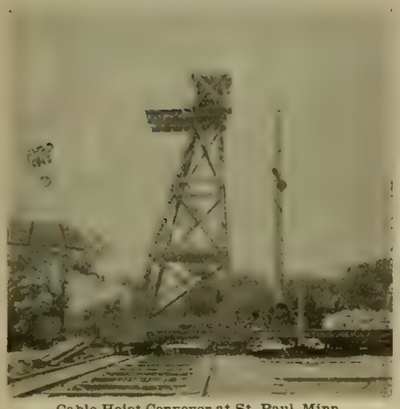
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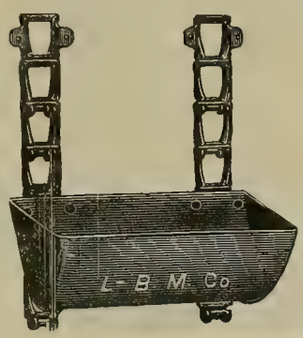
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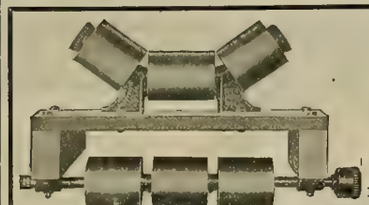
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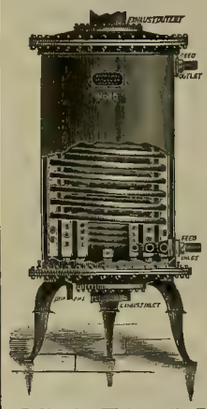


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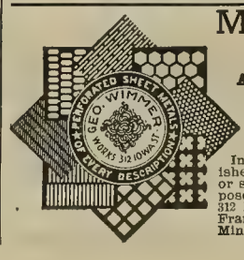


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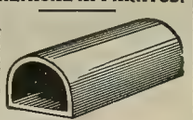
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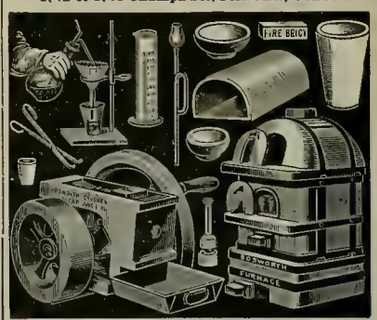
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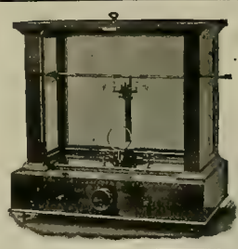
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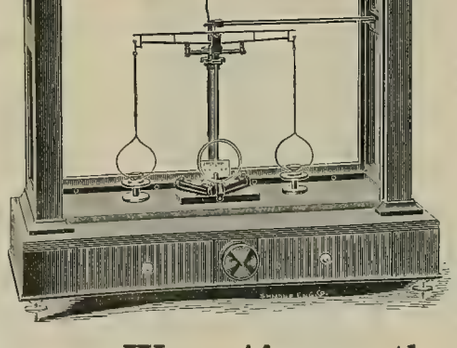
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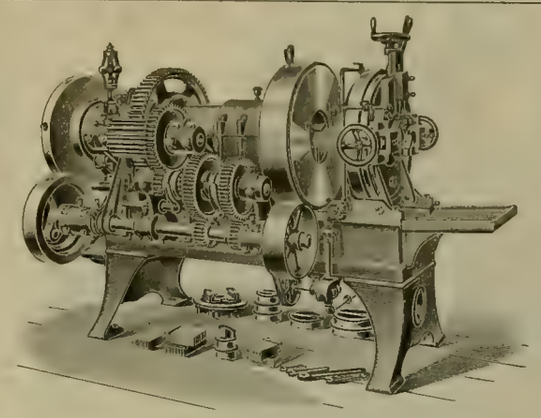
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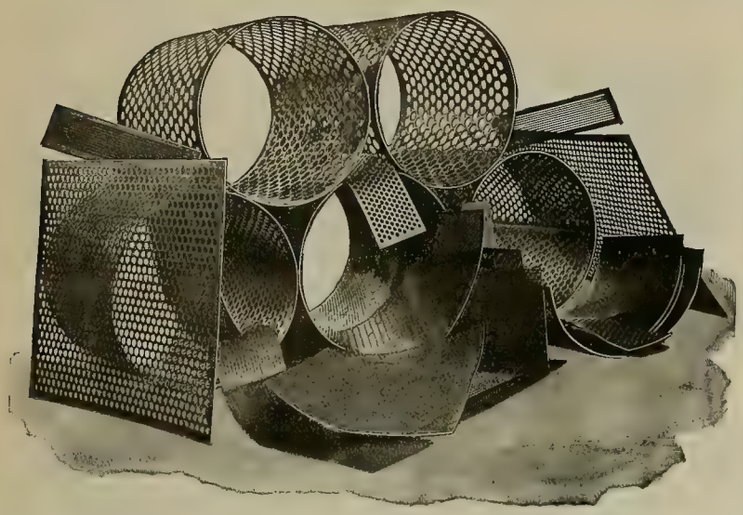
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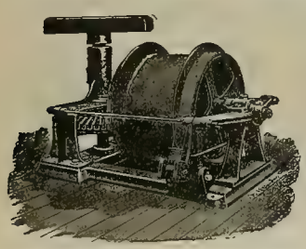
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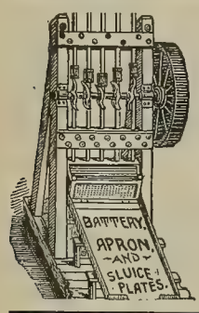


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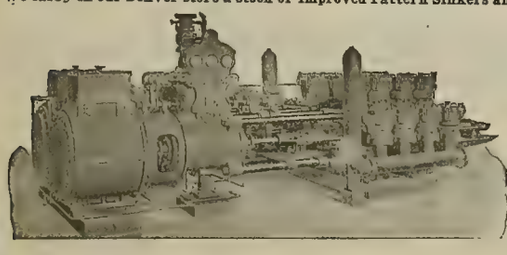
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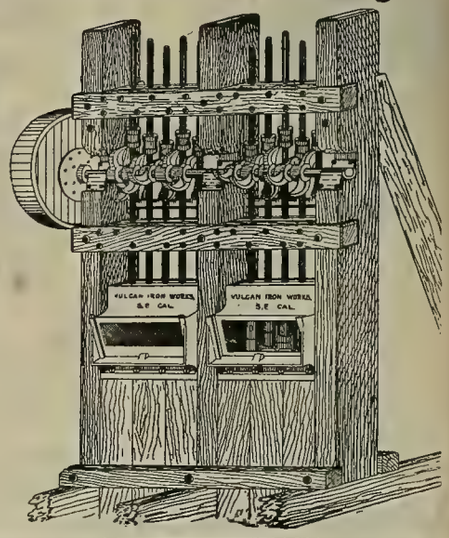
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Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

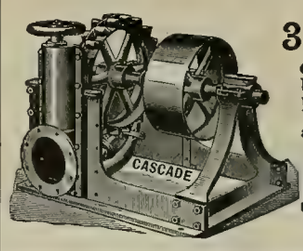
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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.

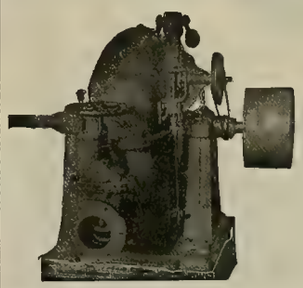


Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.



JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

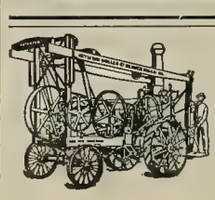


TUTTHILL Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

Write for Catalogue.

OAKLAND IRON WORKS,
330 Market Street,
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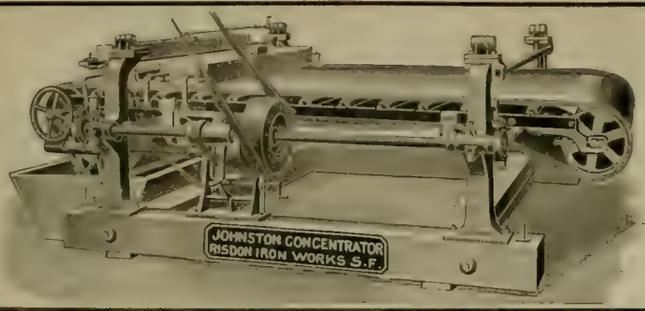


For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

Write for Catalogue and full information.

KEYSTONE DRILLER CO., Beaver Falls, Pa.



THE JOHNSTON CONCENTRATOR.

DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

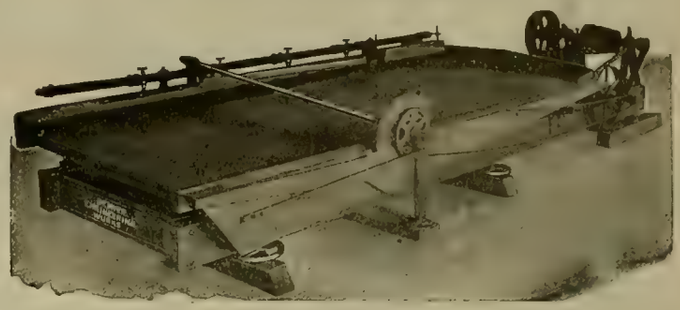
Send for Catalog No. 14. RISDON IRON WORKS, Howard and Beale Sts. San Francisco, Cal., U. S. A.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

The perfect vanner motion given to the pulp by our head motion, together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes. : : : : : : : : : : : : : : : : :

The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings. : : : : :



Thoroughly Protected by Strong Patents. Write for Circular.

Denver Engineering Works,---Shepard & Searing,---Sole Manufacturers,
30th and Blake Streets, - - - - DENVER, COLORADO.

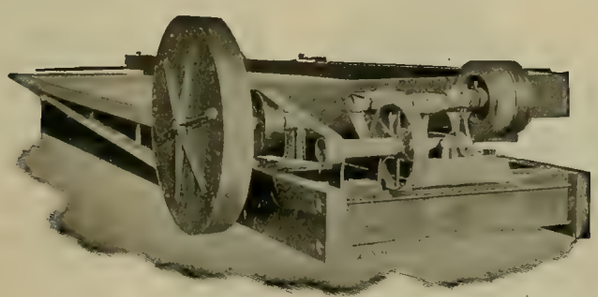
WHITE, ROGERS & CO.,

Consulting Engineers and Millwrights,

OFFICE, 306 PINE STREET, - - SAN FRANCISCO, CAL.

Sole Pacific Coast Agents and Builders of the Celebrated

WILFLEY CONCENTRATOR.



The Wilfley Table is fully covered by U. S. patents Nos. 580,338 and 590,675. Infringements will be prosecuted to the full extent of the law.

PRICE, $450, F. O. B., San Francisco.

One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

Some Practical Reasons Why the Wilfley Concentrator Should Be Used in Gold Mills:

1. It will successfully handle three or four times more material than any belt Concentrator made, without exception.
2. It will save more sulphurets in proportion while so doing, and catch any float gold, amalgam or quicksilver which may escape from mortars or plates.
3. It will make cleaner and much more valuable concentrates, thus saving useless expense for transporting valueless material, as also extra cost for treatment.
4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

—— SEND FOR CIRCULARS. ——

These Machines are Kept in Stock Ready for Immediate Shipment.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

P. & B. RED PAINT.

$1.00 per gallon in barrels, $1.10 per gallon in cans.

Like our P. & B. Roofings and P. & B. Building Papers, this is of first quality.

A little higher in price, perhaps, but the very best.

TRY A SAMPLE ORDER.

PARAFFINE PAINT CO., Makers, San Francisco and Los Angeles.

THE MARION STEAM SHOVEL CO.,



Steam Shovels Dredges and Traction Dredges

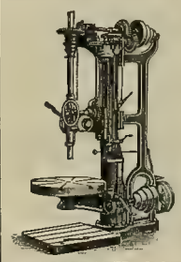
Suitable for all kinds of Excavating Work, making a specialty of

PLACER MINING MACHINES,

separate or self-contained, either as a dry land excavator or floating dredge.

The Marion Steam Shovel Co. MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.



NEW HAVEN Manufacturing Company,

NEW HAVEN, CONN.

Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Market Reports.

SAN FRANCISCO, July 13, 1899.

SILVER.—London, 27 11-16d; New York, 60⅝; San Francisco, 60⅜; Mexican Dollars, 49¾ @50¼; New York exchange, sight, 12½; telegraphic, 15 cents premium.

The recent reports which indicate that the Chinese copper coins known as "cash" are disappearing because of their appreciating value and that silver coins are to fill the vacancy thus created in the currency of China lends special interest to a statement recently prepared by the Treasury Bureau of Statistics regarding the currency of China. The money of China, it says, is uncertain as to quantity and quality. No accurate estimate has been made of the amount of money in circulation in the Empire, while no accurate statement can be made to-day of what its value will be to-morrow. Based upon silver, its value fluctuates with the changes in the market price of silver. The copper cash, valued at about one-tenth of 1 cent, is the actual circulating medium; the "tael" is the nominal standard for larger sums, it being merely a given weight of silver, and a coin. Actual silver circulates in two forms, the "dollar" and the "sycee." The dollar was originally the Mexican dollar, and became a popular and generally accepted form of currency wherever obtained. So convenient was it that large quantities were imported for use as currency. More recently, however, mints for the coinage of dollars purporting to be of weight and fineness equal to Mexican dollars have been established, not by the central government, but by the authorities of the various provinces, and the result is that the rivalry between these provincial mints has reduced the weight and fineness of the dollars which they issue until the provincial silver dollars are looked upon with distrust. Additional mints, however, are being established, the machinery for them being from the United States. Some half dozen of the cities of China now have their mints for the coinage of dollars, and work is in progress upon local mints in other cities, so that by the end of the present year, it is found that at least ten different kinds of silver coins purporting to be dollars will be upon the market. In addition to this uncertainty may be pointed out the fact that the tael differs in various cities and provinces, the weight of silver recognized as a tael being greater at some points than at others. The consequence is that while the Haikwan, or customs, tael was worth, on January 1, 1899, 72.2 cents (gold), the Amoy tael was worth, but 71 cents, the Canton tael 70.8 cents, the Chinkiang tael 69.3 cents, the Ningpo tael 68.2 cents, the Chefoo tael 67.9 cents, the Hankow tael 66.4 cents, the Foochow tael 65.6 cents, and the Shanghai tael 64.8 cents. Even the sycee, which is an actual quantity of silver cast in the form of a shoe with the weight written upon it in Chinese characters, is somewhat uncertain as to its value, both by reason of the constant fluctuation in the price of the silver which it constains and the uncertainty as to the fineness of the silver utilized.

All efforts to learn the exact fineness of the standard silver used in the sycee have been unsuccessful, though the estimates put the rate at ninety-seven one-hundredths, which is considerably in excess of the American coin, which is ninety one-hundredths fine. The sycee is merely an indefinite quantity cast in the form of a woman's shoe, its actual weight being determined by agents or officers appointed by the merchants to weigh the sycees, accuracy and integrity on their part being insured by actual physical decapitation of those who are found dishonest. Even the cash, a copper and zinc coin about the size of our 25-cent piece, having a square hole in the center for convenience in stringing quantities of them together, varies greatly both in fineness and weight, in some cases 1000 of them being equal to a dollar, while in others nearly 2000 are required to equal a dollar. Gold coin is practically unknown in China, no coins of this metal being made at the mints, and gold coins of other countries have seldom, if ever, circulated, though the value of the metal is fully recognized, and gold, whether in coin or bulk, proves a medium of exchange upon determination of its weight and fineness when occasion requires.

The uncertainty as to the quality and quantity of the metals contained in the various coins and measures of weight makes an attempt to indicate the relative weight of the monetary units difficult and somewhat uncertain, though a recent official (consular) statement puts the relative values as follows:

10 cash.....=1 conderin.
10 conderin.=1 mace.
10 mace.....=1 tael.
1 tael.....=1½ ounces (avoirdupois) of silver.
(Value of Haikwan tael on Jan. 1, 1899, 72.2c.)

Mexican dollars and local dollars thus equal about three-fourths of one haikwan tael in value, though no official relationship exists save in the weight and fineness of metal in the dollars compared with the standard tael.

All customs duties are collected in what is known as the Haikwan tael, which has a somewhat higher value than the tael standard accepted in the respective cities.

The following table shows the value of the taels of the respective provinces where issued, April 1, 1899:

Amoy	70 2c
Canton	70.0c
Chefoo	67.2c
Chinkiang	68.6c
Fuchau	65.0c
Haikwan (customs)	71.4c
Hankow	65.7c
Niuchwang	65.9c
Ningpo	65 5c
Shanghai	64.1c
Swatow	64.9c
Takao	70.7c
Tientsin	68.0c

LEAD.—New York reports firmer, $4.55 bid, $4.60 asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¼c; bar, 6.50c.

COPPER.—New York reports Lake unchanged at $18.25 bid, $18.50 asked; brokers' price, $18.50; mill copper plates, 23½c.

The report on the production of copper in 1898 has just been submitted to the United States Geological Survey by Special Agent Kirchoff. The production of the United States in that year was 526,375,591 pounds, which is by far the largest production ever reported. The increase in the production of copper was largest in Arizona, while the Lake district also recorded an advance. Montana fell off considerably.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—12½@13c per pound.

TIN.—Quiet, $27.87½ bid, $28.25 asked; pig, 31c per lb.; Bar, 35c. New York weak, $23.35 bid, $25.50 asked.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8½c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½ @5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¾@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₰ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.08 per gal.; bbl., $1.03; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ....)	11¾	12¼
6 and 9 thread (¼ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 13, 1899.

9:30 A. M. SESSION.

200 Andes	16c	200 Overman	12c
200 Best & Belcher	53c	600 Potosi	43c
100 Con. Cal. & Va.	$2 05	100 Union Con	39c
100 Crown Point	25c		

2:30 P. M. SESSION.

150 Best & Belcher	52c	100 Sierra Nevada	61c
700 Con. Cal. & Va.	$2 05	100 Utah	12c
100 Chollar	23c	200 Bullion	07c
300 Potosi	43c	600 Justice	07c
200 Crown Point	25c	100 Standard	$2 40
650 Belcher	23c		

Recently Declared Mining Dividends.

Grass Valley, Cal., Exploration Co.; 25 cents per share; payable July 20.

Bullion-Beck, Utah, $10,000; July 15.

Centennial-Eureka, Utah, $15,000; July 15.

Mercur Co., Utah, first quarter, $50,000; July 10.

Silver King, Utah, $50,000; July 10.

Grand Central, Utah, $37,500; July 10.

Swansea M. Co, Utah, $5000; July 10.

Gwin Mine Development Co., dividend No. 8, 5 cents on 100,000 shares, $5000; July 11. Total to date, $76,500.

United Zinc & Lead Co., 2% quarterly dividend on preferred stock; July 15.

Missouri Zinc Fields Co., regular monthly dividend, ⅔ of 1% on preferred stock; July 10.

Vindicator Con., Colo., sixth quarterly dividend, $5 per share; payable July 20. Total to date, $253,750.

Highland, South Dakota, $20,000; July 15, making $140,000 this year and total of $3,924,700.

Portland, Cripple Creek, Colo., $60,000; July 15, making $420,000 this year and $2,257,000 in all.

Strong, Cripple Creek, Colo., $25,000; July 15, making $175,000 this year and $700,000 in all.

War Eagle, British Columbia, $26,250; July 15; $183,750 this year and $361,500 in all.

El Dorado, El Dorado Co., Cal.; dividend No. 1, $10,000; payable July 20.

Recent Mining Incorporations.

Hibbing M. Co., San Francisco; capital stock, $100,000; J. W. Hamilton, J. C. Anthony, T. J. Ryan, H. L. Norton, H. Barto.

San Francisco Oil Co., San Francisco; capital stock, $300,000; C. Reis, A. Vrooman, H. C. Tilden, C. Kroeger, W. H. McKenzie.

Cygnet Petroleum & Development Co., San Francisco; capital stock, $150,000; J. C. E. Hebbard, C. J. Heggarty, C. A. Lee, J. C. McElroy, I. N. Hyde.

Star Oil Co., San Francisco; capital stock, $300,000; E. B. Holdan, S. H. Daniels, H. Van Bergen, H. Francis, G. W. Terrill.

Esperanza G. M. Co., San Francisco; capital stock, $200,000; W. A. Clark, Berkeley; S. Salomon, R. Stevenson, San Francisco; J. Y. Miller, East Oakland; F. Enzensperger, Sonora.

The North California Investment Co., Redding, Cal.; capital stock, $300,000; J. A. Stephens, San Francisco; J. E. Isaacs, Redding; W. L. Bayha, C. Dobblestein, Stillwater; G. Bayha, Koln, Germany.

Dewey Con. Gravel M. Co., San Francisco, Cal.; capital stock $12,000; S. M. Sprague, B. Rossi, A. W. Barrett, J. O. Stewart and J. E. Doolittle.

Mines or prospects operated on contract to purchase, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
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MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

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Quicksilver
FOR SALE IN LOTS TO SUIT.
Agents for Redington Quicksilver Mine.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

PROPOSALS ARE INVITED FOR THE CONstruction of a pumping plant and pipe line at Minas Prietas, Sonora, Mexico. Length of line, about 16¼ miles; delivery 275 feet higher than intake; capacity 300,000 gallons per 24 hours, with margin to allow of increase to 600,000 if required; pumping plant of sufficient power to do work required with most economical use of steam, and pipe of suitable strength to allow a safe margin over pressure it may be called upon to stand. Contract for material and installation will be let as a whole, or separate contracts will be made for furnishing material and installation, as the company may determine. For further information, profile of line, etc., address W. T. BARRETT, Minas Prietas Water Co., Torres, Sonora, Mex.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.



FRESNO, June 25, 1898

Hercules Gas Engine Works.
San Francisco, Cal.

DEAR SIRS:—

The fifteen-horse power gasoline engine and hoist purchased from you is doing fine work and is perfectly satisfactory in every respect.

Yours truly,

TUOLUMNE MOTHER LODE M. & D. CO.,

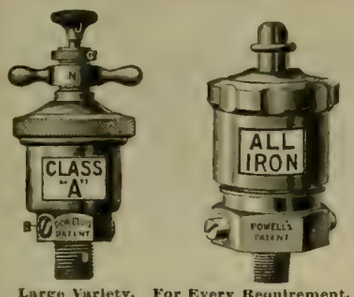
Per N. W. Moodey, Pres.

We have two large books full of testimonials; they speak better for the HERCULES than we can. Our works are the largest in the country. We have built and sold over 3500 engines; they are the standard everywhere. Any size up to 200 H. P. Stationary, Hoisting and Marine

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Manufacturers.

Assessment Notices.

THE OLD BONANZA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of April, 1899, an assessment (No. 1) of two and one-half cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 1) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2:30 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

ROSE CREEK MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 5th day of April, 1899, an assessment (No. 3) of five cents per share was levied upon the capital stock of the corporation, payable immediately, in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of May, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 10th day of June, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMAMS, Secretary

Office—163 Crocker building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 10th day of June, 1899, and the day of sale from the 10th day of June, 1899, to SATURDAY, the 8th day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to SATURDAY, the 1st day of July, 1899, and the day of sale from the 8th day of July, 1899, to SATURDAY, the 22nd day of July, 1899.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 3) has been postponed to TUESDAY, the 1st day of August, 1899, and the day of sale from the 22nd day of July, 1899, to SATURDAY, the 19th day of August, 1899, at the hour of 2 P. M.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, Cal.

BOULDER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of May, 1899, an assessment (No. 3) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 163 Crocker building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of July, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 27th day of July, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. M. WILMANS, Secretary.

Office—163 Crocker building, San Francisco, California

WANTED.—BY A GRADUATE OF CASE School of Applied Science of Cleveland, O., a position as assistant mining engineer, assayer, or chemist. Best of references furnished. Address FRANK B. MARBLE, Bedford, Ohio.

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AS SALESMAN AND BOOKKEEPER IN MINING CAMP. Competent to take charge of store. Address S. E., this paper.

POSITION WANTED by an experienced cyanide man, assayer and chemist, preferably in charge of a cyanide mill. Speaks Spanish. Technical graduate. Can furnish a good assay outfit if desired. Address W. J. P., care of this paper.

Mining Superintendent, Assayer and Millman

of twenty years' experience wishes position. Eight years at last place. Best of reference. Address A. J., care Mining and Scientific Press.

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with eighteen years' practical experience in all branches of mining work, wants position as superintendent, assayer, surveyor or bookkeeper. Address "Cupel," care Mining and Scientific Press.

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WANTED—Second-Hand Huntington Mills,

3½ Ft. or 5 Ft. Must be in good condition. Send age and lowest cash price f. o. b. nearest railroad point, to L. Z., this office.

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DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There is delinquent upon the following described stock, on account of assessment (No. 21) levied on the 1st day of June, 1899, the amount set opposite the name of the shareholder, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Frances A. Sackett (N.Y. issue).	41	100	$25 00

And in accordance with law, and an order from the Board of Directors, made on the 1st day of June, 1899, so many shares of said parcel of stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine Street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 8th day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine Street, Rooms 15 and 17, San Francisco, California.

DELINQUENT SALE NOTICE

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 7th day of June, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. Rehn	77	1,000	$50 00
C. Rehn	161	150	7 50
A. Rehn	176	250	12 50
G. F. Volz	85	1,000	50 00
W. G. Loewe	122	500	25 00
F. B Schuster	139	500	25 00
F. Woenne	154	1,000	50 00
W. F. Hatch	219	100	5 00

And in accordance with law, and an order from the Board of Directors, made on the 7th day of June, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on TUESDAY, the 1st day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received an application from H. W. Tangerman to mine by the hydraulic process in the Clinton Placer Mine, at Clinton, Amador Co., and to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on July 31, 1899, at 1:30 P. M.

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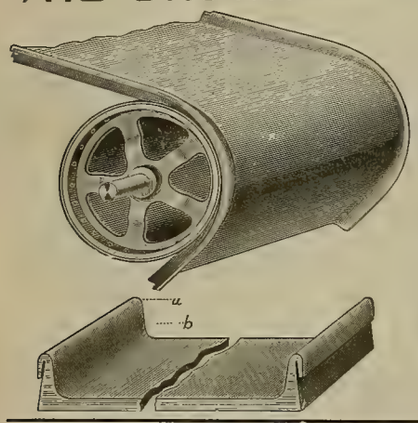
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JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

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By JOHN R. TREGLOAN, Superintendent.

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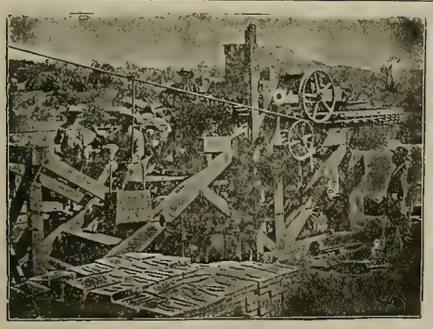
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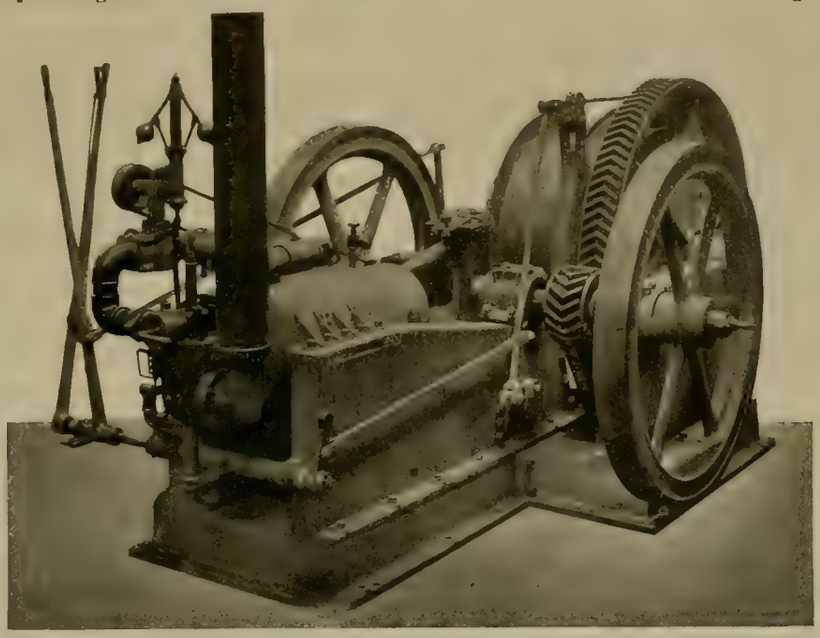
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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2038.—VOLUME LXXIX. Number 5. SAN FRANCISCO, SATURDAY, JULY 29, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Need of Enterprise.

The mines of Colorado are uniformly at a high altitude, few of them being found lower than 7000 feet above the sea and many of them are at an altitude of 12,000 feet and more. In Idaho, Utah and Montana also a large number of the best mines are at high altitudes, and in addition to the drawbacks of high altitude are the rigorous winters of higher latitude; but in each of these States mining is progressive and prosperous. In many of the mines in the States mentioned the ores are not altogether free milling but require crushing and concentration to make their values available, though quantities of ore are rich enough to be shipped without treatment at the mines. The success of these mining regions is wholly due to the spirit of enterprise which characterizes the development of the natural resources of those States and to the activity of the various railroads in competition for mining business which has been so largely profitable to them. In these States no sooner is the value of a newly discovered district demonstrated than railways are built as rapidly as possible to the field and they assist greatly in the development and extension of the producing mining region. In California, for several hundred miles along the high ranges near the crest of the Sierra Nevadas, at an altitude of 7000 to 12,000 feet, runs a great mineral belt which is almost unknown and absolutely undeveloped. The ores are of higher grade than the average of those being successfully worked in the lower hills farther west and the veins much larger generally, but nothing is done with them. The ores are not free milling but are susceptible to treatment by known processes. They are not uncommon ores, consisting generally of the sulphides of iron, zinc, lead and copper, and contain gold and silver. As a class they may be called concentrating ores. If competing railroads were built into these regions undoubtedly many good mines would be opened and become profitable enterprises, and the output of mineral in California would be increased and an industry become established in a new field that would last many years. The snowfall is heavy in these high altitudes, but the drawbacks due to climatic conditions are not nearly as serious as those in many parts of Colorado. The summer season is longer than in Colorado's high mountains and most of the mines of the California Sierras are within or near a magnificent forest of timber and in many places water power is available, and where this is not the case electrical transmission of power is practicable and usually it would be unnecessary to construct long lines. Water for metallurgical purposes may be obtained almost anywhere in this region, where large and permanent springs abound.



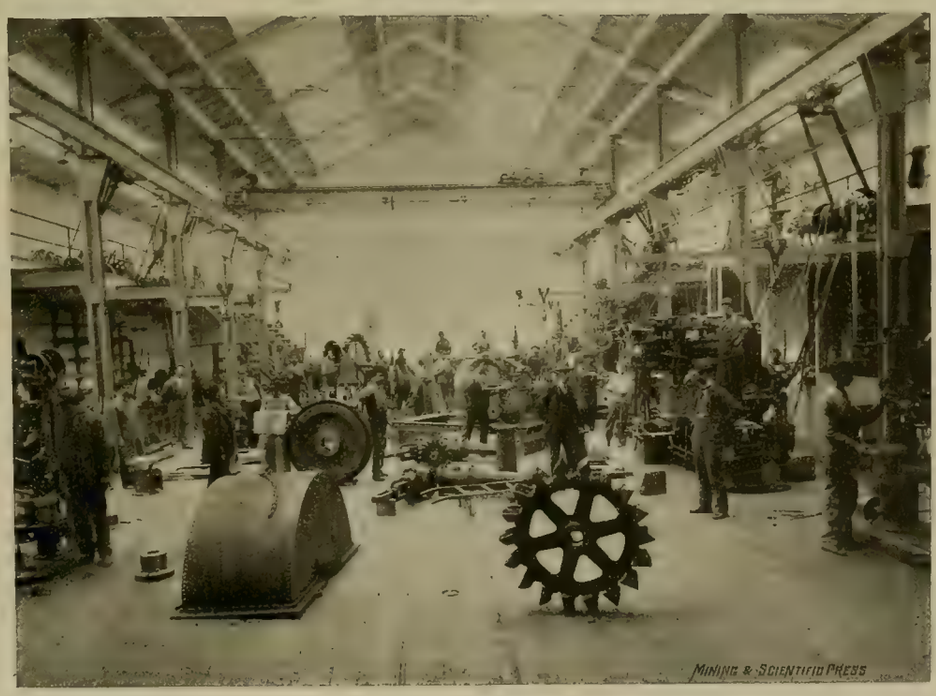
50 H. P. GASOLINE ENGINE FOR A NEVADA MINE.

Gasoline Engines for Mines.

Gasoline engines for hoisting in mines, especially in districts where fuel for steam engines is scarce, are being used more freely each year as mine owners gain confidence in their reliability and find by the experience of others that they are reliable and economical. Herewith is illustrated a hoisting engine recently built by the Hercules Gas Engine Works of San Francisco for the Young America G. M. Co., Tuscarora, Nev., designed to handle a load of 2500 pounds at a speed of 400 feet per minute, the capacity of the engine being 50 H. P. under a brake test. The hoisting drum is 14 inches between flanges, 42 inches diameter; the main gear is 7 feet diameter, 8-inch face; post brakes are intended to afford control of the load at any point; provision has been made for adjustment both of brakes and drum friction. The hoist, as shown in illustration, weighs 14,500 pounds. Gasoline engines for use about mines, where placed in proper hands, have usually given satisfaction and effected a saving in fuel.

New Building of the Pelton Water Wheel Co.

The Pelton Water Wheel Co. have recently erected a four-story brick building on Main St., between Mission and Howard Sts., San Francisco, Cal. The structure is particularly designed for manufacturing purposes and offers unusual facilities for such work. It is equipped with many modern appliances, such as elevators and traveling cranes, pneumatic and electric devices for handling material, etc. The shop portion covers 20,000 square feet of floor space; the entire roof is of glass, affording excellent light. The various mechanical departments are operated by separate electric motors. The general design and arrangement of the building embrace the combined features of modern Eastern machine shops, and for its capacity it has been pronounced by critical visitors to be equal to any structure devoted to mechanical purposes on the Pacific coast. An interior view of the building and machine shop is shown herewith. Besides manufacturing water wheels and other hydraulic apparatus, the company have taken up a general line of high-class work, for which it is well equipped.



INTERIOR VIEW OF THE PELTON WATER WHEEL CO.'S NEW BUILDING.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—50 H. P. Gasoline Engine for a Nevada Mine; Interior View of the Pelton Water Wheel Co.'s New Building, 113. Latest Mining and Metallurgical Patents, 119. Divide Between Little and Big Goose Creeks; Dome Lake Reservoir; Dam at Outlet, Dome Lake; Picturesque Headgate and Dam on a Wyoming Stream; Fall on Big Goose Creek; Drop on Piney and Cruse Creek Ditch, 120. Patent Dust Collector, 122.

EDITORIAL.—The Need of Enterprise; Gasoline Engines for Mines; New Building of the Pelton Water Wheel Co., 113. Where Mistakes Are Costly; Importance of the Petroleum Industry; Trouble of Mine Managers in the Transvaal; Miscellaneous, 114.

MINING SUMMARY.—From the Various Counties of California, Nevada and Other Pacific Coast States and Territories, 123-24-25.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 138.

MISCELLANEOUS.—Concentrates, 115. Metallurgical Machinery, 116. Metal-Bearing Conglomerates; Some Experiences of a Working Miner, 117. How Our "Pictures" Are Made; Worthy of Unanimous Support; The Best in the World: Carelessness in Tamping Holes 118. Latest Mining and Metallurgical Patents, 119. Some Properties of Copper; Conservation of Water, 120. Characteristic Mines of the California Gold Belt; Nickel and Cobalt; Electric Pumps and Pumping, 121. The Gold Belt in Tulare and Kern Counties, California; Charcoal as a Precipitant of Gold from Auro-Cyanides; A Dust Collector; Quicksilver in Oceanica; Experiment with Coarse Crushing, 122. Industrial Notes; Personal, 125. List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recent California Dividends; Recent Mining Incorporations; Commercial Paragraphs; Obituary, 126.

THE divining-rod miner has again put in an appearance in the field—this time in Colorado, with an instrument which infallibly locates the position, size and value of ore bodies. One of the strangest things in connection with divining-rod men is that they are usually financially embarrassed to a surprising extent, considering the facility with which they can locate bonanzas for other people—for a consideration. Although this class of fraud has long been practiced, and there are many who are readily duped by the shrewdness of these wizards of the "hoodoo stick," the first instance where one of these impostors ever really found anything not already exposed by the hard work and capital of some one else has yet to be recorded.

ANOTHER important decision in a "grubstake" case has been rendered in the Idaho courts. Judge E. C. Steele has decided that J. N. Rice and P. Mallory are entitled to a one-half interest in the Big Buffalo mine on Buffalo Hump. Rice furnished the grubstake to B. R. Rigley and C. F. Robbins, who located the claim, going to it by directions given by Mallory, who had previously discovered it. It was understood and agreed between these four parties that defendants should locate the ground in the equal interest of all, but Rigley and Robbins staked the claim in their own names, neglecting to put those of Rice and Mallory on the stakes, and afterward refusing to do so, whereupon plaintiffs brought suit. This is the property recently reported sold to J. R. De Lamar for half a million dollars.

SOME of the mine managers of the Transvaal are having difficulty in securing enough native laborers to keep the mills running to their full capacity. The natives work for a specified time under contract and all those whose time has expired are leaving for their northern homes as fast as released. Desertions are also of frequent occurrence. It is said that not only do an insufficient number of new men leave their homes to take the places of those whose terms of contract have expired, but many who would otherwise come are turned back by those leaving the mines. The reason for this is stated to be the unsettled condition of political affairs in the Transvaal and the likelihood of war. So serious has the situation become that a number of mills have been obliged to hang up a portion of their stamps, being unable to supply them with ore to their full capacity. It is anticipated that if this continues it will materially affect the output of gold. It is also stated that there are an unusual number of white skilled miners leaving the Rand, though no particular cause is assigned for it.

Where Mistakes Are Costly.

In Colorado, California, Utah and other States considerable present attention is given to the development of water power, the supplying of irrigation facilities, and, in general, the proper application of a great natural force hitherto not utilized to its fullest extent in this part of the United States west of the 100th meridian. In view of the necessary expenditure of time and money, and the expectations that should be approximately realized in the various projects now contemplated, it is in order to suggest the necessity of preliminary care and investigation, the employment of competent engineers, and, in general, "making haste slowly," at the start.

The need for such exhaustive preliminary work, the absolute necessity for patient investigation, and the economic value of proper engineering inquiry has been repeatedly shown. Better spend $1000 more in tentative work than lose $100,000 later in the history of the project.

It is in order to cite a case wherein the possession of some scientific information, the continued employment of competent engineers, and the exercise of wise economy (which simply means judicious expenditure of money) would have made a fair success of what it is feared will be a failure.

In 1890 the city of Austin, Texas, decided to dam the Colorado river, which drains an area of nearly 40,000 square miles above that point, the idea being to create a big power supply. About $1,500,000 was appropriated, and a dam 1150 feet long and 68 feet high was built. Those in charge assumed that the Colorado river there had a minimum flow of 1000 second-feet; they also assumed that sufficient precaution had been taken to guard against the deposition of silt in the bed of the artificial lake 800 feet wide and backing up the river twenty miles, that they were creating.

An illustrated description of the work appeared in the issue of September 15th, '94.

Expected results not ensuing, recent measurements conducted on a scientific basis show that the original estimate of the river's flow was greatly in excess of the fact, and further investigation shows that while the original volume of water in the lake was 2,330,000,000 cubic feet, there is now but 1,367,000,000 cubic feet of water possible within its limits, there being 33 feet of silt in the bed of the lake, taking up 963,000,000 cubic feet, and from local reports it appears that no feasible plan can now be devised to prevent the final uselessness of the whole thing by reason of insufficient water supply and the ultimate filling up of the bed of the lake with silt.

In this regard it is in order to notice the good work being done by the U. S. Geological Survey. Government engineers are compiling exact data throughout this entire region, the proper use of which is directly calculated to obviate such an unfortunate waste of capital and effort as that noted in the Austin case, which is cited not for invidious comment, but as a notable example of how well-meant projects deserving of success and honestly conducted with the best intent sometimes fail in their mission because of insufficient attention to preliminary engineering details and scientific requirements.

REALIZING the importance of the petroleum industry on the Pacific coast, the MINING AND SCIENTIFIC PRESS has arranged for a series of articles on the subject by W. L. Watts, the man who knows most about its occurrence in California, having been continuously engaged for several years past in an exhaustive study of its details, under the auspices of the California State Mining Bureau. The first paper will deal with the structural geology pertaining to deposits of petroleum in California; the structural features which control the direction and extent of oil lines and regions wherein there has been much geological disturbance; the factors which enter into oil prospecting propositions of sufficient merit to be classed among commercial enterprises; the business risks which such enterprises involve proportional to the character of geological evidence in sight—which may give those unfamiliar with oil business some idea of the relative merits of oil prospecting propositions; importance of petroleum interests; phases of geological investigation upon which an understanding of the petroleum deposits depends; character of folds which affect the course of oil lines; types of folds; depth to which rocks are affected by folds; relation of oil lines to folds, oil lines occasioned by faults, cross folds, complex geological structure demanding careful study, oil lines traced from mountains to valleys; business risks in oil prospecting classified—orthodox and wildcat prospecting propositions; conditions under which petroleum is found in California; method of determining strike and dip of oil-bearing strata; the element of risk diminished by careful and competent preliminary geological work. The paper is comprehensive in its scope and will constitute a valuable contribution to general and technical knowledge on this subject. It briefly anticipates the publication of a bulletin by State Mineralogist Cooper, now being prepared by Mr. Watts.

THE Executive Committee of the California State Miners' Association, at a meeting in San Francisco on the 25th inst., decided to give its moral and financial support to the defendants in the suits recently brought by the California Anti-Debris Association in Sutter, Yuba and Sacramento counties against hydraulic miners working under permits from the California Debris Commission. A motion to that effect was adopted without opposition and a sub-committee appointed "with power to act." The whole question is so thoroughly understood as to render any discussion unnecessary. The matter was taken out of the local courts six years ago; an act of the Federal Congress gave U. S. engineers sole jurisdiction. If a county judge in an agricultural community can override and subvert Federal law, and if a county in California has jurisdiction in this matter superior to that of the United States, it might be worth while knowing it.

WHY is it that men who are out in large numbers scouring the mining regions in search of property showing sufficient value to warrant investment, ask for large, low-grade mines, it is difficult to understand. One would naturally suppose they would prefer a large, high-grade mine; but inquiry is never made for a mine of this description. It is always a large, low-grade mine that is wanted. It surely cannot be because there are no large high-grade mines, for such things have been known repeatedly. Presumably it is considered easier to find a large low-grade mine than a large high-grade mine. The average prospector, however, seems usually cheerfully willing to supply whichever element may be lacking, but the fact that his statements are not always borne out by the actual conditions has been the source of much sorrow to the itinerant expert.

A HIGH GRADE of ore does not necessarily signify large profits any more than a low grade of ore may indicate failure. The environment of the mine, the size of the vein or ore body, the facility with which it may be attacked and the character of the ore all have a direct bearing on the economics of the proposition. Next in importance is the accessibility of the property, means and cost of transportation, cost of water, fuel, wages, etc. No item of importance can be disregarded when passing judgment on the prospective value of a mining proposition. When all these factors have been arbitrarily determined by actual operation the proposition is simplified, but the engineer in a new and untried field has a great responsibility resting upon him when he undertakes to determine these important questions, and experience elsewhere is the only way in which he can do it.

MANAGERS of copper mines throughout America report that their product is absorbed as rapidly as it can be produced and that, indeed, a still larger production would be taken. London buyers have been withholding their orders, evidently believing that the copper market was being bolstered by the Amalgamated Copper Company, but finding that there is no surplus being created, have commenced to place orders for future delivery, which may result in sending the price up a notch or two. Tin is much higher than copper, though in the United States 12,000 tons of copper is consumed monthly as against 3000 tons of tin, which demonstrates that tin is scarcer.

Concentrates.

ASSESSMENT NOTICES, etc., can receive legal publication herein.

IDAHO is estimated to have increased its population 25,000 in the last year.

SIX CENTS per share is the present New York price of Comstock Tunnel Co.'s stock.

WHENEVER possible avoid litigation in mining—compromise the case if you can.

A DIPPING NEEDLE has been frequently used successfully in locating magnetic iron ore deposits.

GOV. STEUNENBERG sends word that he wants "three experienced pump men" at Burke, Idaho.

THE ore sent from Paradox, Colo., does not contain vanadium or uranium. It is carbonate of iron.

THE employment of an iron tamping bar has caused the death of another miner in Shasta Co., Cal.

AN adit is a tunnel driven from the surface to the ore bodies of a mine either on the vein or across the formation.

IT is not always the largest mine that realizes the greatest profits, nor the richest ore that gives long life to a mine.

THE total amount of copper produced in the United States in '98 was 526,375,591 pounds, valued at $61,849,132.

THE *Arizona Republican*, published at Phœnix, has, doubtless, the largest circulation of any paper published in that Territory.

IN sampling ore it is very essential that the prospector or miner does not deceive himself, though he not infrequently does so.

ANHYDRITE is an anhydrous calcium sulphate, and is harder than gypsum. A large deposit of this mineral occurs in western Nevada.

"PEGAMOID" is a metal paint used by electrical companies to preserve their wires. It gives a silvery appearance, and is non-corrosive.

THE "big" successes in mining are not, were not and will not be made by paying "big" prices for "big" mines, but by developing prospects.

SULPHUR in a free state is usually found about the vents of active volcanos. Often it is associated with selenite and other forms of calcium sulphate.

THE N. Y. average price of lead in '98 was 3.78 cts. per lb., of tin 15.7 cts., of copper 12.03 cts. Present quotations will be found on page 138 of this issue.

PRACTICAL experience favors the superior economic value of freshly cut zinc shavings in cyanide precipitation as compared with other proffered devices.

DR. BARTLETT, American Zinc Lead Works, Canyon City, Colo., could doubtless answer the question asked by C. T. S., Leadville, Colo., regarding reduction of zinc ore.

MILLMEN should give careful attention to details. Do not accept as a fact that the best possible work is being done until the value of the tailings absolutely demonstrates this to be the case.

THE recent reduction in mint and refinery charges noted herein applies only to gold bullion 700 fine and over. No Government modification has yet been announced in the charge for refining silver.

THE present stock of gold in the United States is stated to exceed that in any country in the world, being estimated at $975,454,000, which is 50.05% of all our circulation and $12.81 per capita of population.

IT is said that the flow of water in Lytle creek, a stream flowing south from the San Gabriel range a few miles west of San Bernardino, Cal., has increased 175 inches since the recent earthquake in that vicinity.

THE purest carbonate of lime makes the best commercial lime when properly burned. Calcareous travertine is often employed for this purpose where massive limestone is not obtainable, and it usually makes a superior article of lime.

CALCIUM has never been observed in nature unaccompanied with other substances. It has been isolated artificially, and is a light, yellow metal, between gold and lead in hardness. It occurs chiefly as a carbonate or sulphate of lime.

WATER cannot be held back in mines by cementing the walls. When stopped at one point it finds its way into the workings at some other. Continued pumping is the only way in which a mine below the drainage level may be relieved of water.

"THE fastest Transatlantic steamship run to date" is the trip ending the 15th inst. of the Kaiser Wilhelm, Sandy Hook lightship to Cherbourg, France—5 days, 20 hours, 55 minutes—3190 miles, an average of 22.65 knots, or 26 miles, per hour.

PLACER mines operated on a large scale by hydraulicing or ground sluicing do not clean up frequently, as it involves a large and unnecessary expense. Where sluicing is carried on by shovelling into boxes it is customary to clean up at least once a day.

ASSESSMENT work must be done annually on all unpatented mining claims, and the work must be done each year. Though the amount of work done in any one year reaches the value of many thousands of dollars, it will count as nothing for the succeeding years.

TO DATE operations of the Risdon hydraulic system in the C. & C. shaft, Virginia City, Nev., confirm the expressed opinion that the unwatering would affect the entire lode. So far the water in the Belcher shaft, two miles from the C. & C., has been lowered 22 feet.

COPPER coins are now being imported from India to the United States as "copper scrap" for remelting and commercial use, being worth more as bar copper than in the shape of coins. It is asserted that Chinese copper coin is susceptible of similar profit in the same way.

IF mine owners, who are new in the business, would take more care in testing their ores or having them tested, and determining from these tests the proper kind of machinery to employ in the treatment of their ores on a commercial basis, fewer failures would result.

THE depth to which oxidation takes place in a vein is determined by various conditions. Drainage probably has a direct effect upon this, and atmospheric conditions may also be of importance. That the character of the wall rocks has an influence on the depth to which oxidation extends is improbable.

THE Bonanza pocket mine, at Sonora, Tuolumne Co., Cal., is credited with a production exceeding $3,000,000. A single pocket contained more than $500,000, and one mass weighed $40,000. Most of the gold was taken out with the use of hand mortars. The gold was usually found associated with tellurides, generally petzite.

THE miners' inch equals .02499 cubic feet per second, 1.4994 cubic feet per minute, 89.964 cubic feet per hour, 2159.146 cubic feet per day of twenty-four hours. Under ordinary conditions a 5-stamp battery uses a miner's inch of water. A tank 30 feet long, 11 feet wide and 10 feet high will hold a little over this amount if full.

AT the south end of Kawsoh mountains near Carson river, in Nevada, occurs a rock containing augite, feldspars mostly sanidines, and nepheline, which greatly resembles phonolite. A similar rock occurs on some rounded hills at the north end of the range. On the eastern side of these hills is found a similar rock but much lighter.

SINCE the Forest Hill Divide ancient channel system in Placer county, Cal., was formed, and covered with the flow of andesite from the Sierras, the forks of the American river have cut down through the lava cap and into the underlying bedrock nearly 3000 feet, and still the formation of the gravel channels are considered a recent geological event.

THE Iquique, Chile, subscriber whose subscription was paid up to 1903, was till the 22nd inst. the longest-in-advance-paid-up of any on the list. He is now exceeded by a South African mine manager, who pays to Jan. 1, 1906, and a Dawson, Yukon, miner who pays to July 1, 1904, and says: "Before that time I shall be importing quartz mining machinery."

THE occurrence of pyrrhotite in mines frequently renders it impossible to employ the magnetic needle underground. Owing to the many objects which affect the magnetic needle, such as magnetic ores, track rails, air pipes, tools, cars, etc., it is never safe to depend upon a needle underground. Such surveying must be done by the use of the vernier.

FLUORITE is a calcium fluoride, and is also called tiff by Cornish miners. It occurs associated with lead and zinc ores in England. It is abundant at Castle Dome, Ariz., in Yuma county, and is prominently associated with the telluride ores of Cripple Creek, Colo. The purple-colored rock found in the mines of Creede, Colo., is chiefly amethyst, a variety of quartz.

IF a wall plate is broken by the flying rocks from a blast it can often be sufficiently reinforced by placing a second plate immediately underneath it, driving in short posts at the corners and setting in angle braces reaching from the new plate diagonally to the wall plate in the set below and on the opposite side of the shaft. This will render the entire set rigid and stronger than before.

THERE is little or no sign of glaciation in the lower lands of California—that is, in the foothills of the Sierras—but in the high lands are found large and living glaciers. The most important glaciers are those on Mount Lyell, Mount Dana, Mount Shasta and Mount Ranier. There are other but smaller glaciers on other peaks of the Sierra Nevada. Yosemite valley is of glacial origin.

A FAULT which dislocates the vein was exposed in the Gover mine in Amador county, Cal., several years ago on the 1000-foot level. The displacement was about 50 feet, the north end being thrown to the eastward that distance. The fault was nearly at a right angle to the strike of the lode and vertical. It occurred at a place where the formation had previously been subjected to torsion.

DEATH VALLEY is in Inyo county and Salton basin is in Riverside county, Cal. Both are below the level of the sea. The floors of each are occupied by salt marsh, and the thermometer frequently rises above 125° F. in the shade. At Salton men live all year round and collect the salt. The air is absolutely dry. In a humid atmosphere few human beings could endure such a temperature.

THE Formation springs in the Yellowstone National Park in Wyoming are depositing large quantities of calcium carbonate from the calcareous waters. The deposits cover acres, and are among the most interesting of the natural objects of the park. It is probable that the various deposits of aragonite, called onyx, found in Arizona, Mexico, California and elsewhere, are formed in this manner.

AT Butte City, Mont., the copper-bearing waters pumped from the mines are run through long wooden boxes in which have been placed iron scraps. The copper is precipitated on the iron in the form known as cement copper, which runs 70% to 80% copper, and even lower. The length of the boxes is determined by the percentage of copper in the waste water. If it has not all been precipitated more boxes are added.

THE first long-distance pumping plant to be established at a mine in California was from the Colorado river to the Paymaster mine, east of Glamis station, in San Diego county. The distance is about seventeen miles. Since then two lines have been put in from the river to Cargo Muchacho and two lines to Hedges, distances of twelve to fourteen miles, and raising water 500 feet. Each proved a success.

IN locating a mining claim, first make a discovery, then define the boundaries of the claim by setting a stake or building a monument of rocks at each corner and at the center of each end of the claim. Post a notice at the discovery, stating when discovered, by whom, the amount of ground claimed along the lode in either direction from the stake. The development of the claim may then be proceeded with, but not necessarily at the point of discovery.

A BARRIER REEF is a deposit formed across the mouth of a river or stream flowing into the ocean or a large lake, by the pounding back of the detritus carried down by the stream by the waves. The material constituting a reef of this character is usually made up of cobbles and gravel. A spit is a bar of sand carried out from the mainland into the deep water of ocean or lake by coastwise currents and results in the formation of a bay or lagoon.

LOST mines are illusive; better search for a mine that has never been lost. The Grapevine mine in San Bernardino county, Cal., was discovered by a German prospector named Lee, who thought it was a cinnabar deposit owing to the color of the rock, which is heavily charged with red iron oxide (hematite). Porter & Waterman relocated the vein and developed a rich silver mine. Calico was discovered shortly afterward by prospectors who were searching in the hills near the Grapevine district.

IF your ground is soft and a large amount of grit is taken up and discharged by the pump it may be remedied somewhat by putting a wire netting around the suction in which the holes may be too large. Protect the suction hose by wrapping ¾-inch Manilla rope around it, and then secure it by ropes in such a manner that it will not touch the walls, as the swaying motion given it by the pulsations of the pump will quickly wear a hole through the rubber if the hose comes in contact with the rock or timbers.

IN the Colorado case of the Mayflower G. M. Co., on application made by the company for patents for the Beaver Springs placer No. 1, Beaver Springs placer No. 2 and the Mayflower and the Highland Chief lode claims of the Pueblo district, the Secretary of the Interior holds that both placer and lode claims may be included in one application. It was once held that a patent could not issue for both lode and placer claims where the lode was not within the exterior limits of the placer location, but the Secretary of the Interior now rules differently.

WHEN an abandoned claim is to be relocated a new discovery must be made and a new shaft or new tunnel started, as the work formerly done cannot be counted as a part of the assessment work. It is as important to define the boundaries the same as though no location had ever been made upon the land. It is not necessary that the new location should conform to the lines of the previous location, as, if desired, only part of the old location may be included in the new. It is always well to state what portion of the new claim covers an abandoned location.

IN constructing dams it should be remembered that if an absolute barrier be built across the stream, and no gate provided at its base, the reservoir in time will become filled with sand and silt and its usefulness ended. This may be obviated by the construction of a gate in the dam at the lowest part of the channel, through which the reservoir may be emptied periodically at a time when it will not interfere seriously with the purposes for which the dam was built. The deposits of detritus take place at the upper end of the reservoir and should not be allowed to accumulate in too large an amount.

THE ores which contain tungstic acid are wolframite, a tungstate of iron and manganese. It is a heavy, hard, dark-grayish or brownish-black mineral, with submetallic luster. It is sometimes weakly magnetic. Hubnerite is near wolframite, but contains 20% to 25% manganese oxide. Scheelite is a calcium tungstate, having a hardness from 4.5 to 5. It is white, yellowish white, pale yellow, brownish, greenish or reddish; streak white. It is found associated with cassiterite, topaz, fluorite, molybdenite or wolframite, in quartz. Tungstite is tungsten trioxide; is pulverulent, earthy; color, yellow or yellowish green.

AMONG copper deposits one of the most remarkable in America is that at Copper Basin, eleven miles southwest of Prescott, Ariz. This deposit consists of a bed of detritus—the result of the degradation of the neighboring hills of granite and eruptive rock, which is cemented by carbonate of copper (malachite), presumably derived from the numerous small veins occurring in the underlying crystalline rocks, the waters flowing from which carry copper sulphate in solution which has been precipitated in the interstitial spaces of the debris. The waters flowing in the neighboring creeks contain copper in solution, and when at a low stage deposit films of copper carbonate on the bedrock over which they pass.

FOR many years scientists have claimed that a series of earthquakes was always followed by the active eruption of one or more volcanoes. Whether or not there is any significance in this cannot positively be known, but it is usually the case. Earthquakes have been of frequent occurrence of late, in various parts of the world, and volcanoes are active which have been dormant for years. Mount Ætna, on the island of Sicily, and Mauna Loa, in the Hawaiian Islands, are both active, the latter pouring forth a great volume of molten lava, which is flowing down the slopes of the mountain to the sea. Whether these volcanoes are safety valves which, when active, relieve the pent-up internal forces of the earth remains to be seen.

THE succession of massive eruptions during the Tertiary and post-Tertiary ages in widely separated parts of the earth has been determined by Von Richthofen to have occurred as follows: Propylite (altered hornblende andesite), andesite with dacite (quartz-bearing andesite), trachyte, rhyolite, basalt. All the volcanic eruptions of recent times are of basalt or of finely comminuted material of the basaltic magma. The succession of rocks in Washoe district, Nevada, has been determined by Geo. F. Becker, of the United States Geological Survey, to have been: Granite, metamorphics, granular diorites, porphyritic diorites, metamorphic diorites, quartz porphyry, earlier diabase, later diabase, earlier hornblende andesite, augite andesite, later hornblende andesite, basalt.

WHERE rocks contain a considerable amount of iron sulphide which is undergoing the process of oxidation, water flowing through such rocks takes up the resultant ferrous sulphate in solution. Where it issues in the form of springs or in underground workings, its presence is detected by the astringent (alum-like) taste of the water, and by a yellowish-brown precipitate on the sides and bottom of the channel or upon adjacent rocks. Such water is known as chalybeate. When it comes in contact with other waters containing carbonates in solution, the sulphate is decomposed, the sulphuric acid uniting with the lime or alkali of the carbonate and the iron, uniting with the oxygen, is precipitated as a brownish-yellow powder. Sometimes large accumulations of this iron oxide takes place if not washed away by floods, and in some instances considerable deposits of local conglomerate result from the cementing of the detritus lying in the gulch.

Metallurgical Machinery.*

By A. C. McCALLUM, Peterborough, Ont.

In the matter of the design of metallurgical machinery, it must be admitted, with reference to rolls, crushers, stamps and other machines employed in the reduction of ores, one is almost led to believe that they are not susceptible of as exact an analysis as a bridge, for example. In the following remarks it is purposed to deal with the most familiar machines employed by mining engineers, such, for instance, as crushers, rolls, stamps and feeders. To deal with them from the designer's point is my purpose.

Considering, in the first place, crushers, the introductory remarks anent them are applicable to most all of the other machines mentioned.

It will readily be admitted that many designs of crushers show by the distribution of the material within them that the designer neglected to take advantage of a method of analysis commonly employed by designers of bridges and other large structures, a system of analyzing quite applicable to mining machinery, namely, by that of graphics.

The construction of a graphic diagram of stresses within any machine under design is most essential, as upon it the designer elaborates his working drawing.

The benefits to be derived from such a process of designing cannot be overestimated; it impresses upon the designer an intimate and exact knowledge of the acting forces and their distribution throughout the parts of the machine in the process of design; there may be many problems which are complex and frequently unsolvable; it may be necessary, however, to possess definite knowledge of the resistance of the materials employed in the construction of the machine to those complex forces.

Knowledge of this kind can only be used as a guide by the designer, and in all probability he will be mainly influenced chiefly by experience and precedent, rather than altogether by calculation.

The usual resource of the merely practical man is precedent; but the true way of benefitting by the experience of others is not by blindly following their practice, but by avoiding their errors, as well as extending and improving what time and experience have proven successful. A continual effort should be made to advance mining machinery design to that of a science, not merely executing or copying what has already been done. We must look for marked improvement, as new applications of scientific principles for the reduction of valuable ores are brought forth, bringing with them change and simplification of design in the machinery required to perform the work needed to be done.

It has been sometimes remarked that skill and good workmanship are not essential features in the makeup of mining machinery; but the idea is false; more plants built for the purpose of ore reduction have been failures, due in large measure to the fact that the enterprise was handicapped by machinery ill adapted for the purpose.

Discussion will not alone settle the question finally in all cases without elaborate and unprejudiced experimental work.

Most careful investigation is necessary in many instances to discriminate between real improvement and the impractical.

Logical theory is confirmed by correct intelligent practice.

We who write at this late day are too much indebted to our predecessors, whether we know it or not, to complain of those who borrow from us, and each of us is only able to make his relay, taking up the work where others left off.

The *sine qua non* of good machine design, from a structural point of view, is the presence of sufficient material of the proper kind, in the right place.

There are many types of crushers upon the market, and the majority of them were originally intended for breaking road ballast. The demand within recent years for crushing machinery in mining regions is primarily the cause of their being advanced to the front as crushing and pulverizing machines.

The Blake type of crusher has developed few changes from the original design. The first type of Blake crushers had the crushing jaw pivoted at the bottom; as at present in general use the jaw is pivoted at the upper end. It is a matter of choice to do a given amount of work by either of the types of machine—one with the working jaw pivoted above, the other below. For the jaw pivoted at the bottom, the plea is used that a more uniform product is obtained, and that finer crushing, when that is desirable, can be secured. The concurrence of preference, however, if gauged by use, is in favor of the modern Blake design with overhung jaws when that type of crusher is chosen.

The graphic method of analyzing strains recommends itself. The composition of the forces may be easily calculated throughout any machine, given forces may be fully represented by straight lines, if the three following conditions are complied with:

1st. Magnitude, which can be measured by scale of equal parts.

2nd. Location. The lines representing a force being either parallel to or coinciding with the line of action of that force.

3rd. Sense, being the direction in which the force tends to move the body affected, and being indicated in some one way.

A general summary of crushers upon the market if analyzed by the method shown, would reveal the important fact of a want of harmony among the various types of similar dimensions. The dimensions of the openings are not called in question, but like pieces within different makes of crushers. So far as the openings of the jaws are concerned, those dimensions are not by any means arbitrary, but have been fixed by experience; quartz generally breaking in sizes which can be suitably crushed by ore breakers of such standard dimensions as 10x7 in., 15x9 in., 20x10 in.

Mining engineers in charge of plants are well acquainted with the many faults developed in crushers under their care—broken frames, pitmans, jaws and other parts are known.

What then are requirements of a good crusher?

In order that the crusher shall run easily, cool, and prove serviceable, it is requisite that all of the journals be in correct alignment one with the other. Rigidity, strength, and sufficient weight must be found in the frame, so that the vibrations created while crushing may become absorbed. This must be advanced as the reason for the failure of the many types of steel plate frames, they easily yield to the strains within the machine, thus causing the working parts to become out of proper relation one with the other, and resulting in heating, and running hard.

According to the nature of the product to be crushed, we must have a certain direction of stroke, length of stroke, and relative angle in the position of the jaws, and to procure those conditions various means are employed, which methods are well-known to mining men. But it has appeared to the writer that simplicity of construction may be secured by abolishing from the type of crusher under consideration the wedge block so common, and employing other means of adjustment, for instance by means of the toggles. Change of toggles can be effected as readily as by means of the adjustable wedge. The movement required can then be made by rearrangement of the toggles. The machine being provided with a set of toggles giving the requisite maximum and minimum openings.

It is necessary that the shaft supporting the jaw should be securely fastened to the jaw, not by means of set screws, a preferable method of fastening is that of the gib and key. The jaw shaft is then required to move in the bearings of the machine. This overcomes the pounding and jumping due to lost motion, which readily develops when the jaw moves upon the shaft. The caps of the bearings can then be tightened whenever wear renders it necessary.

Within the pitman much trouble is often created, perhaps no other feature within the makeup of the pitman creates more trouble than the adjustable devices provided to take up wear, when the eccentric shaft has worn out of round, due to the strain upon it being constantly in one direction. It requires a man of good judgment to set up the gib usually provided, and trouble once experienced within this bearing from heating cannot be readily cured, without stopping down the machine. By the application of a first-class lubricant, and employment of a high-grade babbitt, the life of the bearing here should compare favorably with any other within the machine.

The use of heavy wrought iron bolts through the machine taking the entire strain when crushing is a desirable feature, but care must be exercised to so employ them within the frame that their value as tension members cannot be called in question.

Fly wheels as commonly fastened to crushers are at fault.

By employing them as a means to prevent serious injury to the working parts of the machine, owing to sledge hammer heads falling into the jaws, or other causes, we may so fasten the fly wheel upon the shaft that in case of accident the belt may slip and the crusher stop while the fly wheels exhaust their motion. We may use taper keys rounded to suit the shaft, but a better method may be suggested, namely, that of the splitting the hub.

The matter of the application of lubricants is an important one. Prof. Thurston of Cornell University says:

"The art of economical employment of lubricants consists mainly in the determination of their adaption to specific purposes, and in the application to each machine—or to each part of a machine in which pressure on lubricated surfaces of widely differing amount is found—of precisely that quality of unguent which is best adapted to that particular place, and, above all, applying to it in the best possible way."

The employment of oil does not appear to be profitable. Grease is more economical, but a feature worth knowing in using grease is the matter of a proper kind of cup to hold the lubricant. The type of grease cup found most suitable is one in which the whole shell can be removed or unscrewed from the base, filled with the lubricant, then placed back in position. This does not necessitate the unscrewing of the entire cup from off the machine, the replacing of which is ofttimes an annoying matter, where machines are placed in badly lighted places.

As to the nature of cast steel jaw plates being superior to those of chilled cast iron, I am led to decide in favor of chilled cast iron. The first cost is less; the length of life of the chilled cast iron jaw plate compares favorably with that of cast steel.

Crushing Rolls.—The reduction or granulation of coarse particles of ore by means of rolls has been given much consideration during the past few years. The varieties of crushing rolls are many and various in type and construction.

Machines for this class of work have largely been evolved by American engineers, and proof of their superiority is to be found in the fact of their having gained admission to almost every large metallurgical works throughout the world.

Notwithstanding the many changes that have been made during past years in all the various designs known to us, no special one has met with general approval. The most potent change has been in the adoption of steel as the material for use in the construction of the shells. The construction of the frame in one piece, having sufficient weight and strength to absorb the vibrations set up within the machine, and closer study has been given to the matter of the strains with the structure.

Marked improvement over the older forms of crushing rolls has been made in the design of journal bearings, methods of lubrication, and the facilities for dismantling the machine if required. Considerable ingenuity has been displayed to obtain complete and satisfactory methods for keeping the lateral adjustment of the rolls correct. The adoption of springs for that of levers and dead weights within the machine, to give crushing power to the rolls, is an important improvement, affording, as it does, a much more uniform product.

The adoption of some form of housing obviates the wasteful and disagreeable nuisance of dust usually found around rolls employed in dry crushing, and length of life to the machine is ensured.

The most marked change within recent years has been along the line of increased peripheral speed, by the employment of rolls of larger diameters and narrower faces, the results being decrease of journal friction, increase of crushing surface, and reduction of spring pressures. Those changes are undoubtedly the direction in which modern practice is tending.

Peripheral speeds of 600 to 1000 feet per minute are now found to be practicable, but this change in speed has also brought about many of the improvements already mentioned.

The aggregate spring pressure is now greater, ranging from two to three tons per inch width of face of roll shells.

Change has also been made from gears to belts, proving a much more preferable method of driving. In the earlier form of rolls the spring pressure was carried along the main tension bolts, making it a matter of considerable labor to adjust the rolls. The method now in use consists of enclosing the whole nest of springs between two washers, and constructing them so that each nest forms a complete washer, of an inelastic nature, until such time when the maximum pressure is reached, further compression taking place, relief is afforded to the rolls by the deflection of the springs. Chilled iron shells in all probability will be displaced by steel shells. The hopper underneath the rolls is constructed in such a manner that no pockets are permitted, all four sides declining towards the bottom at an angle of 45°, affording cleanliness within the machine.

The matter of sliding versus swing bearings for the removable roll was decided in favor of swinging roll bearings. The wearing surfaces become reduced by means of their adoption. Any wear about the bearing surfaces of sliding roll bearings is an evil, which may result in damage to the frame of the machine. It is easier to maintain the alignment of the swinging bearing than in the sliding type of bearing.

In design for rolls, a feature worthy of consideration is that of the disposition of the bolts employed for the purpose of bolting the machine together. It is a desirable feature to have as few as possible, and so arranged that, should they by any means become loose, they may not fall within the machine. The use of common nuts is not desirable, and recourse must be made to lock nuts or elastic nuts. This provision prevents the bolts becoming loose, and may help to preserve the machine from injury.

Mortars.—The construction of mortars will always prove interesting to mining men. The sectional mortar contains a feature new to the writer. It is usual in the construction of sectional mortars to make the ends in two pieces. In one particular mortar, to overcome making the ends in the above way, they were carefully designed (not to exceed 350 pounds in weight), and in making the ends of cast steel the joint usually found was eliminated, and considerable strength has been thus added.

In a 3-stamp double discharge mortar the lower

*Condensed from Transactions Canadian Mining Institute.

guides of the battery are to be found in the upper part of the mortar, water supply being carried to and around each of the heads. The pulp from back screen running through a channel cored in base of mortar, and joining to that of the channel from front screen, is then carried by a pipe and distributed over the amalgam table.

Among designers of mining machinery the ore feeder has been taken in hand, and it doubtless has been observed in recent designs presented for public favor that of the suspended type shows many marks of improvement in design, utility and simplicity of construction. By its use considerable room is now afforded around the back of mortar, and it can be readily placed away from mortar when desirable. The action is similar to that of the Challenge type.

The marked changes in this feeder are to be seen in the abolition of the adjustable mechanism to the feed lever, the lever adjustment being made by means of a collar on the stamp stem, or by the bumping rod. Gears are not employed at all, thus resulting in quiet running.

One could, perhaps, make extended remarks with regard to other machines in process of design and manufacture.

Metal-Bearing Conglomerates.

Written for the MINING AND SCIENTIFIC PRESS.

For many years the existence of metal-bearing conglomerates has been known in various portions of the world, and deposits of this character have been and are now being worked with phenomenal success. The regions where conglomerates are being operated at present with large profit are notably in the Lake Superior region, where they are copper bearing, and in the Transvaal, where they are gold bearing. A great deal has been written concerning both of these extensive occurrences and their exploitation has attracted attention to conglomerates elsewhere. In California cemented gravels (conglomerates) occur, containing gold, in the beds of ancient river channels, and an instance has been mentioned by R. L. Dunn of an auriferous conglomerate in Siskiyou county, which he considers as being intercalated in the Cretaceous formation, which would give it a geological structure somewhat similar to the conglomerates of the Transvaal. These latter conglomerates and those of the Lake Superior region occur interbedded with sandstones and in both regions are traversed by basic dykes. In the Lake Superior region there are also sheets of eruptive rock (diabase, etc.) interjected between the beds of conglomerate and strata of sandstone.

In the Black Hills of South Dakota occurs a conglomerate of vast extent, entirely encircling the uplift in fact, forming a continuous bed of coarse mechanical detritus about 200 miles in length.

Conglomerate is usually considered a sign of nonconformability, and this conglomerate lies upon the upturned edges of the schists, slates and quartzites of the Archæan and forms the basal member of the Cambrian. As previously stated, it undoubtedly encircles the Black Hills uplift, which is that of a vast quaquaversal fold, fifty miles or more in breadth and much more in length. The sedimentary series dips away from the crest of the fold in all directions toward the surrounding plains, above which they rise like an island in an ocean. The conglomerates are the result of the degradation of the Archæan hills, the detritus having been washed down from the higher land into the surrounding Cambrian ocean, where the fragments were washed to and fro and rounded on the shore line until eventually covered with an accumulation of sand and other material, as the region gradually sank beneath the waters. It is not the purpose at this time to enter into a discussion of all the various features which characterized the geological history of the Black Hills, but to deal more particularly with the conglomerates. They may be traced for miles, and, while apparently absent over considerable areas, it is due to their removal by recent erosion or they are still covered beneath the later formations.

That the Archæan rocks were gold bearing prior to the laying down of the conglomerate there can be no doubt, for the destruction of these rocks freed the gold held in the veins and mineral-bearing zones, and the gold is now found in the conglomerates in several places in the Black Hills and in least two sections in considerable amount. The most noted is that in the vicinity of Central City, and Blacktail gulch, a tributary to Deadwood gulch. The conglomerates were here found near Terraville and between Bobtail and Deadwood gulch and also between Deadwood and Blacktail gulches, as remnants of the once continuous sheet, capping the hills and ridges, having been cut by the erosion of the gulches. North of Blacktail they reappear, dipping northwesterly into a high hill, and were followed some distance in the tunnels driven on the comglomerate and bedrock contact. These conglomerates, once lying nearly horizontal, have been tilted with the general uplift and dip to the northwestward. They are firmly cemented with silica, and so hard have they become that a mass will fracture across the inclosed pebbles and cobbles rather than around them. The gold found in the conglomerates undoubtedly was derived from the veins of the Homestake belt, and they have been worked with more or less profit over a large area. Where the conglomerate has covered the gold bearing formations of the Homestake and have been deposited on the southerly and westerly side of that lode, the conglomerates are no longer gold bearing, or at least only slightly so. A vast amount of the conglomerate which, from its situation, must have been rich in gold, has been eroded, and it was to this erosion that the gulches of the vicinity owe their richness, though had no conglomerate ever formed some of them would perhaps have been as rich.

North of Blacktail the mines have been worked extensively and profitably; but in the interior of the mountain under which they have dipped their continuity is interrupted by the intrusion of a large mass of eruptive rock. Some effort was made several years ago to rediscover the northward continuation of the Gustin belt, as it was called, (named from the Gustin mine), but without success. This was doubtless due to a lack of understanding of the geological conditions, for the conglomerate reappears within a mile to the northward, and northwest of Deadwood about one and a half miles. To what extent, if at all, the conglomerate at this point is gold bearing, cannot be stated. There is a series of faults which displaces the conglomerate and older sedimentary beds, making several exposures of the water-worn gravel, cemented with hematite and silica. It may be seen on the north and northwest sides of Polo mountain.

Over the conglomerate, as previously stated, was deposited a thick bed of sand. This has been metamorphosed by infiltration of silica into a hard, dense quartzite, which is ore-bearing in some parts of the northern hills, where it is known as the lower quartzite. The conglomerates vary greatly in thickness and are always made up of the fragments of the rock masses near which they are found deposited, and, as a result, they vary somewhat from place to place, but are, generally speaking, much the same throughout, and are composed of the fragments of the harder rocks of the Archæan—quartz, quartzite and the silicified slaty rocks which have been able to endure owing to their superior hardness, the softer rocks being reduced to sand and silt and mixed with the particles derived from the attrition of the harder rocks. In thickness the conglomerates range from a foot or two to more than 40 feet, the latter case being observed on the main fork of Castle creek, in the Central hills, four miles above Mountain City. At this place the deposit is more like a bed of coarse gravel than a typical conglomerate, the material being but slightly cemented. Farther east, on the opposite side of Castle creek, the conglomerate deposit is still thick, but cemented with carbonate of lime and iron. Three miles distant, on the south fork of Castle creek, the material is firmly cemented with limonite ore and silica, and the conglomerate, detached in great masses, lies scattered on the slopes of the hill below the outcrop. On the south fork of Castle creek, and three miles from Mountain City, is a prominent hill, shaped much like a large bell standing on its base and tilting slightly westward. The odd shape of the hill is due to the unequal weathering of rocks of varying hardness. It is capped with a limestone formation, in which are abundant fossils. Underneath the limestone is a thick deposit of sandstone, the lower portion of which is friable. This is the stratum which in the neighborhood of Deadwood is found resting upon the gold-bearing conglomerates, and which there has been metamorphosed into a hard, dense quartzite by the infiltration of silica.

The Castle creek occurrence is forty miles distant from the gold-bearing conglomerates referred to. Here the conglomerate is firmly cemented by iron and contains native copper. No exploration has ever been made of this deposit, consequently its commercial importance is unknown. The conglomerate outcrops about the base of the hill, entirely encircling it, and, consequently, underlies it. To what extent the conglomerate bed is copper bearing has never been determined. This occurrence is on the west side of the hills. To the eastward lies a broad Archæan area, on the farther side of which, about thirty miles distant, the conglomerate is again found on the eastern rim of the hills, and on an eminence near the village of Rockerville is gold bearing. Some effort was made years ago to develop and work this deposit, but for some reason the attempt was abandoned.

There are some strange things noted in the conglomerate deposits generally in the Black Hills, one of the most important being the occurrence of a large number of cobbles and pebbles of crystalline limestone. This might not be considered remarkable, except for the fact that no such rock is known to exist in the Black Hills, and these limestone fragments must have been derived from some formation now covered, the locality of which is unknown, but which must lie without the uplift of the Black Hills.

S.

Some Experiences of a Working Miner.

NUMBER XXVI.

Written for the MINING AND SCIENTIFIC PRESS.

The U—— mine was discovered by E——, a prospector who, after doing a little work on it, went to D—— and organized a company. For a time all went well and the stockholders put up promptly. A shaft was sunk about 55 feet and water commenced to come in. Sinking was continued to 70 feet, when it was evident that a windlass and bucket could no longer be used successfully. The prospect was only a fair one and the work might have been continued for a time had not the water become troublesome, but the newness of the corporate existence had worn off, no dividends had been paid and the stockholders became dilatory about putting up, and finally the mine was shut down. The discoverer, E——, did not know what to do. He was unable to develop the mine alone, so he started out on a prospecting trip and scoured the mountains in search of a mine he could work without assistance. After several months spent in a fruitless search, he gave up the idea for a time and began to seriously consider searching for a job some place. He had fully made up his mind to go to some camp where mines were in operation and get a position of some kind, but, before going, went down the U—— shaft to see in what condition things were. He found them all right, and the water standing where he first encountered it—55 feet from the surface. He dug into the exposed wall of the shaft with a small pick and gouged out a small quantity of soft material from a seam in the porphyry. The stuff looked black and soot-like, and he concluded it must be black oxide of manganese and might carry some value, but the seam was so small that he had to gouge for some time before he could get enough of it to amount to anything. He persevered, however, and after several hours work, during which time he put in a temporary platform across the shaft, he managed to collect about two ounces of the black mineral. He took it to his cabin and put it in a tin box. The following day he started for a mining camp twelve miles away to hunt up a job, and took the tin box along. When he reached D—— he met some of the members of the company and showed them the contents of the little tin box. They fingered the heavy black stuff and variously passed their opinions that it was manganese or iron, or both. E—— wanted them to have an assay made, but this useless expense they refused to pay. After some argument he got two of the principal stockholders to accompany him to an assay office for the purpose of having the assayer pass opinion on the rock. The assayer looked at the contents of the box a moment and then remarked inquiringly "Well?"

One of the stockholders said, "E—— has brought us in here to have you pass judgment on that stuff. I don't think it necessary to assay it."

"Nor I," replied the assayer. "I will melt it into a bar if you like, though."

"Bar!" exclaimed all three. "Bar of what?"

"Silver, of course," said the assayer. "I thought you fellows knew what it was."

"No, what is it?" asked the three in a breath.

"Why, black sulphide of silver," replied the assayer. "You are a great lot of miners. Where did you get this, E——?"

"I got it in the shaft of the U—— mine," replied E——. "I always told you there was a mine there."

"Well," said the assayer, "how much of it?"

"Only a little streak, but it may lead to more," said E——, "and if you stockholders will put up a little money we may find a big body of it."

"How much will it go, M——?" inquired one of the stockholders.

"About twelve thousand or thirteen thousand dollars a ton, I guess," replied M——.

Inside of two hours several hundred dollars had been raised and E—— was on his way back to the mine with provisions and two men, and work was recommenced in the U—— mine. A drift was started following the streak of rich rock. It was like a knife blade, but could readily be traced. For 60 feet they drove through the soft porphyry. Late one afternoon a shot was put in and the men went to the cabin for the day. Since starting work not one of the stockholders had come to the mine, and, as there was nothing of particular interest, they were becoming a little unconcerned again. The morning following the shot referred to the men went down into the mine, and in the face of the drift the shot had broken into a fine body of ore. Nothing could be told of its extent, as the hole in which it was exposed was not over 2 feet square, but the ore was fine-looking galena and carbonate of lead, with siliceous brown iron ore over which was plastered flakes of horn silver. As soon as possible E—— had saddled his horse and with a sack of samples started for D—— on a gallop, telling the men to take a holiday. They did nothing of the sort, however, for, being good men, they had the success of the mine at heart and went to work with more energy than they had ever before shown.

E—— reached D—— in a short time over the rough mountain trails. He met the directors and a

number of the principal stockholders and before noon several wagon loads of these gentlemen, now fully awakened to the possibilities of the U—— mine, were on their way to the camp, which they reached several hours later. The miners had put in several small holes and had cleaned up. The entire face was in magnificent ore and they had hoisted a good-sized pile to the surface.

It is needless to say that within a very few weeks a fine hoist and building covered the shaft and the mine was rapidly developed. It was worked steadily for a long time and paid handsome dividends, and all turned upon the fortunate day when E—— went down and scraped two ounces of rich ore from the blocks of porphyry, but E—— was not a man easily discouraged.

* * *

For a long time W—— was superintendent of the M—— mine. One day one of the owners came into the mine, and, after an inspection, suggested that a small vein in the hanging wall be followed. W—— who was a good miner and kept himself posted as to the condition of his mine, knew that there was little or no gold in this vein and did not act upon the suggestion, but did follow a small vein into the foot wall which prospected pretty well. Some days later three of the owners were in the mine, among them being the one who had offered the suggestion a few days previous. When the vein breaking into the hanging wall was reached this gentleman remarked to one of his older companions: "Here is that vein I was speaking of. I think it would be all right to start a drift in here."

"Why, of course," replied the other, "that's the place to work and not over here on this other side. Anybody who knows anything about a mine at all would know enough for that."

W—— for a wonder said nothing. The gentleman who had last spoken turned to the third visitor and remarked: "C——, what do you think? Don't you think the pay goes into the hanging here?"

"No," said C—— bluntly. "I think W—— is right. The pay is in the foot wall streak."

The other turned away in disgust and remarked testily, "You don't know any more about a mine than W—— does."

The work proceeded for several weeks, and the little foot wall seam developed into a good-sized ore body and paid well. The bullion bars did more to convince the stockholder that he didn't know it all than any other argument could have possibly done.

MINER.

How Our "Pictures" Are Made.

Engraving is divided into two processes. By the one outlines, shadows and half tints are represented by incisions meant to contain the printing ink, while the parts meant to come out white on paper are left untouched. Metal work and copper plate engraving belong to this class. In the other method the lines are drawn on or chemically transferred to a flat surface, and afterward the wood or metal is either cut away by hand or etched away by acid, leaving the design standing out in relief. All the illustrations in this paper, wood cutting, zinc etching and half-tone work are of this nature. In the first division the only style of work referred to which is applicable to newspaper illustration is the chalk plate work. In this process a thin steel plate is coated with a preparation of chalk. The artist draws the picture on the chalk surface by using steel needles and fine pointed steel tools, with which he cuts into the chalk, so that when he has finished his work there is a complete drawing on the chalk plate in which all the lines are made by the incisions in the chalk. The drawing finished, the plate is ready for stereotyping.

It is the second division with which modern illustrating is principally associated.

Wood engraving is about as old as the art of printing itself, the principle being that the surface of the block produces black, the white parts of the drawing being cut away, so that when the block is inked the lowered parts cannot come in contact and are thus left white. To produce the effect of all the intermediate shades between solid black and pure white a series of lines and dots, varying in distance apart and in breadth must be employed. A very light portion in the finished print would be produced by leaving fine lines or dots, and cutting out wide spaces between them, and from this to the solid black in the finished print the lines would be coarser and the spaces cut away narrower, until in the solid blacks the wood is not cut away at all. Most of the cutting on wood is done by hand; however a machine is now used for the mechanical ruling and shading. During the first years of this journal's existence it was necessary to draw all the subjects on the wood before cutting the engraving, and all the wood used was soft; now, however, hard boxwood is used for most work, and after coating the surface of the block with a solution, sensitive when exposed to sunlight, a print is made on the wood by using a negative made from the object to be engraved or from an artist's original drawing. When the block is finished the electrotyper takes a mold of the block in wax. This wax mold is covered with a thin coating of black lead, this being a good conductor of electricity. The mold is then suspended by a brass rod in a large bath filled with a solution of sulphate of copper and sulphuric acid. A current of electricity from a dynamo is conducted to the wax mold in the bath and also a sheet of copper placed near the mold. The electricity decomposes the copper and deposits it in small particles on the mold on which a thin coating of copper is formed, producing an exact facsimile of the original engraved block. This copper reproduction is filled in at the back with metal and mounted on a base so as to make the cut type high, and is then ready for printing.

Zinc etching—"line work"—is the process in most general use. The primary essential for a good result in zinc etching is a pen sketch drawn with black ink on a good white paper, in which all the various degrees of light and shade are produced by a series of dots and dashes or lines. Other originals than a drawing can be used, but as the process is one of reproduction by photography the nearer the copy is to a good drawing the better will be the finished cut.

The drawings as a general thing are made to be reduced one-third or one-half. They are made larger for the reason that any imperfection there may be will not show so readily when reduced, and the finer detail can be worked up much better in a large drawing than in a small. When the drawing is finished it is turned over to the engravers. A photographic negative is made the size the finished cut is to be. The negative is dried and printed on zinc previously polished and coated with a sensitizing solution. The print on zinc is made in a similar manner to that employed in making a photographic print, the sensitized zinc place taking the place of the sensitized paper in a photo print. The print on zinc can best be made in good strong sunlight, an exposure of from eight to fifteen minutes being necessary, according to the density of the negative. If the day is cloudy or the work must be done at night, the print is made by using a strong electric light, when it is necessary to make a much longer exposure. The action of the sun or electric light chemically changes the albumen solution on the zinc plate in just the places where the negative is transparent; these transparent portions correspond exactly with the lines on the original drawing. After the plate has been exposed the proper length of time it is rolled up with a special ink and then developed, all of the ink being washed off except the portions chemically acted upon by the sunlight. These portions, as stated above, are the same as the lines in the original drawing, so that when the plate is thoroughly developed we have a perfect facsimile of the original drawing on the zinc. The plate is next powdered up, that is, brushed over very carefully with "dragon's blood," a prepared resinous powder, the powder adhering only to the ink lines which show on the print. After the powdering the plate is highly heated so that the powder just applied is melted and joins chemically with the ink lines and forms a solution which resists nitric acid. As soon as the plate is well burned in it is put in a weak solution of nitric acid and by giving the tub of acid a rocking motion the exposed portions of the plate are etched or eaten away. When the proper depth is reached the plate is dried and again powdered up, and the same operation of etching is gone through with again. Each separate etching of the plate after it has been powdered up is termed a "bite." Plates are given from three to five bites according to the subject. When the etching of the zinc is finished the plate is ready for routing. The routing or cutting deeper of the large open spaces, which are to appear white in the finished print, is done by means of a machine which has a revolving spindle so arranged that it drills or cuts away the superfluous zinc very rapidly. The cuts illustrating recent patents on the opposite page of this issue afford an example of what are usually termed "zincos."

The latest and quickest method of producing cuts for papers is the half-tone process.

The best copy for half-tone work is not made up of lines and dots as for the methods previously described, but must be one in which there are all the various gradations of lights and shades; that is, one in which all the half shades or half-tones are shown. A photograph or wash drawing is such a copy.

The difficulty of the early process workers was to find a satisfactory method of reproducing these half-tones of the photograph in surfaces for mechanical printing.

In typographic blocks it was easy to reproduce high lights and blacks, as described in the process of wood cutting; but what would become of the half-tones? It was not possible by the process of passing a roller over a block to lay half a shade of ink on certain portions of a block. Thus it was a picture without half-tones; a picture of pure whites and solid blacks. But the early process men kept at work and noticed how the wood engraver produced the different degrees of light and shade and that the steel plate etcher and lithographer secured their different gradations of color by taking advantage of fineness or coarseness of stippling or the grain of a coarsely ground stone. Thus it was argued that if the half-tones of a photograph could be broken into some sort of a grain or dot the problem of making the photograph into a printing block would be solved. This problem has been solved. The first attempts were made by placing a piece of coarse cloth in front of the sensitive plate for a negative. In this way the photographic image was broken up into a grain which reproduced the photograph in dots of varying sizes. Half-tone reproduction was accordingly achieved, and the method was called the half-tone process.

Having a good photograph to work from, the first important requirement is a screen. This consists of two pieces of plate glass cemented together, and on the inner sides of the two plates are ruled parallel black lines, the lines on one plate crossing those on the other at right angles so as to form a network. The screens are ruled in various degrees of fineness, the ruling determining the grain point. For cheap paper, such as for poster work, about fifty-five lines per inch are used. For newspaper work about 85 to 100 line screens are used, and for such half-tones as those on pages 113 and 120 screens ruled from 133 to 175 or even 200 lines per inch are used. The finer the screen used the greater the amount of detail preserved; the coarser the screen the greater the contrast. What is required in a half-tone negative is a means of printing the picture on the zinc or copper plate in dots of varying size—big and medium dots for half-tones, and fine dots for high lights. Now, to have dots, one must have a negative, punctured, so to speak, with holes. This negative is secured by placing the screen in front of, but not in contact with, the sensitive plate. The screen is placed about 1-32 of an inch from the sensitive plate. The negative made, it is printed on zinc or copper and developed in a manner similar to that employed in zinc etching. The plate is developed until the sensitized enamel solution is left only on the dots, the spaces between being washed away until the surface of the copper or zinc is left bare. The plate is then "burned in," and the enamel solution on the dots is hardened so as to protect them from being etched away. The plate is then etched in a solution of per-chloride of iron and is left until the dots stand in sufficient relief to yield a printing surface. The coarser the screen used the deeper the plate can be etched, and consequently the coarse half-tone prints better on a cheap paper; and as the dots are larger, they take the ink better on the high-speed press. For this reason the coarse screen half-tone is most suitable for newspaper printing, but such cheap work would not look well in the columns of the MINING AND SCIENTIFIC PRESS.

The methods of producing half-tones are being continually improved. There is now a method being worked up of producing a half-tone plate without the intervention of a screen, and some quite successful results have been obtained. Half-tone negatives are also made direct from the object, so that a great deal of time is saved by not having to wait for a finished photograph.

Worthy of Unanimous Support.

J. F. Halloran, the publisher of the MINING AND SCIENTIFIC PRESS of San Francisco, stopped at Salt Lake, Monday, en route home from the East, where he has been agitating the establishment of a new cabinet office of mines and mining. Mr. Halloran's efforts are in a good cause, and he should have the support of the entire mining press of the United States. No industry is more important, and yet it receives very little encouragement from the Government.

The men who have stormed the rocky fastnesses of rugged mountains, braving the Arctic winters of the north and the burning suns of the south, as well as the capitalists who have made it profitable to mine ores that formerly were almost worthless, have done these things without aid or encouragement, while thousands of dollars have been expended in the interest of agriculture. A decided and unanimous effort in the right direction should be successful.—Editorial in the Tintic Miner, Eureka, Utah.

The Best in the World.

Without doubt the best all-round mining paper published in the world is the MINING AND SCIENTIFIC PRESS of San Francisco. It is the best for the miner and the mine owner and the best for the "man of the shears" looking for stuff to fill the mining department of his paper, for everything in the MINING AND SCIENTIFIC PRESS can be reproduced with profit. The large number of articles that appear in the *Pioneer-Times* credited to the MINING AND SCIENTIFIC PRESS is evidence of the esteem in which that paper is held.—Editorial in the Pioneer-Times, Deadwood, South Dakota, July 21st.

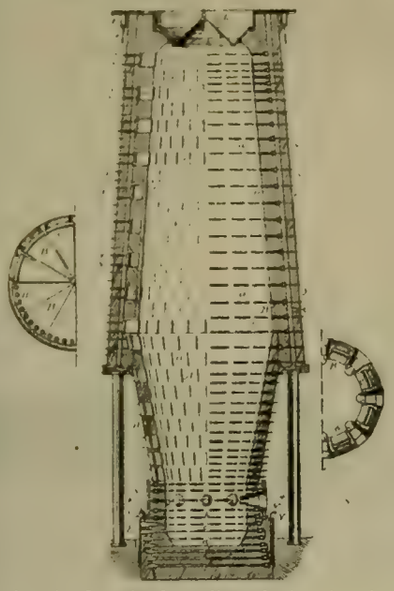
A MINER was killed in a Shasta county, Cal., mine a few days ago as a result of tamping a hole with an iron bar. The State of Colorado makes it a misdemeanor to use a metal bar for this purpose, and every mining State should enact a similar law. High explosives do not require hard tamping, and a wooden stick is much safer and fully as satisfactory for tamping holes. It is even unnecessary to strike it with a hammer. The tamping should be pressed in, not pounded in.

Latest Mining and Metallurgical Patents.

Patents Issued July 17, 1899.

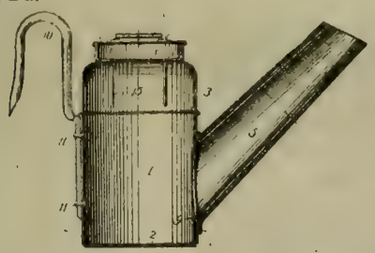
Specially Reported for the MINING AND SCIENTIFIC PRESS.

COOLING DEVICE FOR FURNACE WALLS.—No. 628,790; A. P. Gaines, South Pittsburg, and C. J. Gustafson, Sequache, Tenn.



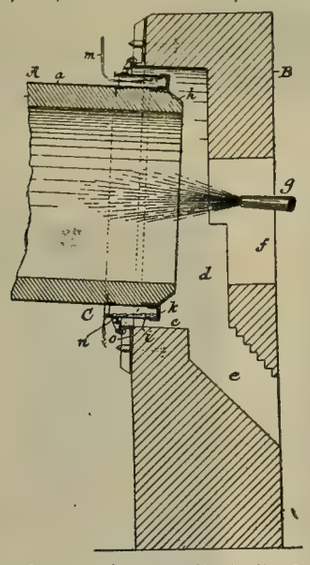
The herein described cooling device for furnace walls, consisting of a composite plate formed of a solid metal plate of high heat conducting power and a protecting plate of other metal capable of resisting wear cast upon conducting plate, the inner end of conducting plate being exposed so as to conduct heat from the furnace chamber, composite plate being provided at its outer end with a cooling chamber for circulation of a cooling medium to abstract heat from the outer end of conducting plate.

MINER'S LAMP.—No 628,653; W. A. Dunlap, Pittsburg, Pa.



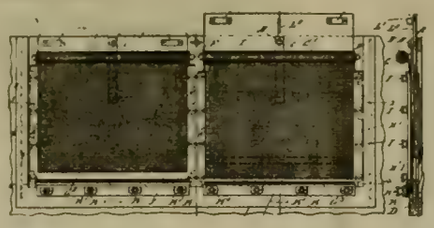
A miner's lamp having in combination a seamless body portion, a seamless breast and neck portion seamed to the body portion; a double wick spout, the inner spout being seamed to the outer spout and the latter seamed to the body portion.

ROTARY FURNACE.—No. 628,940; E. H. Hurry, Bethlehem, Pa., and H. J. Seaman, Catasauqua, Pa.



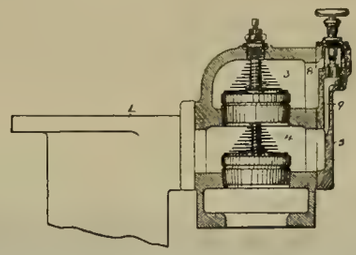
A rotary furnace downwardly inclined, provided adjacent its end with a jacket closed at end nearest the end of furnace, open and unobstructed at the other end and having its annular inclosing wall extending toward the rear of the furnace inclined from the closed end upwardly with reference to a horizontal line, and a water feed-pipe discharging a jet of water directly into the open unobstructed end of the jacket.

SCREEN FOR STAMP MILLS.—No. 629,242; M. R. Driscoll, Utah.



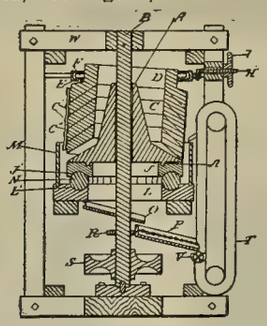
A stamp mill, having an apertured frame, a roll of screen material mounted above the aperture and having a portion extending over the aperture, a clamping frame extending about the lower and side edges of the aperture and covering the edge of the screen material, frame having vertically extending bolt recesses in its side bars, clamping bolts within recesses and an auxiliary clamping bar engaging the outer face of the lower side of the clamping frame. Clamping frame extending about the lower and side edges of the aperture and covering the edges of the screen material, means for releasably securing the members of the clamping frame and the screen beneath it to the screen frame, and an auxiliary clamping bar engaging the outer face of the lower side of the clamping frame. An auxiliary clamping bar engaging the outer face of the lower side of the clamping frame, a gate mounted to slide vertically at the rear of the screen, and inclined guides engaging the lower edge of the gate to force it laterally to its seat as it reaches its lowermost position.

PRIMING DEVICE FOR PUMPS.—No. 629,002; E. M. Coryell, New York, N Y.



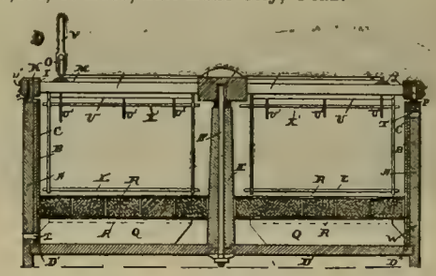
The combination with a valve box containing upper and lower chambers, of a cover or bonnet therefor having within the thickness of its own walls an entirely closed passageway having only two outlets —one communicating with the upper chamber and the other with the lower chamber, and a valve controlling passageway, the passageway being located entirely within the thickness of the bonnet, and opening only into chambers. The valve box containing upper and lower chambers, open at one side, a cover or bonnet for closing open side of the chambers, an enlargement on bonnet, a recess within enlargement, ports or passages leading from recess, one to the upper chamber and another to the lower chamber; passages or ports being located entirely within the thickness of the wall of bonnet and opening only into chamber sand recess, and a valve in the recess for opening and closing communication between the chambers.

ORE CRUSHER.—No. 629,098; B. I. Turman and T. J. Hampton, Los Angeles, Cal.



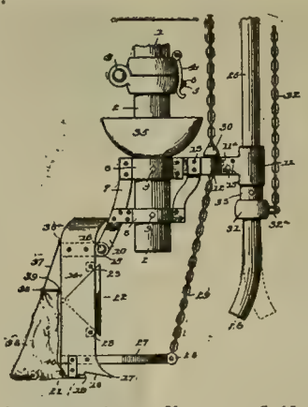
In an ore crusher the combination of a rotating shaft a frustro-conical metallic runner slidably mounted on a squared portion thereof, a cylindrical shell surrounding runner and supported thereby, means for holding and guiding the upper portion of the shell in a position eccentric to the shaft, a ring surrounding the shaft immediately below and engaging and supporting the runner, and having an annular race or groove in the under surface thereof, a stationary annular bedplate having an annular race or groove formed in the upper face thereof, pulverizing balls adapted to fit between groove and the annular race in the upper face of the ring which carries the runner, a peripheral casing or curb extending up from the bedplate, a chute or apron below the central opening in the bedplate and adapted to receive the ore therefrom, a screen receiving the ore from the chute, and adapted to separate the thoroughly pulverized portion from the coarser, a wiper wheel mounted on the shaft and communicating motion to the screen, and a return elevator receiving the coarse overtail from the screen and redelivering it inside the casing to the pulverizing balls; the central operating shaft *B*, runner *A* slidably mounted on shaft, shell *C* surrounding runner having collar *D*, frame *F* having anti-friction rollers *F* surrounding collar *D*, threaded bolt *H* having hand wheel *I*, ring *J* having an annular race *J'* in its lower face, immediately below and engaging with runner *A*, annular bedplate *L* having a groove *L'* in its upper face, pulverizing balls *N* fitting in race *J'* and groove *L'*, casing *M* surrounding bedplate *L* and extending above the base of the runner *A*, chute *O* below the central opening in the bedplate and adapted to receive the ore therefrom, screen *P* adapted to receive the ore from chute *O* and separate the thoroughly pulverized portion thereof from the overtail, wiper wheel *R* mounted on shaft *B* and adapted to impart a shaking motion to screen *P*, screw *V* adapted to convey the overtail to elevator *T*, and elevator *T* adapted to convey the overtail into casing *M*.

CELL FOR THE PRECIPITATION OF METALS.—No. 629,134; J. Luce, Salt Lake City, Utah.



In a cell for the precipitation of metals, a tank, a revolving frame mounted thereon for carrying the cathode, combined with the anode, consisting of two slotted lead plates, one of which is connected with the circuit, a series of carbon blocks placed between them, the cathode elements and electrical connections. The anode consisting of two slotted lead plates, one of which is connected with the circuit, a series of carbon blocks placed between them.

MINING DREDGER.—No. 629,048; L. D. Sibley, Vineland, N. J.



In a mining excavator or digger, a fluid pressure pipe for conveying fluid under pressure to be forced into the earth, a frame fixed to pipe, above the open delivery end thereof, a shovel hinged to frame at a point to one side of the pressure pipe, and means for raising or lowering the hinged scoop, whereby the scoop may be raised to a horizontal position or lowered to a vertical position at one side of pressure pipe. The combination with a fluid pressure pipe and a hinged shovel or scoop, of a reflecting pan adapted to deflect the current of pressure fluid from pipe and protect the contents of the shovel or scoop from the action of pressure fluid. A main pressure pipe, with a shovel or scoop supported by main pressure pipe and provided with an inclined face and a pocket or depression in rear of inclined face and adapted to retain minerals of greater specific gravity than the surrounding washings which are agitated by a current of pressure fluid, and an auxiliary pipe arranged at one side of the pressure pipe and provided with a deflected or inclined nozzle. A reflecting pan carried by the scoop and arranged to be raised thereby into vertical alignment with no outlet from the pressure pipe, and a reflecting cup supported by pressure pipe above the discharge mouth thereof, cup adapted to deflect the pressure fluid in outward direction against the walls of the cavity or excavation made by the action of the dredger and to collect particles of mineral which may gravitate into cup. A collecting shovel and a collecting bag or sack attached to shovel and adapted to gather fine particles of mineral by its flexible lower and thin front edge.

Some Properties of Copper.

Apart from electrical requirements copper probably owes its present extended use mainly to custom, and its first selection was, no doubt, due to its non-liability to corrosion and to its great ductility. The latter, however, is a variable quantity, depending largely upon the treatment to which it has been subjected, and depending also upon its composition. When copper has been thoroughly annealed it is very soft, and a very low stress, say, even less than two tons per square inch, will produce a slight permanent set. As the stress increases the deformation increases more rapidly, and at a tensile stress of from thirteen to fourteen tons per square inch, calculated from the original section, fracture will take place. In the case of good copper, which has been previously properly annealed, the elongation in 8 inches will be about 30% to 40%. If the copper is stressed to any less amount than its ultimate strength and the load released, it will be found that the stress has hardened the copper, and that the metal will then be practically elastic up to nearly its original load, less stress than this producing no further permanent elongation. If, after this hardening, the copper is again annealed, it will behave as it did in its original annealed state, a low stress again producing a permanent elongation.

Commercial copper, as used for other than electrical purposes, is rarely pure, or even nearly pure. The effects of some of the common impurities, such as arsenic, nickel and silver, are supposed not to be detrimental; while on the other hand antimony is objectionable, and bismuth, even in small traces, is exceedingly prejudicial. The usual workshop test for the quality of copper is to cut off a portion of the pipe or sheet and anneal it, when it should stand bending quite close, without a sign of cracking. The edge should also stand thinning to a knife-edge without crack when hammered to a scarf joint form with a lap of about three or four times the thickness of the copper.

THE successful cyanide plant of the Great Boulder Main Reef Co., Australia, consists of rock breakers, drying furnace, ball mills, a "shaft" or tower furnace and the ordinary cyanide equipment. The general manager, E. Skewes, made choice of a plant which, while simple in construction and easily repairable, also permitted the definite control of operations at each stage of the work. For roasting the ore his choice was a furnace similar to that used at Mount Morgan in Queensland. The work of erection at the mine was begun in September, 1898. As now finished, this furnace is a tower 65 feet high, 30 feet long and 12 feet wide. It is divided into eleven floors by arches one above the other at distances varying from 2 feet 6 inches to 4 feet. The walls are of solid brickwork, 2 feet in thickness, braced with iron girders on the outside.—Kalgoorlie Miner.

Conservation of Water.

The movement begun last November by the California State Miners' Association toward the conservation of water is engaging present attention among many who realize how much that matter means to the commonwealth. It is a question that affects not only California but all the States and Territories west of the 100th meridian, for upon the proper conservation of water lies largely the industrial welfare of the future of all that great region. The presence here of Elwood Mead, in charge of the work entrusted by the last Congress to the proper Government department, makes it timely to reproduce from his last report, as State Engineer of Wyoming, some engravings which are significant of kindred opportunities in California. These picturesque portrayals are not depicted here for their inherent beauty, but have a profound industrial significance as a demonstration of available water in one of our arid land States. So far as the scenery is concerned it might be labeled Colorado or California or Idaho, but the engravings faithfully portray possibilities for conservation of water in Wyoming and are as applicable in speaking of similar possibilities in other States. Secretary Wilson, under whose direction Mr. Mead proceeds, is now in California anxious to inform himself upon forestry and irrigation needs, as well as other desiderata, and it will be a good opportunity for those interested and acquainted with the facts to get a hearing.



Divide Between Little and Big Goose Creeks.



Dome Lake Reservoir.



Dam at Outlet, Dome Lake.



Picturesque Headgate and Dam on a Wyoming Stream.

IN Moravia, at Ellgoth, in the Ignaz shaft, instead of provisionally lining it with timber, brickwork was put in at once in sections of 4 to 7 yards as the sinking proceeded. This method, which had not been previously used in the Karwin coal field, is said to save time, labor, cost of material and seems to present greater security for circular shafts.



Fall on Big Goose Creek.



Fall on Big Goose Creek.



Fall on Big Goose Creek.



Drop on Piney and Cruse Creek Ditch.

Characteristic Mines of the California Gold Belt.

NUMBER IX.

One of the most noted mines in the State is the Morgan mine, in Calaveras county. It covers the summit of Carson hill and extends northward some distance toward Carson creek. The croppings constitute a great mass of quartz 40 feet wide in places. The great vein has a peculiar banded structure consisting of wavy ribbon-like strips of quartz, an inch or two in width, though differing in appearance from the bluish ribbon rock common to veins in slates. The structure of this vein is unlike that of any other in this part of California, and is not confined to the surface, but extends to considerable depth. In a crosscut tunnel the vein is exposed where it possesses the same structure and is 65 feet wide. Usually these large masses of quartz are flinty, milky or vitreous, and contain little sulphide mineral or gold, but the Morgan vein contains both.

On the surface and in the hanging wall of the great vein is a pit, now about 30 feet square, though probably originally smaller, the sides having caved and enlarged its dimensions somewhat. This hole is in a soft, much decomposed iron-stained material which is traversed in all directions by a network of quartz seams, varying from little seams to veins 4 inches or more in width. It was this ordinary looking cut that first brought fame to Carson hill. It is claimed, on what may be considered responsible authority, that nearly $3,000,000 was taken from this hole in the early fifties, the rock being pounded up in hand mortars. The gold occurred in masses and twisted rope-like strips. One of the men who worked in the mine and assisted in removing this gold told the writer that large pieces of gold were found projecting from the quartz after a quantity had been shot down, and the men would grasp them firmly with both hands and swing upon them, endeavoring to wrench them from the matrix, but without success. Holes were drilled as usual and black powder was used in blasting. It was customary to cover the rock face with rawhides, which were weighted down with rocks, timbers, etc., for the purpose of preventing the golden fragments from flying when the powder exploded. It is said that the largest amount of gold ever taken from a single place came from here, as well as the largest single mass. The mine, at one time equipped with a 40-stamp mill, has been idle and in litigation for many years.

As has been previously stated, the dolomite vein splits in Tuolumne county south of Carson hill, crosses the Stanislaus river and reappears as a series of separate, large veins on the hill itself, continuing to the crest and down the north slope to Carson creek, where it disappears and is seen no more for thirty miles, when it reappears at Jackson, Amador county. Between Carson hill and Angels Camp, a distance of five miles, there are a great many mining claims, some of which are extensively opened, and some give promise of becoming productive mines. When Angels is reached the gold belt is found spread out over a width of nearly three miles, extending from the Star of India group on the west to the Birney ranch, a mile east of Angels. The largest and most productive mines thus far opened in this part of the belt are at Angels, the principal mines being the Utica-Stickles and Madison-Gold Cliff properties. Other mines have extensive development, but those mentioned are the largest.

The Madison-Gold Cliff property is conspicuous for its massive quartz croppings, and is thought by many to represent the main fissure of the mother lode, but there are other outcrops nearly as large east of Angels, and it is very uncertain and, indeed, entirely unimportant which is the main fissure, as the largest and richest mine in the district was not considered as being on the main lode in early days, for the reason that it did not possess a bold outcrop of barren quartz.

The Madison mine is opened by an inclined shaft about 1500 feet in depth, levels being run at every hundred feet, the longest connecting with the Gold Cliff mine on the north. Long drifts are also run south from the main shaft. These drifts are all of large size, being 6 to 20 feet wide and 10 to 20 feet high. In all this development of thousands of feet of drifts, shafts, raises and winzes there are very few excavations that may be considered stopes, and it is one of the few mines which has paid for blocking out in this manner, that it has been claimed cannot be profitably stoped, as the rock is so low grade that it will not pay for the cost of the necessary timbering should stoping be carried on extensively, and, of course, would not pay for filling. The gold-bearing material is chiefly silicious chlorite schist, altered from diabase. The massive quartz of the croppings continues in depth, with varying thickness, 4 to 60 feet, but is always low grade. Several attempts have been made to mill this rock, but it has never been found to pay. The zone of gold-bearing chlorite schist lies in the foot wall of this massive quartz vein, which extends unbroken throughout the length of the claim and beyond. In the laminations of the schist are thin sheets of quartz and calcite. The entire mass, 5 to 20 feet wide, carries gold and about 4% auriferous sulphide (mostly pyrite). The pay zone is often found in direct contact with the massive quartz hanging wall and as often at a distance from it. Small banded veins of quartz, probably representing a more complete stratification of the schist, are found at intervals in various parts of the mine, lying on a smooth, well-defined wall, which usually forms the foot wall of the zone. These small veins are from a few inches to 2 or 3 feet in width, and are generally higher grade in gold than the schistose zone.

The massive quartz vein on the hanging side is often found crushed to a granulated mass like coarse salt, which is doubtless due to movement and a tremendous crushing force exerted upon it since its formation. Throughout the gold belt this evidence of movement, the crushing of vein quartz, is of very frequent occurrence, but usually the brecciated material is found recemented with silica or carbonate of lime, or both.

On the hanging wall side of the great quartz vein in the Madison mine is found a putty-like gouge varying from a foot to several feet in width. The gouge includes many fragments of quartz and diabase.

The Gold Cliff mine, adjoining the Madison on the north, is essentially similar in most respects in the lower workings. The upper portion of the mine was worked by an extensive open-cut system, and the large exposure in the cut showed some peculiar geological features. The hanging wall was found dipping quite regularly to the eastward at a high angle, and was usually defined by the massive quartz croppings, although these were not as large as those at the Madison. The foot wall on the surface over a hundred feet distant at the north end of the cut slopes eastward at a lesser angle and southward approaches the hanging wall. In this large, trough-like segment formed by the converging fissures, the material was largely amphibolite (chlorite) schist altered from the massive diabase. Some quartz was found in irregular, veinlike masses along the foot wall side and toward the south end of the cut, which is several hundred feet long; the volume of quartz increased until it met the main mass on the hanging wall side. Lying nearly flat and extending from wall to wall was a series of quartz sheets, one above another, dividing the mass into sections like floors. These sheets were at varying distances from each other, ranging from a foot or two to 10 feet or thereabouts. In size they varied greatly also, from an inch to 2 or 3 feet in thickness. Irregular masses of quartz also occurred, disposed at random throughout the mass. The entire occurrence suggested that a compressive force had been exerted from without the walls, resulting in a fracture of the schistose mass within, uplifting it along the jointing plane, with the subsequent formation of the floors of quartz. The entire mass was found auriferous, but low grade. It is said to average $2.50 per ton, but was worked at considerable profit by the open-cut system, and large stamp capacity—four to five tons per stamp—water supplying power.

W. H. S.

Nickel and Cobalt.

South America was formerly a great source of nickel and cobalt, some of its hydrated arsenites testing 25% in the ores of nickel, and 17% in the ores of cobalt. A. S. Johnstone, who is a very good authority on the subject, says that the only mine in Connecticut has been worked for many years, while Sweden has yielded nickel from the Klefra and other mines. In Germany the supply of nickel is obtained principally from the Mansfield mines. The rich nickel deposits of New Caledonia now furnish a large proportion of the supply, and important shipments of the ore are going forward to Europe. This ore is a double silicate of nickel and magnesia, the percentage of nickel ranging from 7 to 10. Nevada, however, is the latest source of supply, both of nickel and cobalt. In 1880 a powerful impetus was given to the utilization of nickel for manufacturing purposes by the invention of Wiggin & Co., Birmingham, for rendering the metal malleable by the use of manganese. A year later a German inventor, Dr. Fleitmann, accomplished the same result by the use of magnesium. Thus produced nickel may be drawn into wire or rolled into plates, and may be stamped, beaten, raised or welded. The adoption of nickel for coinage purposes by Germany in 1873, raised the price of the material from 4s to 16s per pound, but this inflation was only temporary, and the average price to-day is about 2s per pound. The oxide of the metal is used in the Staffordshire potteries for giving a soft brown tint to china and earthenware. Cobalt is used chiefly as an anode in plating, and for some parts of scientific instruments. It does not whiten copper to the same extent as nickel. The oxides of cobalt are of very great value in the coloring of china, earthenware and glass, and form the basis of the pigment known as cobalt blue. The present day tendency is to replace brass and electro plate by white alloys which have nickel for their basis. These alloys are known by such names as silveroid, argentoid, navoline, nickeline, etc., but they are all varieties of German silver, mixed either with tin, lead, or cadmium, according to the requirements of the metal. Nickel and cobalt ores are very largely smelted in and around Birmingham.—London Mining Journal.

Electric Pumps and Pumping.*

By A. W. K. PEIRCE.

An important feature of mining operations, of whatever nature, is the disposal of water met with in sinking and developing shafts and workings, and the distribution on the surface of the water required for the various requirements of the plant or process. On the gold mines of the Rand the latter feature is in general more prominent than the former, although there are some districts here where the handling of the underground water plays a very important part in the problem of gold winning. It is my purpose to speak only of water handling by means of pumps driven by electric motors, hoping that my remarks will bring to light much desirable information regarding other methods, with the result of obtaining fair comparisons of the various methods of transmitting and applying the power required for handling water. As the disposal of underground water is usually more difficult than surface distribution, I shall speak mainly of that. Let us first examine the conditions under which the water must be handled. In the first place, underground water as met with in shaft sinking and development appears in two ways, which differ considerably in degree, though not much in kind. One is the surface water, which is met with in the first 200 feet or so of shaft sinking. This water is mainly seepage from the local surface soil coming into the shaft through clay or soft rock seams. This seepage being from a comparatively local area, with little or no underground reservoir capacity, the flow of water varies with the season, being a minimum at about the end of the dry season, and maximum at or near the end of the wet.

At greater depths the water, while, of course, its ultimate source is similar to that of the surface water, is of steadier and usually greater flow, because of the greater area of country drained, and the liability of the existence of reservoirs, either surface or underground, in which the water is stored during the wet season, and which keep up the supply during the dry. Consequently, the flow of water does not exhibit much, if any, variation with the season. These reservoirs are not necessarily large cavities in the earth, or lakes on the surface. A seam of broken rock, or a series of clay or talcose seams in the rock, may hold a very considerable amount of water, and it is usually in cutting through such seams or fissures that the water is found. It is frequently the case that when these water-bearing seams are first cut into the flow of water is considerable, but after a few hours, days, or weeks, depending on the nature and source of the water supply, the flow may diminish considerably, or cease altogether.

Then, too, in some sections of the Rand the water-bearing rock is met with at intervals all the way down (I am speaking more particularly of vertical shafts) whereas in others the water all comes from one or two points only. All these and other features of the water supply make it difficult to attempt to deal with more than the very general features of mine pumping, but there are certain general characteristics of electric pumping that are universally applicable, and with these and a description of a few typical cases I will proceed.

Assume that a deep level company is to put down vertical shafts to a depth of 2000 or 3000 feet, and that the management has decided to use electric pumps, if any. Assume also that the quantity of water, for which pumping plant must be provided, has been decided.

The first questions that arise are:

1. What type of pump is to be used?
2. What system of electrical transmission?
3. What type of electrical apparatus?
4. What head shall the pumps be operated against?
5. What size of pump, and what capacity, shall be used?

I think there is no question as to the superiority of the three-throw or triplex type of pump, having the cranks following one another at angles of 120°, driven from motor by single reduction, machine-cut gears. As to whether the pumps should be of the horizontal or vertical type is largely a matter of design, and of the use to which the pump is to be put. I would rather have a well-designed vertical than a poorly-designed horizontal pump for any service, but it is my opinion that for heads of over about 300 feet or so a vertical pump cannot be made sufficiently stiff and heavy to stand the strain of the gearing and the thrust of the plungers as well as a horizontal pump, unless it costs more money.

In any type of valve, the area of the water passage through the valve varies directly as the diameter of the valve, while the total pressure on the valve varies as the square of the diameter. Furthermore, the area of the water passage around the edge of the

*Condensed from Transactions of the South African Society of Electrical Engineers.

valve need be no larger than that through the valve seat, but should be as large. From this it follows that the lift, which is limited by various factors, also limits the diameter of the valve. So long as the valves are of the automatic type, the total pressure on the valve or the lift must be kept low, or else the wear of the valves and seats will be excessive from the hammer of the valves; and as these two factors—total pressure and lift—are to an extent independent, it follows that for pumping against high heads, say, 1000 feet or more, only small valves can be successfully used, which renders it necessary to use a considerable number of valves for each plunger, if any considerable quantity of water is to be handled.

The Gold Belt in Tulare and Kern Counties, California.

TO THE EDITOR:—I want to recall a prediction I made in a communication nine years ago. At the instance of your office I took the contract of taking the census of mines in Kern and Tulare counties, and in passing over the uninhabited portion of Kern county I was led to say to the MINING AND SCIENTIFIC PRESS: "Here lies the coming El Dorado of California." The later discoveries at Red Rock, Goler, Garlock, Johannesburg and Randsburg—and in fact up to the Inyo line, have verified my predictions.

The great belt of schistose and calcareous formations which extends from Fresno Flat across Tulare county carries mostly silver ores and the baser metals until it reaches the Kern county line. The course of this belt is generally 25° to the east of south until reaching Kernville, when it divides, or, perhaps, more properly speaking, spreads. To the north of this point the belt is generally about two miles wide, with granite on both sides. At Kernville there is a change of 50° in the bearing of the west wall of this formation, and a line drawn from the Big Blue mine, above Kernville, to the Warrington, west of Havilah, on a bearing of 25° west of south for a distance of sixteen miles would almost exactly mark the contact running through this county. There are, however, about three miles where this line would follow the bed of Kern river. Those three miles lie between Isabella and Kernville, and it is below where Kern river covers this contact that all the placer gold has been mined which this stream has ever yielded. It is the southern eleven miles of this contact which has during the last year attracted attention. Much of the way it carries about 100 feet in width of low-grade, gold-bearing material, ranging from pure quartz to a porous, talcose matter, something like that contained in the blanket ledges at Mercur, Utah. This formation frequently carries a large quantity of small cubes which most miners are unable to classify. They are silver white, or perhaps more nearly tin white, from $\frac{1}{16}$ to $\frac{1}{32}$ of an inch in diameter, somewhat malleable, heavier than galena, and are believed to carry gold in chemical combination, something like sylvanite.

As I have said, this formation of calcite and slate spreads, and the main trend is to the east of south to Erskine creek, Kelso creek and Piute mountain, where it spreads directly east, and if the desert sand was removed it might be found to embrace nearly the whole region from Mojave to Randsburg and beyond.

Between this southern trend and the western contact, and west of Erskine creek, two mines have been opened which promise to rank with the foremost of this part of the State. The Russian Bear, at Glenn Olive, on East Bodfish creek, has yielded about $250,000 to five stamps during the last five summers. The vein is from 5 to 8 feet wide and increases in value with depth.

The second of these mines is on the Erskine creek ridge, two miles to the north of the former, and is just being opened up. In size and wealth it promises to surpass the mine at Glenn Olive.

The numerous stringer veins jutting into this contact from the southwest still afford employment to many poor men, who mine on their own hook and mill their high-grade rock at custom mills.

STEPHEN BARTON.

Isabella, Kern Co., Cal., July 17th, '99.

THE most economical mine to develop and operate is that which can be opened through an adit tunnel or a series of them, and of course where the tunnel runs in on the vein is an advantage over one which reaches the vein through a crosscut. Shaft sinking is always more expensive than tunneling and the necessity of handling water from shafts entails an additional expense. Still most of the mines which have developed the greatest permanency and paid the largest dividends are those which are opened through shafts. Some mines are extensively operated in their early history through tunnels which later are worked through shafts.

THE surface ground of several of the largest mines of Butte, Mont., were worked in the early history of the camp for glacer gold and proved very profitable. When the loose material had been removed the ore contained silver and further development was delayed for years.

Charcoal as a Precipitant of Gold from Auro-Cyanides.

By JOHN I. LOWLES, Inst. M. M.

In the district of Victoria this method is used to the almost total exclusion of any other, in many cases probably in imitation, rather than with any definite grounds for its superiority over the zinc process.

The methods are identical down to the extractor house which in a typical plant contains 189 tubs, each 2 feet 4 inches high, 2 feet 1 inch in diameter at the top and 1 foot 9 inches at the bottom. In the center of the bottom of each tub are two small wooden cleats, 4 inches apart, on which rests a glazed drain pipe, 4 inches in diameter, flanged end downwards. Center pipes and tubs are filled with charcoal, coarse for 6 inches from bottom and medium size to within 6 inches of top of center pipe, with about 3 inches outside and 5 inches inside the tub of coarse charcoal again. On the top of the charcoal, inside the tub and all round the pipe, is a wooden lid to keep the charcoal from floating and blocking the outlet pipe.

Another form of tub much used has no center pipe, but there is a false bottom of filter cloth, while on the top of the charcoal is a hinged lid with feed pipe let into it.

The preparation of the charcoal is important, impurities being prejudicial and wasteful. Fine stuff is objectionable, being a bad filtering medium and also passing through into the sumps. Heavy compact charcoal again is not so efficient as that which is light and porous, gold being deposited throughout the whole of light charcoal so that compact material offers less depositing surface and is moreover more difficult to incinerate. The charcoal is ground and sieved to three sizes: coarse, medium and fine, the latter being discarded. The other sizes are thrown into separate tanks of water, and only that which floats used.

The tubs in above works are arranged in two groups, the first of 144 filters, in 24 sets of six each, for strong solution; the second of 54, in 18 sets of three each, for alkaline wash (0.04% KCy) and weak solution.

The solution passes down the center pipe of the first tub in each set coming up on the outside and flowing over the lid through a 1 inch pipe to the next tub of the series, and so on, finally passing away to its own particular sump. The top filter catches most of the gold and when fairly charged is removed, each of the remaining five being moved up one step and a newly charged tub being placed in the sixth position. The filter removed is drained of some of its solution and emptied into a large box with a filter bottom where the rest of the solution is run off into the sump, leaving the auriferous charcoal ready for the furnace room. A tub occupies first position for about three days.

The efficiency of the precipitation is, of course, an important point. The strength of solution does not appear to affect the precipitation at all, the percentage extraction being uniformly high; the solution going out to the sumps in one establishment rarely showing more than 3½ grs. per ton (original value not stated), while 0.04% KCy solutions are successfully precipitated. The gold in the top filters is considerably purer than that caught in the lower ones and the author suggests that means might be taken to keep the contents of the top filters separate. Frequent tests show a steady diminution in the value of the gold, taking place downwards through a set till the bottom tub is nearly pure silver.

The exact action of the charcoal has never, as far as the writer knows, been experimentally demonstrated, but he thinks it may be due to the hydrogen and hydrocarbons remaining in the charcoal, the result being the formation of hydrocyanic acid and free gold. This HCy represents a certain amount of loss of active agent.

From the filter house the auriferous charcoal is conveyed to the furnace room where it is incinerated in four reverberatory furnaces, each 10 feet long. The ash is sieved through a 900-mesh trommel and the coarser residues returned to the furnace. The fine stuff or "ash" containing about 80% gold is then smelted.

The author thinks it doubtful whether the process will supercede the zinc process, but points out the following advantages:

1. A high-class bullion is produced—one well known mine receives £4 per oz. for cyanide gold.

2. Percentage extraction is high regardless of strength of solution.

3. In spite of the large amount of auriferous charcoal to be handled the "waste" is easily got rid of by burning, and the ash is easily smelted without the necessity of treating with strong acids or careful oxidizing roasts (with some unavoidable loss).

One great disadvantage is the greater chances of loss through the immense bulk of stuff to be handled and the higher cost of the operation itself. The cost of charcoal precipitation (with charcoal at 9d. per 40 lbs.) works out at 4.29d. per oz. of gold. Zinc precipitation (with zinc at 4½d. per lb.) would cost 2.25d. per oz. of gold. Labor works out at 0.763d. per ton of the charcoal and 0.382d. per ton for zinc.

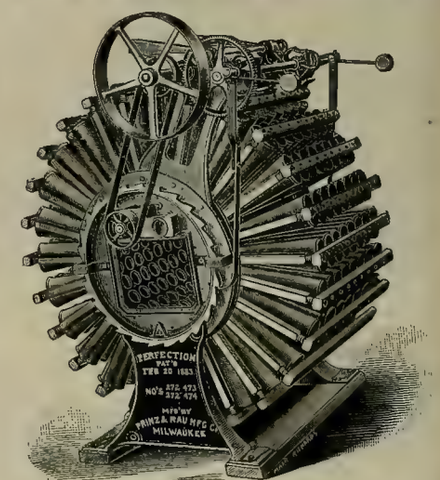
To recover the gold from the "ash" at these works costs 1s. per oz., bullion 900 fine, exclusive of labor, as against about 2d. for zinc slimes which would probably average not more than 800 fine.

There remains the question of increased outlay for plant and buildings, but these are not very serious. Considering the same works the 198 tubs cost £247 10s., zinc boxes would require but a small portion of this.

[Charcoal was at one time tried as a precipitant of gold in the chlorination process and has been recommended for the purpose by some operators and condemned by others. In 1893 Dr. W. D. Johnston of San Francisco, Cal., applied for letters patent on a method of abstracting gold and silver from their solutions in potassium cyanides, which contemplated the precipitation of gold from auro-cyanides by passing them through a series of charcoal filters.—ED.]

A Dust Collector.

Dust is a source of discomfort and disease in many mills. The device illustrated herewith is designed



PATENT DUST COLLECTOR.

to do away with such annoyance. This dust collector is made and sold by the Prinz & Rau Manufacturing Co., Milwaukee, Wis.

Quicksilver in Oceanica.

In New Zealand, as in Victoria, the discovery and working of cinnabar deposits has aroused no little attention. In Victoria the deposit which has given best indications of future value is located on Jamieson's creek, Gippsland. In New Zealand the ore is being worked on the Kaweranga creek at the Shortland end of the Thames gold field. Some of the ore, which has been exhibited in Auckland, is very rich in quicksilver, and has been valued at £50 per ton. A company is being formed to work the deposits, called the Thames Quicksilver Mines, Limited. The capital is £6000. One-third goes to the discoverers in paid-up shares. Mr. Rundall, an expert in mercury from Mexico, and Mr. Daw, general manager of the New Zealand Crown Mines, consider the property well worth prospecting. The markets for quicksilver will be New Zealand and Australia, and also China, which absorbs 15,000 flasks per annum. Quicksilver is largely a monopoly held by the Rothschilds, who own the Almaden mine in Spain, which has a history of over 2300 years. It is said that 1% of cinnabar will pay the working expenses, and a report from the Thames School of Mines shows that specimens of this ore selected by the director, B. F. Allen, ran from 0.3% to 27.5% of cinnabar. Other quicksilver producing countries are the United States (California), Mexico, Russia, Italy and Austria.

Experiment with Coarse Crushing.

Formerly fifteen days were occupied in the treating of the Dorotha Morton, B. C., ores by cyanide before the extraction was completed. This difficulty has been recently overcome. Mr. Lang, the Fairfield Co.'s manager, having discovered that, by crushing coarser and using a screen of thirty mesh instead of twenty mesh, as formerly, extraction is limited to seven days, and at the same time a higher percentage of values is recovered. The last month's operations show nearly 90% gold and an 80% silver extraction—a very material gain over previous returns.

The value of the output last month was $13,138, as against $9536 in April and $3363 in December last. The bullion returns for the six months aggregate $48,245. The cost of working, which includes mining, transportation, crushing and cyaniding, have been $6 per ton; but these costs, it is affirmed, will be considerably reduced when the mine is developed sufficiently to warrant an increase of the crushing and treating capacity.—Vancouver Mining Record.

Mining Summary.

ALASKA.

The Coast and Geodetic Survey has a report from G. R. Putnam, who is with a party at St. Michael, regarding the gold fields around Cape Nome. He says he cannot vouch for the accuracy of the reports from Cape Nome. It is certain new fields have been opened five to thirty miles back from the coast between Cape Nome and Cape Rodney. There are 2000 miners in that section, with their principal settlement at Anvil City, a new town not on any map except those of the transportation companies.

United States Consul McCook at Dawson says that reports from Alaska indicate that more gold will be found there than will ever come out of the Klondike. Typhoid has broken out six weeks earlier than in former years. Many people in Dawson are destitute.

ARIZONA.

Phœnix *Republican*: The Crowned King Co. have again started their mill in the Bradshaws. They have been shut down for a month for repairs. The mine has been running with a full force. The rich ore has spread through the vein. They have made a strike at the Big Bell mine, which has been worked and managed by R. Harrington. They have thirty men to work since they put in the new hoist, and are sinking and drifting. The rich ore is in the 300 level. The Star mine is owned by the Harringtons, who have a large force of men, and are drifting to cut the ledge at 1000 feet. ——E. M. Foltz, Supt. of the Place mine, will start up again. The Place M. Co. has the south extension of the Crowned King, and have rich ore. He has men working on the wire gold claim.

Kingman *Miner*: Dr. Hamilton of Los Angeles has bonded the Keystone mine from J. Uncapher. The Keystone is at Mineral Park.

Tombstone *Prospector*: P. D. Clark of Los Angeles has a bond on the Little Jessie property in Pearce.

Prescott *Courier*: Mr. Collins has bonded the Johnstone mine on Rich hill and has made Mr. Jones Supt. He has also bonded other mines in the same neighborhood.——Three hoisting plants are en route to Prescott. There are two hoists for Mr. Haggott—one a steam hoist for the Blue Bell Copper Co., the other a gasoline hoist for the Zonia Copper Co. The third hoist is for Mr. Button's mine near Minnehaha.——The projectors of the copper property on Whipsaw gulch, two miles from Briggs, which property was incorporated some time ago, have raised funds for development and prospect work and will erect a 40-ton smelter to work the ores. Contracts have been let to sink the shaft 250 feet. The mines carry copper and gold ore. ——It is reported that the Val Verde Copper Co., Ltd., has paid the P. & E. Railroad (Big Bug branch) $10,000 for tracks and spurs, and teams and men are grading for same to Agua Fria falls, the site of the proposed plant.—— ——The Baltimore capitalists who purchased the Buster group on Pine creek have purchased the Mohawk group and are negotiating for other mines in the neighborhood. They have sixty men at work and are putting up a quartz mill and a saw mill.

Jerome *Reporter*: The Spoke and Stonewall claims in Mescal gulch were sold in Boston to Burkes & McBride. Thirty-five thousand dollars have been deposited at Prescott and will be turned over as soon as certain conditions are complied with.——The Dewey, an undeveloped mining claim in the neighborhood of Stanton, has been sold to J. W. Dean of Boston for $5000.

Globe *Silver Belt*: The Copper Queen Co. of Bisbee is to increase its smelting capacity from 600 to 800 tons per day.

Arizona *Star*: At the new copper discovery not far from Davidson's canyon the bodies of ore continue at depth, as on the surface. H. Bushman is driving a tunnel which will crosscut the vein at a depth of 130 feet. At last accounts they were coming into the ore body.

Yuma *Sun*: The discovery of lead is reported to have been made in the Castle Dome mountains, twenty-two miles north of Gila City, on property belonging to M. Modesti and F. Avila. The property has been worked in a small way for the past four years and is developing into a large lead mine. Two shafts have been sunk—one 110 feet and the other 50 feet—with a tunnel connecting from the bottom of the 50-foot shaft. The ledge is 2 feet wide and is gradually increasing with depth. The ore is solid and runs 50% lead, with a small amount of silver. Returns from the two carloads recently shipped to the smelter at Pueblo show a profit of $2623.90.

CALIFORNIA.

Alameda.

Oakland *Enquirer*: The ledge of gold-bearing quartz uncovered back of Mountain View cemetery, in Hays canyon, is being developed. This ledge was located a year ago by W. W. Hooper, who, with W. W. Newcomb, J. G. Bruguiere and others, has developed the vein. The Bruguiere M. Co. has been organized and will work the claim.

Amador.

Jackson *Dispatch*: At the Spagnolia mine, near Clinton, the shaft is down 150 feet. It is expected to reach the ledge at 200 feet.——It is reported that the Hoffman-Field mine, south extension of the Argonaut property, at Jackson, will be opened by W. F. Detert as soon as a suit for partition to the Jackson quartz mine and adjoining placer claim is settled.——The matter of the construction of a mill at the Oneida mine, near Jackson, is to be taken under consideration.——The Central Eureka, where the recent strike was made, is negotiating to have a test made at the Zeila mill, at Jackson.——H. J. Lambert of Carbondale is to open new pottery works at that place. There is a bed of clay on this property that, after a series of experiments, is said to be a good quality of potters' clay.——The Potazuba, at Sutter creek, is sending 200 tons of ore from their mine to the Zeila mill at Jackson.

Butte.

Oroville *Mercury*: At the Gold Bank mine, near Forbestown, the upraise from the adit tunnel has been enlarged to a two-compartment shaft, which is now 1040 feet deep. Work is in progress on four levels. Power drills are employed in drifting, the smaller machines being operated in the stopes. Seventy-five men are employed. The 40-stamp mill on the property crushes 40,000 tons of ore per year, running constantly. The mine is equipped with a canvas plant and chlorination works, the ore in the Gold Bank ledge being heavily sulphuretted.

Calaveras.

The United Labor G. M. Co. has recently been incorporated at Angels, to work mines located west of Angels in Smith's Flat. The company has been organized on the lines of building and loan associations.

Prospect: The Shirley Queen mine, four miles from Copperopolis, owned by W. H. Oxendine, was bonded recently to E Germane and W. H. Gifford of Los Angeles, Cal., for two years, for $15,000. This property has been developed to a considerable extent. A mill from one of their mines on the desert is on the way to Copperopolis for this mine.

San Andreas *Citizen*: It is reported that negotiations are pending for the sale of the Ford mine.——D. C. Demarest, Mgr. Demarest mine, six miles south of San Andreas, reports work on this mine begun June 26th, '98. Preliminary work occupied till July 15th, when sinking began from the 100-foot level. The shaft was sunk in foot-wall slates, at an angle of 60°. The shaft has two compartments, 4x4½ feet, and is down 435 feet. Eighty tons of ore netted $550 in free gold; 220 tons yielded $1545; the concentrates saved on this lot had an assay value of $103 per ton. The stamp mill has been overhauled; the copper plates were resilvered; two concentrators were put in; a new 60 H. P. engine was installed, also a blower with independent engine. The cash receipts were $24,357.14.—— The affairs of the Fort Wayne Gold Producing Co., also known as the Marshall mine, are being readjusted. The employes have been paid, less the costs of the attachment suit. The mine is being retimbered in part and other repairs made. It is reported W. Knight will succeed J. F. Clapp as superintendent, and A. Schulte, the representative of the Indiana owners, will have charge of the office. ——J. C. Kemp Van Ee has filed a claim in the Stockton land office to the Royal Extension mine, at Hodson, in Salt Spring Valley. It will become a part of the group owned by the Royal Consolidated Mining Company.—— It is reported that the Royal Consolidated Co. will build a new mill of 100 stamps. There are forty stamps on this property.—— The Commodore mine is now the name for the old Flamm property, two miles north of San Andreas, operated by W. H. Clary, Jr., of Stockton. A steam hoist has been put up and sinking will be resumed.——At the Ellen Vannan gravel mine the owners have been investigating and changes are to be made. The Radamaker mill will be replaced by a 10-stamp gravel mill.——The Poorman mine is being opened up one and a half miles above Glencoe. Charles Guth is the foreman. He employs thirteen men.

Mokelumne Hill *Chronicle*: The Melba G. M. Co. of San Francisco has been incorporated to develop and operate the Melba mine, patented, southeast from the Gwin mine. It extends 3000 feet along the lode and is 800 feet wide. The rock is slate and quartz mineralized. Development consists of a tunnel 200 feet in length, crosscutting the ledge, and a shaft 50 feet sunk on the ledge. The lead is 3 to 6 feet wide. Daniel Grant will act as Supt.

Del Norte.

Work on the Myrtle Creek ledge, owned by Jenkins, Lewis and others, is to be resumed. When it is found possible to save the gold in the tailings from the arrastra the profits will be large, as the tailings assay $14 per ton.

Crescent City *Record*: Development work is being done at the Young's Valley copper ledge by a New York company. Thirty men are employed. There is considerable snow yet between there and Waldo.

Crescent City *Record*: T. B. Jones is making locations on upper Smith river. In a few weeks a dredger and gold-saving machine will be put to work in the bed of that stream.

El Dorado.

The county assessment of the Union mine has been raised from $12,500 to $100,000.

Placerville *Nugget*: Hayward & Lane, who recently bonded the Santa Clara quartz mine, Kelsey district, of J. McGraw & Co., are putting in a steam hoist and are making preparations for development.——A steam pumping plant is being installed at the Little Gem mine near Volcanoville.——A 50-foot shaft has been sunk on the Gem and a 2-foot ledge of high-grade ore exposed. Water was encountered near the bottom of the shaft. A pump has been put in and the work of sinking resumed.——Richardson & Klopfer have begun sinking a new shaft on the Alta Vista, Granite Hill district, west of the old shaft. ——Eighteen men are employed at the Darling mine near Georgetown, recently unwatered by the English company which purchased the property two years ago. Drifting is progressing on the 150-foot level, and it is said good ore is found.——The new mill at the McKeeney mine near Greenwood is completed.

Georgetown *Gazette*: The McKeeney mine, one mile north of Greenwood, will be ready to work soon, as the mill will be completed this week.——Collins & Sylvester have the contract for running a 150-foot drift and an upraise of 100 feet, which will tap the old shaft of the California Jack mine and the lode at a depth of 200 feet. Work will commence next week.

Fresno.

J. H. Hand has sold the Heskell copper mine, three miles from Pollasky, to H. B. Vergo for $25,000. Mr. Vergo represents an English syndicate, which owns the Copper King mine and other copper properties in Fresno county.

Kern.

Randsburg *Miner*: Big Butte has struck a good lead. It is reported to be 4 feet wide, 60 feet on the level, and runs $50 per ton.—— The Dyke G. M. & M. Co has been incorporated to work the Dyke mine, one and one-half miles southwest of Randsburg. The directors are J. C. Brown, M. P. Minor, W. C. Brown, C. F. Roberts and C. H. Belcher.

Inyo.

O. O. Howard Jr., Pres. Mt. Shasta Gold Mines, Ltd. has returned from the East where he organized and incorporated under the laws of Michigan, the Ratcliff Con. Gold Mines, Ltd. The home office of the company is at Battle Creek, Michigan, and general offices for the transaction of all business in the Mills Building, San Francisco, Cal. The company have a group of twelve mines in Pleasant canyon, Panamint mountains, in the South Park mining district, six miles from Ballarat. On the property is a 10-stamp mill and a 50-ton cyanide plant, with a tramway 4000 feet long from the mine to to mill. The mines are reported producing several thousand per month and employ twenty-five men. It is the purpose of the new owners to double the capacity of the plant, and to prosecute the development of the mines, which now show an ore body in places 30 feet in width, with no hanging wall exposed, and milling well in gold.

The Ratcliff Con. Gold Mines, Ltd , is a close corporation, the shares held by seven shareholders. The board of managers are O. O. Howard Jr., chairman, H. A. Ladd, Sec'y, both of San Francisco, Cal., and W. W. Durand of Battle Creek, Michigan, Treas. R. F. Harrison, one of the shareholders, has been appointed Supt. and is now in charge of the company's property.

Los Angeles.

E. Brough is developing his mine, the west extension of the Red Rover, five miles west of Acton. The Red Rover is being worked steadily.

Several prospectors are looking for the vein from which fragments of a dark colored, granulated copper ore came, found near Acton. It is rich in gold, but thus far no trace of the vein has been discovered.

Mariposa.

It is reported that the mill of the Merced Co. near Coulterville is to be hung up preparatory to the enlargement of its capacity by the introduction of twenty more stamps, making sixty in all. Meanwhile the Mary Harrison shaft will be sunk 500 feet deeper and an electrical plant installed.

The Mariposa Estate, covering 4387 acres of mineral territory in this county, is to be reopened. For thirty-five years it has lain idle; the mills have fallen into decay and many of the mine workings caved. The property has been owned for years by the Mariposa Mining & Commercial Co., composed of J. W. Mackay, J. P. and S. Jones, A. Hayward and the Hobart estate. Some months ago H. Smith, Jr., and H. C. Perkins bought a one-sixth interest and recently obtained an additional sixth from Mr. Mackay and additional interests from S. Jones. It is stated that the London Exploration Co. is not directly interested in this deal. A new Board of Directors of the Mariposa Mining & Commercial Co. has been elected as follows: T. Mein, Pres.; H. H. Taylor, Vice-Pres.; H. C. Perkins, Mr. Gorham; J. H. Mooser, Sec. Capt. Mein will have the management of the property.

The Pine Tree and Josephine workings are to be cleaned out and extended, dams are to be built in the Merced river and an investigation of the large property commenced.

The Princeton mine, which is only 600 feet deep, is credited with a production of $4,000,000, is nearly ten miles southeasterly from the Pine Tree and Josephine, which are near the Merced river.

Mono.

Bodie *Miner*: The Dunderberg mine has been bought by A. D. Sullivan, who will settle all obligations outstanding against the property. The mine is twelve miles south of Bridgeport, and is opened by a crosscut tunnel 700 feet long.

Napa.

The Napa Con. mine produces 600 flasks of quicksilver monthly.

Nevada.

The old Osborn Hill mine, near Grass Valley, is to be reopened by W. B. Burn, the recent purchaser. A new hoisting and pumping plant will be put in. Geo. W. Starr will be general manager.

Captain Thomas Mein and H. C. Perkins recently inspected the Union Hill mine, near Grass Valley. Both are interested with the London Exploration Co. in the property. They are figuring on other properties in Grass Valley district and at North Bloomfield.

In Grass Valley it is expected that the Kate Hayes quartz mine on Osborn hill be reopened within the next few weeks, and will be in charge of John Eddy, formerly of the Pennsylvania mine.

Tidings-Telegraph: A new 100 H. P. double cylinder hoisting plant has been ordered by the Pennsylvania M. Co. The hoist will be operated by steam, but may be changed to water or electricity. This machinery will permit of working the Pennsylvania to a depth of 3000 feet, and will hoist a load of three tons at the rate of 400 feet per minute.

Placer.

The Bald Mountain gravel mine, twenty miles east of Forest Hill, has been bonded in San Francisco. F. W. Venze is Supt. and fourteen men are employed. A new hoist will be put in. The company is said to have $15,000 for development work.

Plumas.

Twenty-five men are employed at the De-Long mine. The wing dam is being extended, preparatory to putting in the elevator.

Quincy *Independent*: N. S. Trowbridge is making preparations for working the Robinson quartz mine, in Granite Basin, and is putting up a shaft house and other buildings.

Riverside.

The Leon mine, fourteen miles southeast of Perris, is extensively developed and has exposed in the workings some fine ore, in which gold can be seen. The workings have exposed two ore shoots; and further development is being planned. There are two shafts on the property and levels are run, but the shafts have not been connected. They are 500 feet apart. The vein is unlike others in that region, being at the contact of mica schist and a porphyry dike. The vein varies in size greatly. No crosscutting has been done, but when work is recommenced a system of crosscuts will be run.

Nothwithstanding the heat of mid-summer on the desert there are a large number of men working and prospecting in that region this year and some of them are meeting with success.

The Reity & Sherman mill has been bought by Ellerman & St. Germain and moved to their Ivanhoe mine near Virginia Dale.

San Diego.

The Ranchita mine, near Banner, which was purchased last year by G. Borden of New York, has been shut down, the miners have been paid off, and two men have been employed to guard the property, it is reported, with instructions to allow no one to enter the mine. There were eighteen miners employed in the mine when the shut down took place. A 5-stamp mill had been added to the five already in place and all was in readiness to begin work with the new mill. A test was ordered and the machinery was started. Soon thereafter orders were issued to close the mill, shut down the mine and pay off the men. The owner gave no reason for shutting down. The miners were offered work in mines at Randsburg owned by Mr. Borden, and all took advantage of the offer and have gone to that camp.

Shasta.

It is reported that W. A. Clark of Montana is trying to secure copper property in this county. His expert, F. K. Wilson, has been on Still Water creek, eleven miles from Redding, examining land belonging to J. B. Rathbun. The property is covered by gossan which assays in copper and has never been developed. Sulphide was reached at 100 feet depth at Iron Mountain mine. At the Rathbun property it is reached at 35 feet.

J. T. & F. O. Jorden report the discovery of a gold deposit in the Mills-Rabbit mine at Merlan, two miles from Redding. The mine has paid the expenses of operation the past year. A few days ago the owners struck a ledge 8 to 12 inches wide, rich in gold. It is said a single nugget, 10 inches long and 6 inches wide, contains $300.

The Copper Plate M. & D. Co. has been incorporated. Sacramento is the company's chief place of business. The directors are J. F. Morgan, W. Laing, G. M. Hignett, S. A. Rice and E. S. Wachhorst. The capital stock is $30,000. The new company will operate in Shasta county properties.

Redding *Searchlight*: Pugh & Menzie, who have opened a property in the Clear Creek district, near the Mt. Shasta mine, are preparing to roast their ore. The mill recently put in place has been operation a week.

Redding *Free Press*: F. H. Dakin, Mgr., reports a new rich vein disclosed by an upraise from the No. 2 level in the Uncle Sam gold mines. Miners were cutting an upraise and struck a vein that was not known to exist. The vein is 4 feet wide, half of it being sulphurets and the other half pure white quartz. Cyanide experiments are now progressing with both dry and wet processes to ascertain which is the better for the refractory ores found in the mine. A 50-ton cyanide plant will be built.——The sale of the Bully Hill copper mines to Capt. J. R. De Lamar of New York for $200,000 is confirmed. The deed conveying the title in the five claims comprising what is termed the Bully Hill, at Copper City, was filed for record at the office of the County Recorder July 18.——The ore deposit in the Arps claims at Copper City has been tapped again by a drift run from a winze 25 feet from the floor of the 100-foot tunnel. Wm. Arps, is superintending the work. The ore is a partially oxidized sulphide. The percentage of copper is not usually high in the ore, but the precious metal values make the deposits valuable.——A rich body of ore has been found in the Cora Ethel mine, owned by J. M. Bassett, at Shasta. The ore is said to run $125 a ton.——It is reported that a smelter will be built on the section of land offered by the Uncle Sam Gold M. Co. at the mouth of Squaw creek, near the west bank of the Sacramento river.——The first purchase by J. R. De Lamar in the Pittsburg or Copper City district since the purchase of James Sallee's Bully Hill property is that of the adjoining placer and quartz mines of T. M. Popejoy and T. Jennings. The deeds have been executed and recorded transferring the Baxter claim and the South Killinger quartz claim for $5000, and the Popejoy and Squaw placer claims, three water ditches and the southwest quarter of section 9, township 31 north, range 4 west, for $3000.

Sierra.

Johnson, Byrne & Ewer of Downieville have prospected the gravel in the river bed, above Yore's toll bridge, and obtained results that were so satisfactory that they will work the ground. The tailings from the Webster and Byrne diggings, which were rich, were dumped here.

Siskiyou.

Redding *Searchlight*; W. A. Bantz, Gen. Mgr. Siskiyou G. & C. Co. of Boston, and G. E. Ward, engineer of the same, have been at

Mabel group of mines, one of their recent purchases, and report the Mabel ledge uncovered the full length of the claim, and other ledges are uncovered in many places. An eight-pound sample of what is said to be sylvanite ore from the Mabel ledge sent to Selby for a test yielded $300.

Yreka *Journal*: E. C. Green has been working a porphyry dyke on McAdams creek, near Deadwood, from which he has taken out fifty ounces.——The Greenhorn Blue Gravel miners have commenced sinking a new shaft.——Page & Co., who have an option on the Nurse place, near the mouth of Greenhorn creek, have commenced sinking a shaft to bedrock on the line of the Greenhorn blue gravel extension.——G. H. Souther, manager of the company intending to work Yreka creek, has called for bids on lumber needed.

Trinity.

Recently a visitor at the Sykes placer mine at Trinity Center found a nugget on top of a boulder where the force of the water had thrown it. It weighed $7, and is the second largest piece of gold ever found in this property.

Redding *Free Press*: Van Ness has uncovered a 4-foot vein of copper gold ore near Bragdon. Fowler & Co. are pushing things on the Van Ness bonded ledge, and have many sacks of ore on the dump. Their large double arrastra is nearly finished.——Rogers & Butler have some fine rock in their Ophir claim.

Tuolumne.

Work on the installation of new machinery at the Santa Ysabel mine has been hampered by the slowness of deliveries, caused by the congested condition of the iron and steel industry. The company is running twenty stamps and the date of the beginning of dividend payments depends upon how soon stamping with forty stamps will be begun.

It is reported that the lot of treasury stock recently offered in Boston by the Boston & Tuolumne G. M. Co. has nearly all been taken. The Supt. reports from the mine that the ore body continues to improve. Development work is being rushed and it is expected the 300 level will be reached by August 5th, '99.

The pocket mines of this county annually produce hundreds of thousands of dollars and give employment to a large number of men, many of whom are tributers.

The Jubilee M. Co, C. L. Benton, Sec'y, has six claims on the East Belt, fourteen miles from Sonora. On one of the claims, the Hazel Dell, a tunnel run 376 feet in 1854 has been extended by the present company to 478 feet, the width of the exposed vein averaging 4 feet. A drift on this vein has been extended with machine drill for 80 feet; assays show good value. The rock is free milling. The quartz carries sulphurets of iron, lead and copper. An open cut 30 feet long and 12 feet deep on the Esterbrook exposed a vein 2¼ feet in thickness. There is a shaft sunk and a crosscut tunnel run on the Jubilee claim and the same quality of ore found. Two small stamp mills and a two-drill air compressor plant from the Compressed Air Machinery Co. of San Francisco have been installed. There is a large quantity of ore on the dump. The company has free water and an abundance of timber W. B. Moore, the president of the company, is in charge of the work.

Jamestown *Magnet*: The Dreisam mill, at Arrastraville, has been started up again after a shut down.——South of the Tuolumne river the Longfellow mill, at Big Oat Flat, is running on ore from the 180-foot level.——At the Mt. Jefferson mine, at Groveland, an ore body has been developed on the 300 level.——Preparations are being made to ship another carload of rich smelting ore from the Vine Springs mine, near Columbia, to the Selby Works at Selby.——G. B. Breese is developing a new discovery on the hill above and southeast of the Densmore, near Columbia.——The Hyahpooh mine, near Columbia, is again a regular producer, several new strikes having been made there in the last four weeks.——Forty miners held a meeting at Confidence recently and organized a miners' union.——Andrews & Swett have bonded the John Royal mine, at the head of Experimental gulch, from C. Smith & Co. It was worked years ago, and a number of pockets were taken out. It also contains shoots of rich milling ore. No work has been done on it for thirty years.——The Stockton Gravel M. Co., operating the Philadelphia Diggings, near American Camp, on account of scant water supply, have about ceased operations. The season's run has been encouraging and the company will enlarge its ditch.——Lack of water caused a shut down at the Star mine, on Rose creek, July 15th, this property being partly supplied by water obtained from the Stockton Gravel Co.'s ditch.

Sonora *Independent*: Work has been resumed at the Slapjack mine, at Second Garotte, under the supervision of H. Argall, and gold-bearing quartz is being taken out. This property, with several other claims, has been incorporated under the name of Yosemite G. M. Co.

COLORADO.

The attempt to reopen the Globe smelter on the ten and twelve hour schedule has failed. The men demand an eight-hour day, but have pledged themselves to abide by the decision of the State Board of Arbitration as to hours of labor and wages.

The State Board of Arbitration concluded its investigation in Denver on the 26th inst. of the causes of the deadlock between the smelter managers and their workmen, in consequence of which the smelters that are in the trust have been idle since June 15th. The board has commenced taking testimony at Pueblo. The impression is gaining ground that the board's decision will be accepted by both sides to the controversy and that the smelters will resume operations next week. Managers J. B. Grant and Dennis Sheedy claimed that it was impossible to grant an eight-hour day and the increase of wages demanded by the men, as the increased expense would have to be placed upon the producers of ores, and would lead to the closing of many low-grade mines.

In '98 Colorado produced $3,000,000 worth of lead and $1,200,000 worth of copper.

CHAFFEE COUNTY.

It is reported a concentrating mill is to be built at the Cuba mine in Dewey district.

Granite *Pay Streak*: Machinery is being put into place on the Magenta mine. This is the inauguration of operations contemplated by the Magenta M. Co., under the superintendency of C. G. Barrick. The company has been reorganized.——A matte smelting plant is to be taken to Winfield in La Plata district.

CLEAR CREEK COUNTY.

Silver Plume *Standard*: Two machine drills are being operated in the Burleigh tunnel drifting and stoping on one of the veins of zinc ore, cut by the tunnel.——In the Bear creek section of Clear Creek and Jefferson counties some good finds of copper are reported.——The sale of the Gold Dirt and other properties at Empire, owned by F. L. Peck, is reported for $100,000. The purchasers are the Empress M. & T. Co.——Mgr. Begley of the Humphrey Spelter Co. is employing men on some properties across the range in the Montezuma district, in which large streaks of zinc ore are showing, which have heretofore been considered worthless.

EL PASO COUNTY.

The Elgin Leasing Co., operating on the extreme south end of the Republic, of the Mary McKinney Co., is making big profits. This month 115 tons of ore, of smelting grade, have been marketed, and there is every indication that by August 1st, '99, this tonnage will be doubled. The second half of the 115 tons is estimated to return six ounces to the ton. The ore is coming from the 300-foot level. The lease expires at the close of the year and will probably not be renewed. The management is making the most of its opportunity and is crowding down the shaft for another level. The work was started the first of the month.

From the smelter returns to the main office of the Jack Pot Co. it is learned that the treasury reserve has been increased by royalties from ore shipped by the Creston M. Co. during the week ending July 18th, '99, $2,377.77. This would indicate a net production of $9500 a week. The ore varied from low grade, worth $14 a ton, to $120 a ton. Mgr. Davenport reports the breast of the drift in the 400 level to be in fine ore.

GUNNISON COUNTY.

The Doctor mine employs thirty-two men and keeps nine four-horse teams hauling ore to the railroad. The ore is a lead carbonate running well in lead and about thirty ounces in silver.

The business portion of the town of Vulcan was destroyed by fire on the night of the 20th inst. Several lives were lost.

A. Plewis and D. C. Mason have sold their one-third interest in the chloride mine on the ridge between Ohio City and Pitkin to J. H. Sinclair for the chloride company for $10,000.

Gunnison *News*: G. W. Bartholomew is manager of the concentrating plant his company is erecting to treat the Keystone ore, soon to be completed. The mill will have a capacity of twenty-four tons in twenty-four hours, and five tons will be concentrated into one. There will be two grades of concentrates, the first silver-lead and the second gold, copper and iron.

Marble *Times*: Rich sulphide ores have been found in the 20-foot incline of the Fargo by Mgr. Moore. Mr. Moore concluded to unwater the incline and see what was in it. This was done by a siphon, and upon examination a small vein of lead and copper ore was found. Men were put to sinking, and with each shot the vein became wider and richer. The vein proper is 3 feet in width, and has a high grade of lead ore, intermixed with copper values. Immediately under the hanging wall is a streak of copper ore that will assay from 30% to 35%. Two shifts are working on the vein and six tons are already sacked for shipment.

Silver Lance: The past week men have been cleaning out the ice and dirt in the Eureka tunnel. The force will be increased. This mine is at an altitude above timber line.

LAKE COUNTY.

When it is considered that the metallic zinc contents of Colorado ores are in excess of any other mineral except iron, the growing importance of zinc mining in the State will be appreciated. The development of this industry has been retarded by the fact that the lead smelters charge a penalty for this metal, in most cases 50 cents a unit over 12%. Metallurgical science does not yet seem to have discovered a method of saving the zinc in the ordinary ores of the State. This, of course, is a loss of thousands of dollars to the State, and the mining and smelting men are evidently awakening to the fact that from an economic standpoint it is poor business.

At Leadville the Bimetallic and Arkansas Valley smelting plants have posted a new scale of wages to take effect immediately. The schedule is the same as the ten and twelve-hour systems in use before the adoption of the eight-hour law, but the rate of wages represents an increase of 16% over the old scale. The following is the scale, the rate being based on twelve hours' work: Furnacemen, new scale $3.50, old scale $3; tappers, new scale $3, old scale $2.50; pot pushers, new scale $2.75, old scale $2.50; general labor, ten hours, $2.

Boston capitalists, headed by J. W. Knowlton and F. C. Hitch, and known as the Boston Gold-Copper Smelting Co., have purchased the old Elgin smelter and ground, covering eighty acres, at Leadville. A 300-ton furnace to handle pyritic ores will be built. The company is operating a plant at Ward. There are great bodies of low-grade ore in this district, and the new plant will be of benefit.

Leadville *Miner*: K. Chisholm is in Leadville making arrangements to sell a lot of hessite ore to the Arkansas Valley plant from the new Klondike strike in the Little Alex at Bromley. Specimen assays indicate that the eight-ton shipment will run fifty ounces gold, fifty ounces silver and 14% copper.

Carbonate Chronicle: The Morning Star on Carbonate hill has been shipping 150 tons a day of iron ore, but during the past week production has fallen off. The territory is blocked out and turned over to lessees, who ship from twenty to thirty tons a day of iron, which is found in a zone 200 to 300 feet from the surface. The ground embraced in the Morning and Evening Star combination has never been explored below the plane of oxidation, so that what is in the gray porphyry and lime, as well as the Cambrian quartzite, is a problem. Some day the company may decide to do some diamond drilling in order to ascertain the existence of any mineralization. It seems to be a well-established fact that where the upper contacts are mineralized there is almost certain to be deep-seated ore bodies. It may be added that this is one of the strong arguments in favor of the M. A. W. enterprise. The ground in the new consolidation embraces the site of what were once rich mines. The millions which came from the Maid and Henriett, Adams and Wolftone, were found in the region of oxidation, but below this lies the zone of the sulphides.

PITKIN COUNTY.

Aspen *Tribune*: This week the Aspen Union Smelting Co., owners of the old Holden lixiviation plant, closed a five years' lease on the plant to E. R. Stark of Colorado Springs, S. C. Arnold and E. B. Green of Denver. The lessees have possession and have men at work on the flume and in the mill, making repairs. L. S. Smith, who conducted the negotiations, states that the new concern will be known as the Stark Milling Co.—a private company. E. R. Stark, who is at the head of the enterprise, is treasurer of the Raven G. M. Co. and director in both the Union and El Paso G. M. Cos. S. C. Arnold is a practical millman and will have charge of the mill. E. B. Green is a mining man and ore expert. He will buy ores and attend to the outside business. In the mill the old tables have been removed and ten new ones ordered. It is expected to have them running within three weeks with a force of twenty men.

SAN JUAN COUNTY.

Silverton *Standard*: A test run of 110 tons is being made from the Occidental mine through the Gold King mill.——The ore from the Irene will sample by the carload 180 to 200 ounces silver, $2 gold and 30% lead to the ton.——Supt. Riggs has let a 300-foot crosscut tunnel contract on the Maid of the Mist to Gerow & Vanderlip. The claim is above Gladstone, in the Red mountain belt.——The Hidden Treasure crosscut is in 975 feet.——On the Prodigal Son an 18-inch streak in the bottom averages sixty ounces silver and 12-100 gold.——On Galena mountain Briggs et al are driving their Turtle Dove tunnel at the rate of 1 foot a day. The tunnel is in 116 feet, with 30 feet to run to get under the ore shoot.——The Big Ten, in the same locality, has a 160-foot tunnel driven on the vein.——Work has been resumed on the Empire Con. M. Co.'s property. The crosscut tunnel, driven to intersect the Dora and other veins, is in 1030 feet. Several veins have been cut. Mgr. Kane is working eighteen men.——The first shipment of tungsten ore from Silverton, reported to be the first mined for the market in Colorado, will be made by Grabowsky & Schultz of the Everline mine on Cement creek.

SAN MIGUEL COUNTY.

Mining Investor: A contract has been let in Denver for sixty 1050-pound stamps, with all appliances, for the new addition to the Smuggler-Union mill near Telluride. The Smuggler-Union group recently passed under control of a Boston-Colorado company, supposed to be allied with the Calumet & Hecla Copper M. Co.

SUMMIT COUNTY.

Breckenridge *Journal*: I. P. Lambing & Son are working placer ground under lease in Illinois gulch, above the town limits of Breckenridge.——Work has commenced on the Carrie, in Swandyke district, under the management of T. A. Brown. A small force of men will be employed, as the work for some time will be development. The property has been shut down for a year and the men found the tunnel full of ice. This has been removed and drifting commenced. There are several patented claims in the group, which, with a stamp mill, is owned by the Carrie G. M. & M. Co. of Pennsylvania.——A contract has been let to J. Gough for sinking a 50-foot shaft on the Ground Hog lode, a Cucumber gulch property owned by D. W. Fall and others. This mine, with the Hazel group, is under bond and lease to New York capitalists. Two years ago the Ground Hog was worked under lease and at a depth of 50 feet the vein was cut, from which a car of ore netted $550. A cave occurred in the drift, which, together with the large amount of water, shut the leasers out, who did not feel disposed to go to the expense of putting in machinery with the uncertainty of getting the lease extended.——The new Pennsylvania mill was started a few days ago.——The Humphrey spelter people are working thirty men on the Silver King, shipping the product to Upland, Indiana. Four cars per week are going from this property.—— Considerable new work is being done in the vicinity of Rathbone and several old properties are resuming operations.

TELLER COUNTY.

At Colorado Springs it is asserted that many of the larger mines in the Cripple Creek district are making five-year contracts with the Guggenheim's smelter at Pueblo, Colo., for the treatment of their ores. An agreement as to charges is reported having been made between the Guggenheims and the American Smelting & Refining Co., but this agreement does not divide territory or business. The controversy between American Smelting Co. and its employes over the eight-hour law has given the Guggenheims an opportunity to secure a large amount of the Cripple Creek business. In order to secure a continuance of the work which would warrant large additions to the Guggenheim's plant the mine owners are compelled to enter into five-year contracts. Plans now in existence call for a doubling of the Guggenheim's plant at Pueblo, Colo.

Cripple Creek *Times*: There is a movement to establish a concentrating plant in Cripple Creek. When the smelter strike was inaugurated the fact was apparent that the product of the camp could have been handled without inconvenience had the tonnage been less. Concentration was suggested, and the matter has taken definite form. A private company has begun a series of tests of Cripple Creek ores for the purpose of adaptability to concentration.——The owners of several claims on Carbonate hill have been endeavoring to consolidate their properties into one concern. At present there is little development being done on any of the claims, and if the company is formed enough treasury stock will be disposed of to work the ground in a systematic manner.—— Extensive trenching is being done by the owners of the Little Joe on the north side of Bull hill, in the hope of finding the extension of the Pinnacle vein.——A 12 H. P. gasoline engine is being installed on the lower shaft of the Morning Star.

Victor *Record*: Preparations are being made to erect an electric hoist at the Plymouth Con. Co.'s mine, northeast of this city.——The Gold Coin mine, located in the town of Victor, it is stated has sufficient ore in sight to maintain an output of 100 tons a day for three years without sinking or driving any new levels. Recently the vein was cut in the sixth and seventh levels. In the sixth the vein was encountered 135 feet from the shaft, while at the seventh the crosscut had to be driven 10 feet farther. The vein is stronger and more clearly defined than in the upper workings, but carries the same values. In appearance the ore is a dark blue quartz colored by fluorite. The mine is yet as dry as the driest in camp. The vein is about 40 feet between walls. The output has been curtailed to eighty-five tons daily, due to a limited ore market. With the opening of the two new levels and the new mill running, the output of the Gold Coin will only be limited by the capacity of its hoisting plant.

IDAHO.

(Special Correspondence).—Some time ago the large holdings of the Florida Mountain M. Co., belonging to Col. W. H. Dewey and others, were consolidated with those of the Trade Dollar M. & M. Co., and the result is the Trade Dollar Con., which remains under the management of James Hutchinson. These holdings cover a strip across Florida mountain from the Silver City side to the opposite side at the town of Dewey. At the latter place is a 20-stamp mill, with concentrators, in good condition, which is included in the consolidation. The newest project is the driving of a transportation and drainage tunnel from the base of the mountain, at Dewey, through the mountain, coming out at a point near the old Trade Dollar mill. Its length will be about 12,000 feet. It will be connected at various points with the Trade Dollar workings. This work is now in progress.

The Black Jack, on the western slope of Florida mountain, which belongs to the Idaho & Pittsburg M. & M. Co., has been closed down since April 18th, '99. The reason for this was the flooding of the stopes and drifts in the deeper workings. In this property the ore body is reached by a 2100-foot crosscut tunnel, 1200 feet vertically from the surface. From this tunnel level a shaft sinks on the hanging wall to a depth of 220 feet, from which point the drifting and stoping has been done. Here is where the surplus water comes in. From Supt. Frederic Irwin I learn that the property remains idle pending the solution of the surplus water question, the present pumping facilities of the property not being ample. It is locally reported in Silver City and DeLamar mining circles that negotiations are in progress looking to a further consolidation which will bring the Black Jack group into the Trade Dollar combination. The Black Jack is a large producer and a money maker and there should be no hesitation about putting in any pumping plant found necessary; but the inactivity since last April possibly can be explained by the consolidation proposition. The seeming tardiness in providing the requisite pumping facilities is accounted for by the projection of the Florida mountain tunnel on the part of the Trade Dollar Co., which cuts far below all Black Jack workings and which will drain the latter as well as other sections of the mountain.

The Boise, Nampa & Owyhee Railroad Co. are extending their line from Guffey, on the Snake river, to Reynolds creek, a distance of twelve miles, which will reduce the stage trip to Silver City and DeLamar. The Idaho & Northern Railroad Co., comprising the same people as the B. N. & O., are taking steps to build a line from Boise to Horseshoe Bend, fifty-five miles, which will tap a heavy timber belt and go within twelve miles of Quartzburg. Col. W. H. Dewey is at the head of these enterprises. WASCOTT.

Silver City, Idaho, July 20th, '99.

(Special Correspondence).—The De Lamar mine is working with its usual force and is milling 180 tons of ore per day at the cyanide plant. The coarser tailings are carried back, recrushed and submitted to a second treatment. The mineral zone, trending in an easterly and westerly direction, which carries the various parallel ledges of ore, is opened on this property by a system of crosscut tunnels, driven into the mountain at points 1500 to 2000 feet above the bed of Jordan creek, on which the mill is located. A rapidly operated rail tramway conveys the ore from the vari-

ous tunnels to the mill. Not 100 feet above the mill a new tunnel has been started, to be driven to the ore bodies, which, it is calculated, will be reached at 3200 feet. This will open the veins to an unusual vertical depth. A study of the vein structure here and the changing characteristics of the ore is one of interest. Much of the ore is a porous, decomposed quartz and porphyry, with streaks of talc and clay, and with good values in common-looking material.

In earlier days, when high-grade De Lamar ores were milled by stamps and plates, the tailings were passed down the stream and dumped on a bar, where to-day something like 150,000 tons are to be seen. The De Lamar Co. have completed a 200-ton cyanide plant to treat these tailings, which by tests are known to contain good values. The plant will be operating in a few days.

John Scales is operating a pan, settler and amalgamation mill on a portion of the tailings, paying a royalty from the proceeds.

W. H Townsend is running a similar mill farther down the stream, it is stated, at a profit. WASCOTT.

De Lamar, Idaho, July 21st, '99.

(Special Correspondence). — War Eagle mountain, on the east side of which is Silver City, was the scene of activity and large production in early days. On this mountain are the Poorman, Cumberland, Oro Fino, Ida Elmore, Golden Chariot, Minnesota and Mahogany. Just now little is doing in that locality, though the Cumberland, recently sold, is preparing to start up. It is claimed all these are on one great lode, and the old workings are through shafts, many of which are filled with water. A drainage tunnel, cutting below the old workings from the east side, has been suggested as a project that would unwater all the properties on the mountain. An effort is said to be making to harmonize all interests with such an enterprise as the object. Every vein, lead and spur of the lode mentioned is said to have produced good values. WASCOTT.

Dewey, Idaho, July 21st, '99.

MICHIGAN.

It is reported that the silver mine on Silver Islet in Lake Superior is to be reopened. Silver Islet is naturally a small rock 40x70 feet, and rising a few feet above the waters of the lake. Cribs and coffer dams were constructed about it and two acres of land built in this manner years ago. The property was equipped with machinery and the mine successfully worked to a depth of several hundred feet. The product of the mine was largely in native silver. A series of heavy storms destroyed a large part of the breakwater and coffer dams. The mines were flooded and have now been idle for years.

The inability of Isle Royale Co. to contract for mill machinery at anything like a reasonable price, as well as impossibility to secure it within a year, is said to be the reason why a stamp mill is not in course of construction. A four-head stamp mill at to-day's prices for steel and machinery would cost nearly half a million dollars without any guarantee as to when machinery would be delivered.

Boston *Financial News*: What is claimed to be the greatest feat in the world's history of mining was brought to a successful conclusion at Houghton July 20, when the forces rising and sinking at the new Quincy shaft No. 7 met a short distance below the 13th level, thus extending the shaft from the surface to a depth of 4000 feet in little more than eighteen months, thus eclipsing all records in the matter of fast work. The shaft was commenced 4000 feet below the surface on Jan. 1, 1898, and five months later sinking began at the surface. The start was made on the line of the shaft in the south levels of No. 4 shaft. No. 7 shaft curves toward the bottom to conform with dip of lode. The undertaking and its successful conclusion is due to Chief Engineer J. L. Harris, who was lately made assistant mine superintendent. No. 7 shaft will be timbered to the bottom within six months. The hoist and combined shaft and rock house will be ready six months hence, when the new mill will also be ready, and then No. 7 shaft will be able to supply 1000 tons of rock every twenty-four hours.

MISSOURI.

The American Zinc, Lead & Smelting Co. has bought the Richland mine, near Carterville, for $150,000.

MONTANA.

Anaconda *Standard*: The Alice Mining Co. at Butte is working its usual force. The total is about 100 men, including leasers and men on wages. The product from the mill is silver bullion, carrying gold in the proportion of 3 ounces gold to 1000 ounces in silver. Aside from the ore milled by the company they produce considerable base ore, which is shipped and sold to the smelters. The company is doing prospecting work in the Alice and Blue Wing mines. This is the only silver mine in the district that is now productive.

NEVADA.

The United States Copper & Smelting Co. has been incorporated under the laws of Nevada, with a capital stock of $2,500,000, to operate at Alpha, Eureka county.

At the recent annual meeting of the Dexter M. Co. of Tuscarora a new board of directors and officers were elected, composed of J. Dern, Pres.; J. S. Lakin, Vice-Pres.; S. B Milner, E. O. Lee and H. C. Southworth; G. E. Airis, Sec'y and Treas. During the past fiscal year the Dexter mine produced 19,994 tons of ore, which yielded gold bullion and auro-cyanides to the value of $155,347.31. Improvements costing $64,969.04 were made. Recently a vein of ore was struck in an upraise above the 250 level that gave average assays of $379.75 per ton, carrying a large amount of free gold.

A belt of copper croppings has been discovered on the northern slope of the divide between the Carson and Truckee river valleys, a short distance below the summit of Arrowhead peak.

At the De Lamar Works, in eastern Nevada, and at the April Fool mine, work is progressing as usual. It is reported that the option on the April Fool group will be taken up August 1st.

W. S. Brown, Gen. Mgr. North Mountain M. Co. on Cherry Creek, has commenced at the 600 level, where the workings will be cleaned out and preparations made for the further opening of the vein. The ores show an average value of $9 per ton in silver and gold. The cyanide process will be employed.

C. L. Taylor and J. M. Fulton of Reno have bought from S. Hunt, O. Bennett and S. D. Thacker their antimony mine, there being reported 10,000 tons of ore in sight. The mine is in Humboldt county, seventy miles north of Winnemucca.

The Mayflower, Great Eastern and other mines in Bristol district, which were once worked for silver and lead, are now being explored for copper ore and making shipments.

The Jackson Creek district copper mines in Humboldt county, seventy-five miles northwest of Winnemucca, are said to be located on a vein showing a width of 150 feet across at places in the Jackson Creek range.

NEW MEXICO.

Silver City *Enterprise*: The Pinos Altos G. M. Co. is building a pipe line from the Gebhart George cienega to Pinos Altos, five miles in length. The Gillett shaft on the Pacific vein is down 700 feet. A level will be run at 700 feet and the shaft continued to 1000 feet, with levels at intervals of 100 feet.——It is reported that the Little Fannie mine and mill at Mogollon will be put in operation.——At the Last Chance mine, E. Craig, Supt., ten stamps are running and regular bullion shipments are made. A bar of gold and silver bullion weighing 110 pounds was shipped last week. The bullion contains equal values in gold and silver.——At Hanover, Gilchrist & Dawson are shipping ten tons of copper-iron ore daily from the Thayer mine.——A carload of copper-iron ore was shipped from the Hanover No. 2 last week.——J. Schlosser is working on a body of copper ore on the Humboldt mine, which shows 800 feet. The ore runs from 8% to 20% copper.——The Anson S. is being pumped out and repairing the shaft is in progress. W. E. Clark, Supt.——The old shaft on the Hanover mine is being pumped out and the old workings drained. Two new shafts have been sunk, one 75 feet and the other 65 feet. Drifts have been started to connect with the ore bodies in the old workings.

OREGON.

Sumpter is to have a smelter which will be built by the Union Smelting & Manufacturing Co. of St. Louis. The name of the Sumpter company is the Union Smelting & Sampling Works, of which P. R. Bishop, W. H. Gleason and T. McEwen were the incorporators. The first meeting of stockholders and election of officers were held Saturday, July 22, in Sumpter.

Spokane *Chronicle*: At the Red Boy mine a mill of twenty stamps has been built, and arrangements are being made to increase its capacity to forty stamps. It is reported that $20 and $30 a ton is saved on the plates in addition to the concentrates. It is worked through a crosscut tunnel, which cuts the three veins running through the property. The Golden Monarch lead ranges between 10 and 15 feet in width, was the first cut at 500 feet, and at the same depth from the surface the Red Boy ledge was cut. This lead is 6 feet wide and carries rich ore. The tunnel is being continued to cut the Blaine vein, which is the largest. It will be reached in 300 feet. Drifting is in progress on both of the ledges cut.

SOUTH DAKOTA.

Deadwood *Pioneer-Times*: A large amount of wolframite is being shipped from the Black Hills. Three outfits are making these shipments and getting from $150 to $300 a ton for their product. All of this ore is sold through agents representing foreign firms, most of the ore going to Germany, where it is used in the manufacture of fine cutlery. Some of those who have made shipments of this ore are the owners of the Two Stike of Yellow creek, the Durango of Lead City and the Harrison mine, near the Durango. The Harrison mine has shipped twenty tons, the owners getting from $150 to $200 a ton. One thousand dollars was paid to the owners of the mine before the first shipment left the dump.

UTAH.

Pres. Coram reports development work of the Bingham mine to be satisfactory, finding all drifts and tunnels in ore, averaging 10% copper and $5 to $6 per ton in gold. The adit tunnel will tap the vein several hundred feet below the present workings. The directors will be asked to consider the advisability of erecting a new smelting plant.

A new shaft is to be sunk on the Massachusetts at Park City. Engineers have been making surveys with this object in view.

Deseret *News*: Copper ore has been found on the mountains east of Centerville, between Salt Lake and Ogden, assays of which give 15% copper.

Salt Lake *Tribune*: With 3000 tons of milling ore in the bins and on the dump, the plant on the Last Chance at Bingham will be started up again next month. Morris R. Hunt is manager of the property.——In the property of the Rich-Cache M. Co., at the head of which are L. R. Martineau and F. Turner, in the main workings is exposed 7 feet of ore, some of which shows native copper, while, it is said, there is enough silver with it to pay the cost of extraction and treatment. The group is located on the line between Cache and Rich counties, and the camp is a new one.

Salt Lake *Tribune*: Supt. Hood of the Silver Shield at Bingham reports that at a depth of 35 feet in a new shaft sunk from the tunnel level the vein has been broken into and uncovered a body of high-grade galena, the extent of which has not been determined, owing to the influx of water that followed. He has eleven men working on ores that are exposed in drifts off the tunnel level.——A Denver mining man who has been in the mining section east of Ferron pronounces the ore from claims owned by Huntington parties as bearing tin.

Tribune: All the alterations having been completed, the Highland Boy smelter has been turned over to the Utah Con. M. Co. by Kiepetko & Fischer, who superintended its construction. Mining men estimate that the cost of the plant has been $300,000.——The first consignment of bullion by the present owners of the Dixie group near St. George has been settled for. The bars contained 88.2% copper and a small amount of silver.——The pumps installed in the Independence shaft on the properties of the Tesora M. Co. at Tintic are at work, and breaking of ground after an interval of many years has been resumed. The ore shows 13% copper, fifteen ounces silver and $3 in gold per ton. The shaft, which is an incline, is at a depth of 225 feet. It was at that depth that water was first encountered.

WYOMING.

Grand Encampment *Herald*: At the Boyce discovery, the Eureka, the shaft is down 6 feet and the mineralized vein is 4 feet in width. One-half of the vein is solid ore assaying copper 22%. A carload will be sent to the smelters. The Eureka is three and one-half miles south of Grand Encampment——The Anchor M. Co., with a capital stock of $250,000, has been incorporated by A. H. Rehkopf, H. Crookham, F. S. Aldrich, W. G. Owens, A. E. Hollingsworth, L. G. Everist, T. R. Smith, of Des Moines, Iowa. The company will operate at Grand Encampment.

FOREIGN.

BRITISH COLUMBIA.

The Government has decided to establish an assay office at Vancouver. The agitation which has resulted in this action was caused by the bankers and others who objected to paying the fees asked by the United States Government.

MEXICO.

(Special Correspondence).—Reports from the Inguaran copper mining district, in Michocan, indicate that a railroad will be built from the mines to Zehuatenejo, on the Pacific coast, in which event San Francisco will be the basis of operations of the French syndicate that owns the mines and the railroad concession. The properties of the syndicate cover a territory which contains numerous veins of copper ore. The mines have been worked for two centuries, first by the Spaniards and later by the Mexicans. Prior to a year ago all work was done by hand. A little over a year ago Mr. Phillips, an American, was placed in charge. Air compressors and drills were put in, and on Dec. 20th the plant was put in operation. Five tunnels are being driven and considerable outside work is being done by hand. Two hundred men are employed. Other people are prospecting in the same neighborhood, as there are indications of copper on three sides of the syndicate's properties.

The new Tavichi district, a day's ride from the city of Oaxaca, is attracting attention. The La Natividad, owned by Rickerts, Grandison, Trinker and others, has just ordered a 10-stamp mill. Arrangements have been completed by which F. B. Morse, associated with City of Mexico capitalists, will erect a stamp mill in that district.

In the Tlacolula district of Oaxaca an English company, under the management of F. McCann of the City of Mexico, will erect a 20-stamp mill for the Oest mines, which have recently been purchased.

Mexico, July 22nd, '99.

It is said the mines at Alamo, Lower California, are doing well. A $5000 gold brick was recently shipped from the Viznaga mine at that camp.

SOUTH AFRICA.

At Glynn's Lydenburg the output for May was as follows: Milled, 2130 tons, yielding 810 ounces fine gold; cyanided, 1380 tons, yielding 522 ounces fine gold; slimes—April 731 tons, May 708 tons, yielding 441 ounces fine gold; total, 1773 ounces fine gold. Total value of output, £7925.

Commercial Paragraphs.

THE *Australian Trading World* of the 8th ult. notices the opening of the Western Australian section of the Greater Britain Mining Exhibition, under the auspices of the West Australian Chamber of Mines, and speaks of the Wilfley ore concentrating table. The *World* says: "The accuracy and the speed with which the Wilfley table does its work is truly wonderful, and it seems to require only the attention of an ordinarily intelligent non-expert; even a sharp boy could run it. The Wilfley Ore Concentrator Syndicate, Ltd., 32 Old Jewry, E. C., are the owners of the patent (excepting for America, whence it originally hails), and an enormous demand for this table may be expected from Western Australia, New South Wales, Victoria, Tasmania and New Zealand, where it should be the means of giving life to a great many low-grade mines that are at present unable to work their poor-grade stuff at a profit with old-fashioned machinery."

Obituary.

LLOYD TEVIS, a California '49er and prominent miner, died in San Francisco on the 24th, aged 75. The Anaconda, Mont., copper property, the Homestake mine, South Dakota, and the Ontario, Utah, were among the large mining properties in which he was interested. About two months ago he was credited with having received $8,000,000 for his share of the Anaconda property, then sold to the Rockefeller syndicate.

Industrial Notes.

—Seattle, Wash., is to have a government assay office.

—There is a general advance of $2 per M. feet on lumber.

—Several suffering miners are stranded at St. Michaels, Alaska.

—A branch line of the Sierra Railroad is to be built from Jamestown to Angels, Cal.

—Skaguay, Alaska, and Dawson, N. W. T., will be connected by telegraph Oct. 1st, '99.

—The Phœnix, Arizona, street railway is to be sold for failure to pay interest on its bonds.

—Government engineers have completed the survey for the new $20,000 reservoir near Florence, A. T.

—Moran Bros. are putting in a big lot of shipbuilding machinery in their Seattle, Wash., establishment.

—War revenue stamps to the value of $3160 were affixed to a deed in Oakland, Cal., this week, transferring the property of the Oakland Water Co. to the Contra Costa Water Co.

—The Occidental Smelting Co. has bought the Kirkland, Wash., townsite, near Seattle, and is locally credited with immediate intent to "build and operate a large smelting plant."

—The Southern Pacific Co. has increased its capital stock from $150,000,000 to $200,000,000, pending the reorganization of the Central Pacific Co., and its consolidation with the S. P. Co.

—The building of the Southeastern Mexican railway from a point on the National Tehuantepec road to the Guatemalan border is assured. The line will pass through the State of Yucatan.

—The Boston Gold-Copper Smelting Co., W. R. Duvall, Mgr., has bought an 80-acre site at Leadville, Colo., and will put in a 300-ton furnace. The Loeder pyritic reduction system will be employed.

—Prof. Le Conte, head of the geological department in the University of Cal., thinks that there is no connection between the recent volcanic eruption in Hawaii and the southern California earthquakes.

—Labor on railroad work and in harvesting crops, etc., is still reported very scarce in California. The Southern Pacific Co. say that their construction work is delayed because of inability to get laborers.

—The Hawaiian Islands are U. S. territory. The Philippine Islands are not. A sealed letter can be sent from the U. S. to the Philippine Islands for 2 cents; the same missive to the Hawaiian Islands costs 5 cents.

—The seventy-five miles of grading for the Wyoming Southern Railroad, from Fort Steele, Wyo., to the copper deposits in northern Colorado is expected to be supplemented by track laying in September, and later the road is to be continued through to Salt Lake, to connect there with the Short Line now being built to Los Angeles, Cal.

—The California State Fair at Sacramento, Cal., will be from Sept. 4th to Sept. 16th, inclusive, and is worth attention. Secretary Shields and those connected with it are sparing no effort to make it a success. The various departments will be of interest to all visitors. In the two weeks' racing $40,000 will be competed for, the mechanical display will be of unusual merit, and the daily celebrations by various organizations will be a feature that can not fail to be of interest to all.

—Consul Dudley, of Vancouver, B. C., writes: "The Government of this province has decided to establish an assay office in this city, and has also made arrangements with the Victoria Board of Trade and bankers there for the assaying of gold at the Government assay office, which has heretofore merely made assays for the benefit of the Department of Mines and not for private individuals. The agitation which has resulted in this action was caused by the bankers and others who objected to paying the fees asked by the United States Government. The requirement of a consular fee and an entry fee were regarded as hardships."

—James J. Hill, president of the Great Northern Ry., says that he sent 16,000 track laborers out in the past twelve months, and yet has had not more than 2500 men at work at any one time, the conclusion being that the most of them find work that suits them better in other lines. West of the Dakotas he employs more Japs than men of any other nationality, not from choice, but because he was obliged to. He says: "Every healthy man who is idle in the United States to-day is so from choice. I do not say that every carpenter can get carpenter work to do, or that every plumber can find a job at his trade, but if he will take what he can get every idle man in the country can go to work as soon as he is ready to. At this moment there are jobs ranging in pay from $1.25 to $3 and $4 a day for 100,000 men in the Northwest."

—The California State Board of Trade asks the MINING AND SCIENTIFIC PRESS to say that it wants a full line of minerals—gold ores, silver ores, quicksilver ores, copper ores, iron ores, tin ores, auriferous gravel, asbestos, mineral paints, onyx, marble, granite, limestone, pottery clays, asphalt, bitumen or any other mineral product of commercial value—and wants to be put in communication with parties who can furnish creditable samples of any of the above. Samples of each of these products are desired by the State Board of Trade, first to replenish its permanent exhibit, and, secondly, for a display of California products that it is helping to prepare for the Paris Exposition. If parties who have any of these articles will notify the State Board of Trade, an order will be placed with them at once for such amounts as may be required. All articles will be paid for by the State Board of Trade, also the cost of packing and expressage to their headquarters, Union Ferry Bldg., San Francisco.

Personal.

SUPT. FRANKLIN LEONARD of the Sutro Tunnel Co. is in New York City.

D. B. HUNTLEY of the DeLamar, Idaho, Co., is visiting the Buffalo Hump country.

CAPT. DE LAMAR and John Hays Hammond are expected in California next week.

R. K. COLCORD has been appointed assayer in charge of the Carson, Nevada, assay office.

JOS. MCGILLIVRAY arrived in London on the 21st inst. in connection with some Klondike mining property.

WM. RUSSELL is chief chemist for the Gold & Silver Extraction Co. of America, Ltd., at their Denver, Colo., office.

PHILIP DEIDESHEIMER of San Francisco and W. H. Lewellyn of New York are examining copper properties at Waldo, Or.

THOS. O'BRIEN, owner of two Dawson, N. W. T., papers, and a pioneer there, is in San Francisco en route to Ottawa.

H. A. COOK, Supt. of the Cowboy mine in Shasta county, Cal., has been a visitor in San Francisco. He has returned to the mine.

GEO. W. PARSONS of Los Angeles, Cal., is in San Francisco on business connected with the Leon mine, twelve miles south of Perris, Cal.

W. A. HOLMES, a mining man, who for several months past has made headquarters at Sonora, Cal., has gone to Siskiyou county, Cal.

PRES. MOHLER of the Oregon Ry. & Navigation Co. resigns to take the presidency of the Chesapeake & Ohio R. R., at an annual salary of $35,000.

PROF. G. P. GRIMSLEY of Washington College, where he is professor of geology, is making geological examinations in Nevada county, Cal.

J. L. SWANNEY of Cripple Creek, Colo., has returned to that place from Junction Bar, Idaho, where he has been in the interest of the Scottish-American Development Co.

F. H. NEWELL, chief of the hydrographic division of the U. S. Geological Survey, is in San Diego, Cal. He is on a tour of inspection of water-storage reservoirs throughout the country.

ALFRED BUTTEMER, who for four years has been superintendent of the mines of the Gresham Gold Exploring Syndicate of London, at Coolgardie, Western Australia, has returned to San Diego, Cal.

R. S. MOORE and T. J. Barbour of the engineer staff of the Risdon Iron & Locomotive Works, San Francisco, are on the Comstock inspecting the hydraulic pumping plant in the C. & C. shaft, while No. 2 elevator is being rearranged.

R. H. POSTLETHWAITE of San Francisco left for Breckenridge, Colo., on the 25th inst. to install a third dredger in the placer mines at that place for the North American Gold Dredging Co. Two of these dredgers were put in last year by the Risdon Iron Works of San Francisco.

CONGRESSMAN BELL of Colorado and colleagues, constituting a congressional committee of inquiry, are this week investigating labor troubles in the Cœur d'Alenes, Idaho; they go thence to Butte, Montana, and Salt Lake City, Utah, there to inquire into smelter conditions, etc.

A. A. WATKINS, A. Carrigan, S. J. Hendy, J. Sloss and F. M. Leland constitute the San Francisco finance committee of the California Miners' Association in connection with the reception and entertainment at San Francisco of the American Institute of Mining Engineers next September.

Recently Declared Mining Dividends.

Boston-Little Circle Zinc Co., 1%; payable Aug. 1.

Boston & Montana, regular quarterly dividend $4 per share and $6 extra; payable Aug. 21.

Quincy M. Co., Michigan, $6; payable Aug. 15.

Homestake M. C., South Dakota, regular monthly dividend 25 cents per share, 25 cents extra; July 20.

Colonial Lead & Zinc Co., first monthly dividend 1%; payable Aug. 1.

Grass Valley Exploration Co. (W. Y. O. D. mine), dividend No. 3 of 25 cents per share, $7500; July 20.

Sacramento M. Co., Mercur, Utah, dividend ¼ cent per share, $5000; payable Aug. 1. Total for year, $35,000.

Pennsylvania M. Co., Nevada City, Cal., dividend No. 31 of 25 cents per share, $10,000; payable Aug. 1.

Hidden Treasure drift mine, Placer Co., Cal., dividend 10 cents per share, $3600; July 20.

High Five mine, Colorado, $10,000; July 25.

Recent Mining Incorporations.

Maple Creek G. M. Co., San Francisco; capital stock, $200,000; W. E. Shepman, C. A. Malm, J. Zederman, P. J. Miller, A. H. Winn, San Francisco.

Mines and Machinery for Sale at Public Auction.

The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Daliman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JULY 18, 1899.

629,119.—ROTARY ENGINE—W. W. Andrews, Los Angeles, Cal.

629,102.—HEAT INSULATING COVERING—Borrowe & Lumley, S. F.

629,234.—HORSESHOE—W. Cahill, S. F.

629,122.—WATER HEATER—C. A. Davis, Pasadena, Cal.

629,154.—HAT HANGER—Carrie Easton, S. F

629,156.—LAND GAUGE FOR PLOWS—R. B. Fentern, Newman, Cal.

629,030.—HAY PRESS—W. H. Gray, San Leandro, Cal.

629,294.—MORTISING MACHINE—G. H. Heady, Los Angeles, Cal.

629,034.—BOX COUCH—J. Hoey, S. F.

629,254.—CORNET SHANK—Horn & Wain, S. F.

629,039.—RECIPROCATING MOTION—Luitwieler & Wilkinson, Los Angeles, Cal.

629,044.—CATAPULT—C. F. McGlashan, Truckee, Cal.

628,956.—HORSE DETACHER—J. Orteig, Phœnix, A. T.

629,137.—PLOW—Spaulding & Robbins, S. F.

629,138.—PLOW—Spaulding & Robbins, S. F.

628,962.—PILE DRIVER—A. C. Speer, Woodville, Ogn.

629,098.—ORE CRUSHER—Turman & Hampton, Los Angeles, Cal.

629,115.—CABLE REEL—E. Turney, Portland, Ogn.

629,055.—TOP—J. Wallace, Sacramento, Cal.

629,282.—GAS GENERATOR—Wheelock, Walker & Diers, Tacoma, Wash.

629,144.—WOOD SPLITTING MACHINE—P. F. Wise, Los Angeles, Cal.

629,023.—ROASTING FURNACE—L. T. Wright, Keswick, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CONTINUOUS SPINNING TOP.—James Wallace, Sacramento, Cal. No. 629,055. Dated July 18, 1898. This invention refers to tops and means by which they may be made to spin and the motion kept up indefinitely by occasional pressure. The top consists of a disk or other form of suitable weight and size having a hollow central shaft extending above and below. A point at the lower end of the shaft serves as a support upon which the top may spin. Within the shaft are lugs or pins and a screw of rapid pitch is adapted to slide between these pins. A spring in the bottom of the hollow shaft forces the screw up, and when, by pressure upon the head of the screw, it is forced down without turning, it causes the top to turn by its action on the pins between which it passes. As soon as pressure upon the screw is released it rises and when again pressed upon the same action takes place. A sufficient speed of rotation is thus produced to keep the top in rapid motion, and whenever it begins to run slowly one or two more pressures upon the screw will increase its speed and keep it running. In order to conveniently apply the pressure a pressure head is fitted to the stem forming the upper end of the screw and is loosely turnable upon it, when no pressure is applied to the head. When pressure is applied to the head it forces it into contact with a disk which is fixed upon the screw shank, and sufficient frictional contact will be produced to prevent the screw from turning so that the downward pressure acts through the screw to turn the top. As soon as pressure upon the head is relieved the screw can turn freely in unison with the movements of the top and without retarding its rotation.

HAY PRESS.—W. H. Gray, San Leandro, Cal. No. 629,030. Dated July 18, 1899. This invention relates to improvements in hay presses of that class in which the follower is moved in the press box by means of a horse or other power transmitted through a chain sheave and intermediate machinery. The invention consists of a vertically journaled column, a chain-driving sheave fixed thereto, mechanism by which the column and sheave are turned sufficiently to compress the bale, then disengaged and allowed to return to their normal position, an air cylinder with a plunger movable therein and adapted to form a cushion when the parts are allowed to suddenly return after being disengaged. A spring-pressed latch pivoted upon the lever arm and a lug projecting from the sheave engage each other and move the arm until the piston has reached the end of its outward stroke, the lug being then detached or disengaged.

CATAPULT FOR THROWING PROJECTILES.—C. F. McGlashan, Truckee, Cal. No. 629,044. Dated July 18, 1899. The object of this invention is to provide a catapult or mechanism which can be made available for the purpose of throwing bombs and other projectiles to a distance, and means by which the trajectory and distance to which the projectile is thrown may be accurately estimated and proper provision made to accurately place it. It consists of a plurality of coiled springs having anchor arms by which the ends adjacent to the coil are held in place, means for drawing down the long or throwing arms so as to produce a tension upon the spring which will act when the arm is released to throw said arm through its arc of travel at a high rate of speed. This throwing arm is provided with a cup which is adapted to hold the projectile, and means for lengthening the arm and adjusting the cup are also provided. A scale is fixed with relation to the arms so that the trajectory and distance to which the projectile may be thrown by the use of springs can be accurately determined.

BOX COUCH.—John Hoey, San Francisco, Cal. No. 629,034. Dated July 18, 1899. The object of this invention is to provide a couch, sofa or like article in which an improved means is shown for connecting the seat and upper portion with the box base, and to provide for a graceful configuration of the front in making the connections. The couch is made in two parts, the seat portion and the box base, the latter having the upper part extending toward the main vertical end of the box and a transverse uniting strip between the projecting ends. The rear edge of the seat is hinged to the base, and at the corresponding end of the box is an arm extending upwardly and outwardly with a downwardly depending projection which overlaps the end of the box extension. The front of the arm and the front of the box have a continuous line of reverse curvature from the top of the arm to the bottom of the box. A connecting concavo-convex link is pivoted upon the tilting seat portion and has its lower end slidable through a link or loop which guides it in opening and closing, and which forms a stop to hold it in place when the seat has been opened for the purpose of removing the contents of the box.

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Wanted—At the Zantgraf Mine,
NEWCASTLE, CAL.,
Ten Able-Bodied Muckers and Carmen.

WANTED,
4-INCH BLACK PIPE; ALSO ROUND IRON FROM ½ TO 1½.
Must be in fair condition. DYER BROS., 117-119 Beale St., San Francisco.

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20-STAMP GOLD MILL,
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Must be nearly new and in first-class condition. Give full particulars and price f. o. b. cars or steamer, or as it stands. Address "ALASKA," care of Mining and Scientific Press.

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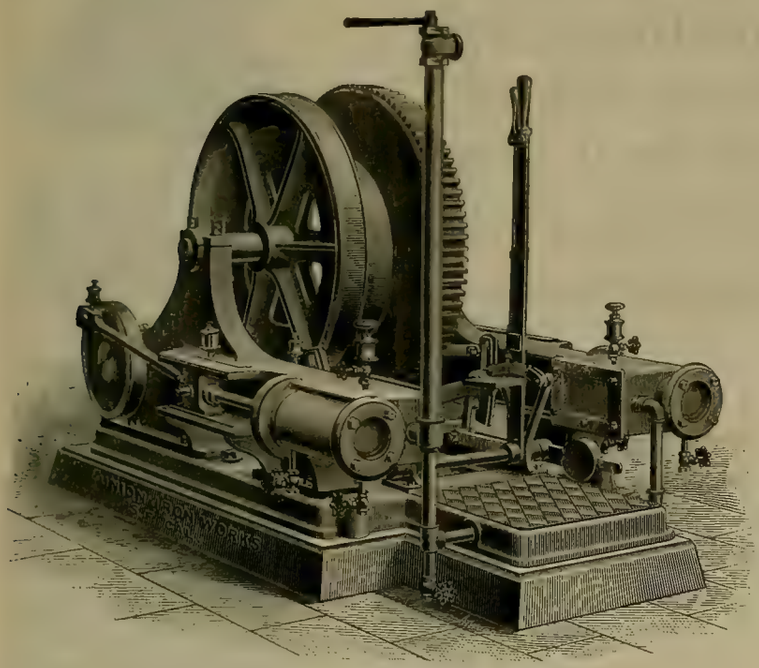
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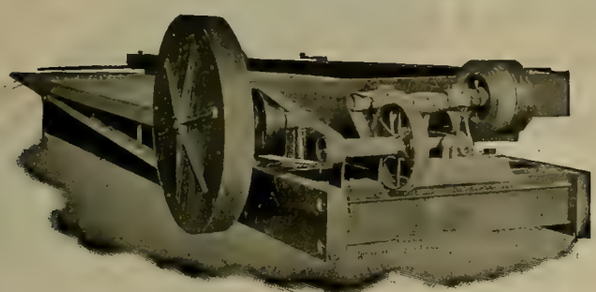
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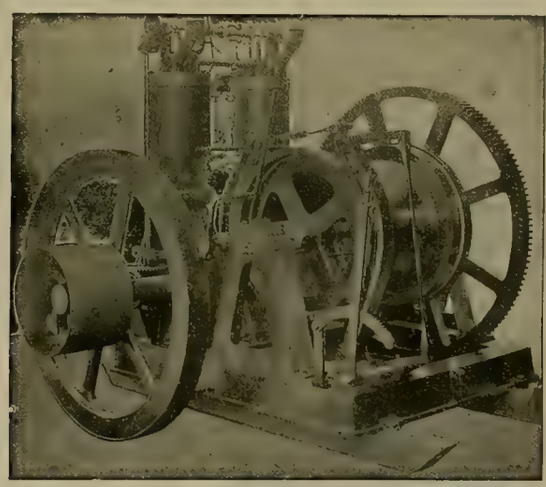
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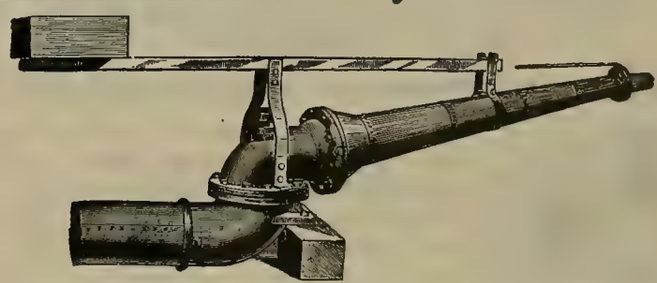
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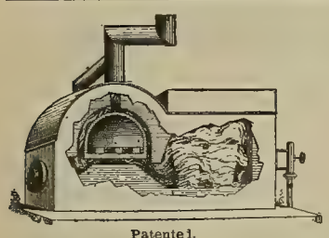

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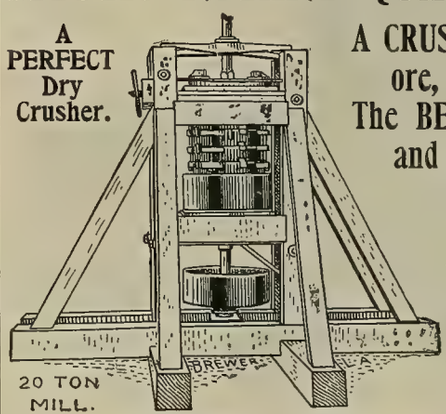
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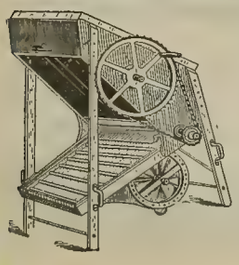
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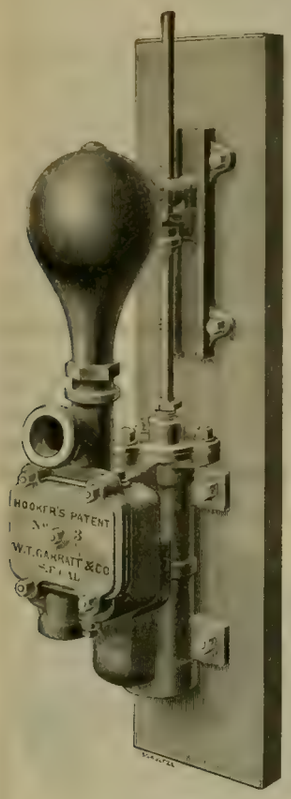
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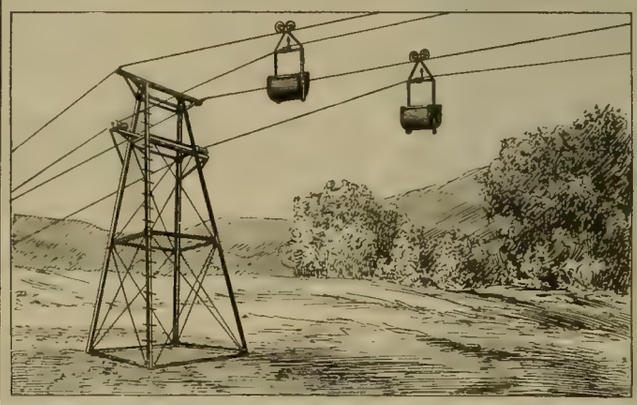
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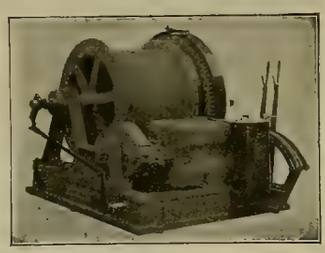
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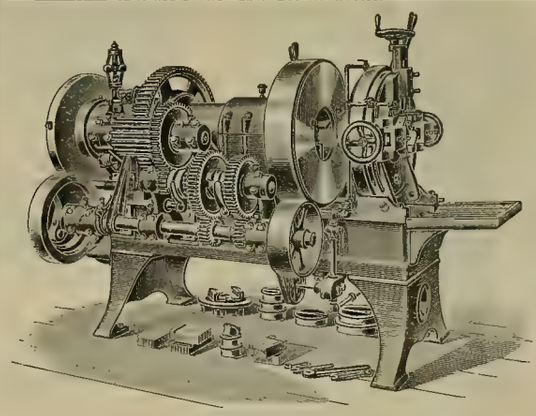
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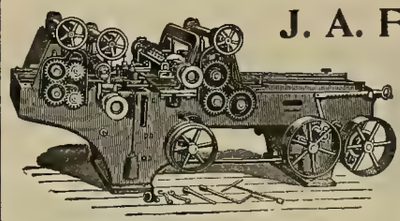


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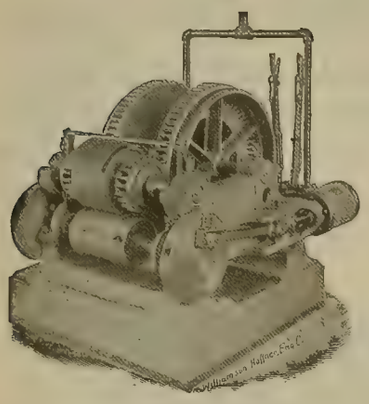
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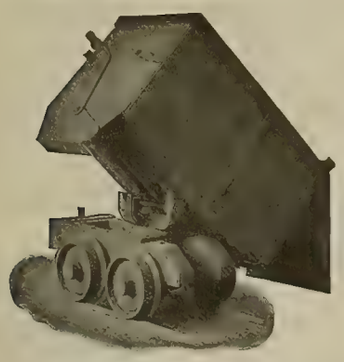
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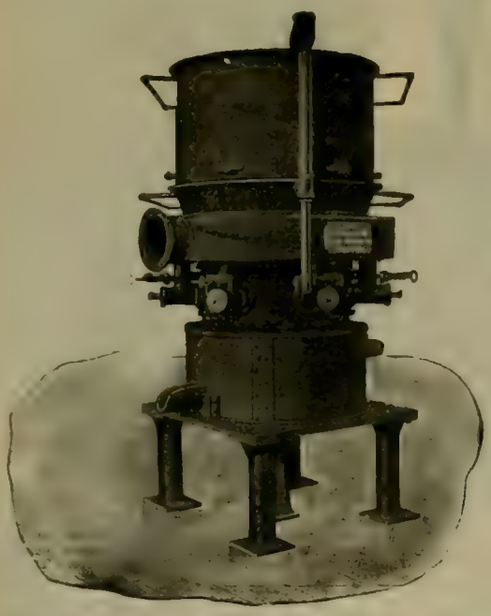
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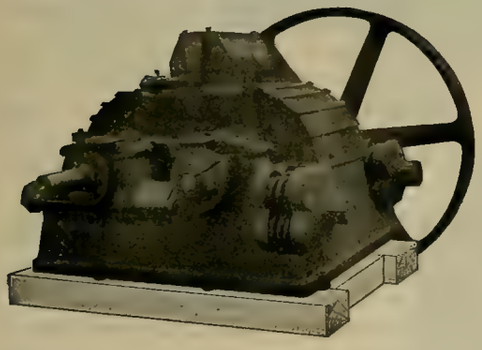
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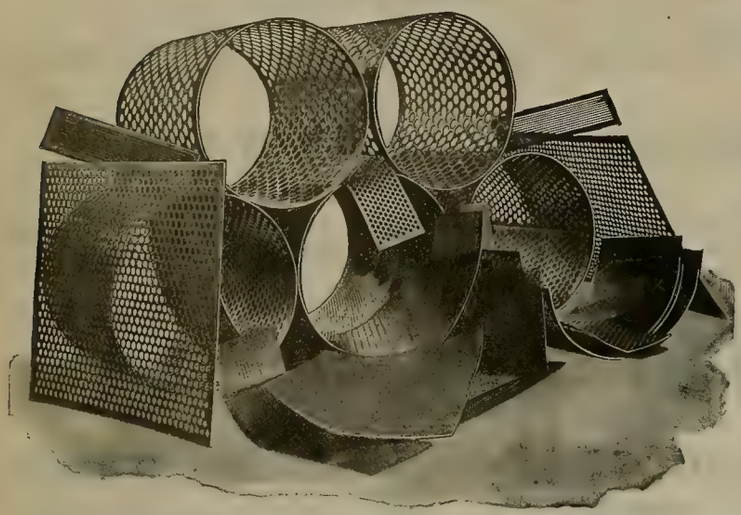
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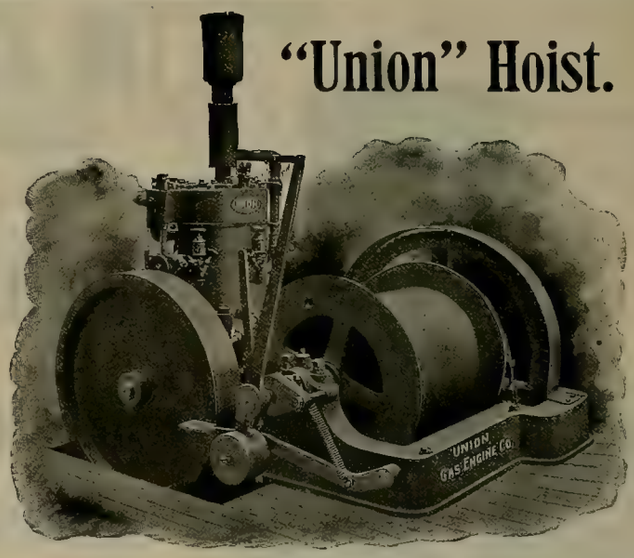
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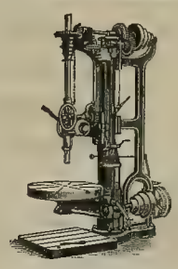
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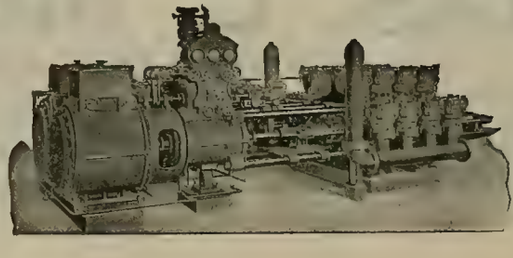
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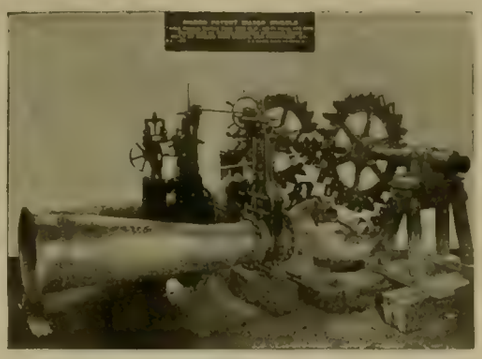
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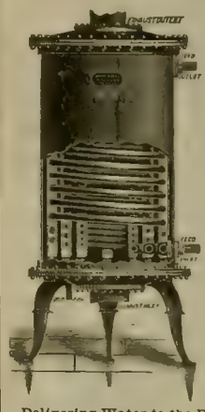


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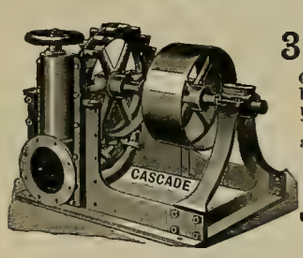
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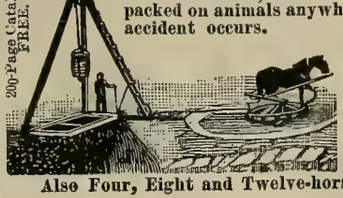
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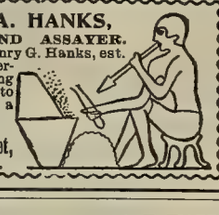
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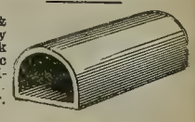
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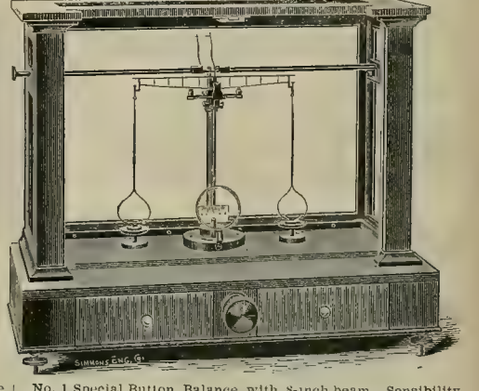
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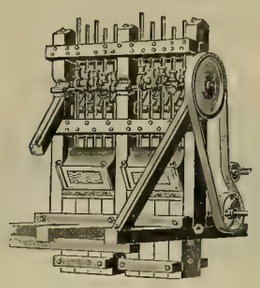
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Canton Extra Drill Steel,

WARRANTED.

CANTON STEELS are noted for their toughness and durability.

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THE JACKSON HAND POWER ROCK DRILL,

NO JAR. EASY RUNNING. POWERFUL BLOW. RAPID STROKE.
Operated by One Man. Works in Any Rock or Position.

.....Write for Circulars and Testimonials to Your Hardware Dealer or to the Company.....

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Sole Licensees for all Foreign Countries and Eastern United States: THORNTON N. MOTLEY COMPANY (INC.), 43 John St., New York.

AGENTS: Schaw, Ingram, Batcher & Co., 27 Main St., San Francisco, Cal., 219 J St., Sacramento, Cal. Chas. B. Boothe & Co., 126 So. Los Angeles St., Los Angeles, Cal.

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RAPID, STRONG, CONVENIENT, FOR MINING, SHAFT SINKING, TUNNELING.



Sullivan Diamond Prospecting Drills

Operated by Hand, Horse Power, Steam, Compressed Air and Electricity.

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Standard Types! Special Patterns! All Sizes!

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CHROME CAST STEEL.

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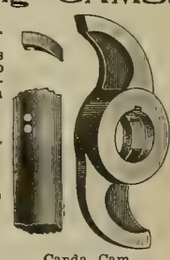
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We make a hand power drill to bore 350 feet and sell it for $350.00.

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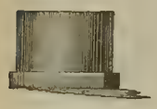
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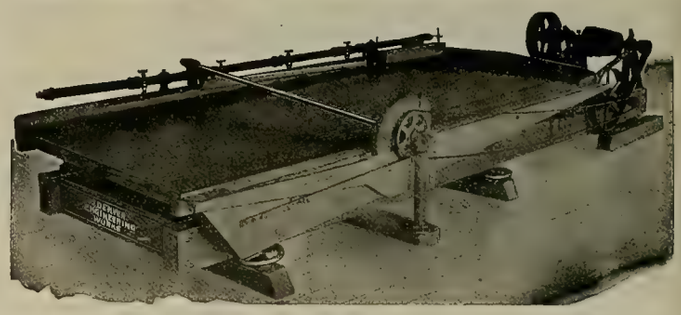
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Designed with some Regard for the Laws of Concentration.

The perfect vanner motion given to the pulp by our head motion, together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes. : : : : : : : : : : : : : : : : :

The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings. : : : : : :

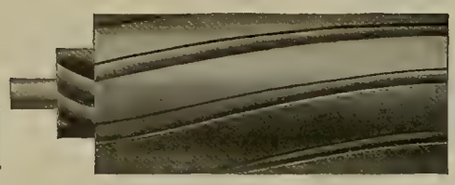


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See those wires -- how they interlock? Note the smooth surface also. No displacement of wires in any event. Gives three times the service of other cables, and adds correspondingly to the life of the rolling stock.

—THE PATENT—

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Is Used only on the Patent

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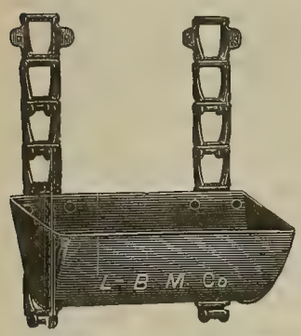
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Best and Cheapest Pump for Irrigating and Drainage Purposes.
Estimates and Plans Submitted.

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Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



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LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

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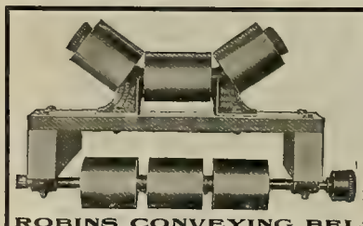


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For handling Ore, Coal, Tailings and Dredgings. Catalogue mailed on application.

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Operate Your Mine Electrically

and the expense account will be reduced.

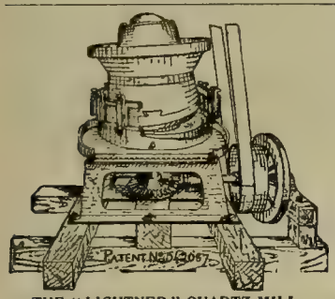
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			Price.
No. 1 works 3	tons per day with	1½ H. P.;	$225
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LARGER MILLS BUILT. SEND FOR CIRCULAR.

"Birch" Two-Stamp Mills, McGlew Concentrators,
And All Kinds of Mining Machinery.

P & B ROOFING

ROOFING is to a building what clothing is to the body. It must protect and it must wear well. To put money in an interior and to save it on the roof of a building is poor economy.

P & B ROOFING possesses all the requirements of a first-class roof covering. It is waterproof, durable, inexpensive, easily laid. Ask your dealer for a circular, or address the makers.

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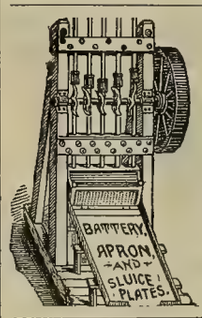
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Silver Plated Copper Amalgamating Plates

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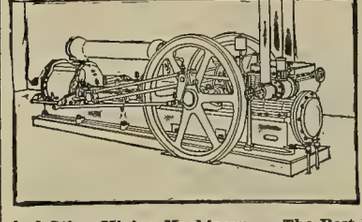
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Market Reports.

SAN FRANCISCO, July 27, 1899.

SILVER.—London, 27⅞d; New York, 60¼; San Francisco, 60¼; Mexican Dollars, 49@@50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports firmer, $4.40 bid, $4.57½ asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¼c; bar, 6.50c.

COPPER.—New York reports Lake firm at $18.50; brokers' price, $18.50; mill copper plates, 23¾c.

The copper market is firm, evidently being maintained by the steady disappearance of the metal as fast as marketed by the producers. Formerly a large amount of the output from the mines was held at the various smelting works or sent to various points to await shipment on consummation of sales, but now producers have their output sold up while it is yet in the mineral, or even possibly in the rock before it has reached the stamp mill, and it is a rush to bring it from drifts and shafts, put it through the stamping process, hurry it to the smelter, load it on the cars and send it by the fastest and most direct route to the consumer, who has it in the crucible with an alacrity that is truly ingenious.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¼c per lb.

STEEL.—15@16c per pound.

TIN.—Unsettled; $31.75@32.50; pig, 35c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18¼c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¾c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $3.10; cut, $3.00; 10 to 20d, wire, $3.15; cut, $3.05; 8d, wire, $3.20; cut, $3.10; 6 and 7d, wire, $3.30; cut, $3.20; 4 and 5d, wire, $3.40; cut, $3.30; 3d, wire, $3.55; cut, $3.45; 2d, wire, $3.80; cut, $3.60. In carload lots, 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ....)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$7 50	Cumberland	$9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, July 27, 1899.

9:30 A. M. SESSION.

400 Andes	20c	200 Potosi	51c
200 Best & Belcher	53c	200 Sierra Nevada	61c
300 Gould & Curry	42c	200 Utah	12c
200 Ophir	$1 10		

2:30 P. M. SESSION.

200 Gould & Curry	42c	200 Crown Point	27c
300 Best & Belcher	54c	400 New York	02c
450 Con. Cal. & Va.	$2 10	300 Standard	$2 70
100 Hale & Norcross	54c		

Quicksilver

FOR SALE IN LOTS TO SUIT.

Agents for Redington Quicksilver Mine.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.



REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO.
AKRON, OHIO.

Largest Manufacturers of Oil Filters in the World.



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SAN FRANCISCO Pioneer Screen Works,
JOHN W. QUICK, Prop.

Improved Facilities! Finest Work! Lowest Prices.

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—

221 and 223 First Street, San Francisco, Cal.

Mines or prospects operated on contract to purchase, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

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GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.

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QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.



Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

THE CALIFORNIA DEBRIS COMMISSION, HAVing received an application from H. W. Tangerman to mine by the hydraulic process in the Clinton Placer Mine, at Clinton, Amador Co., and to deposit tailings in Jackson Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on July 31, 1899, at 1:30 P. M.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.

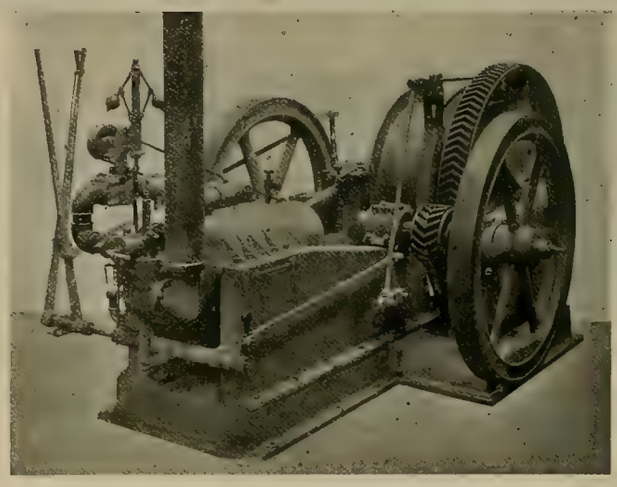
THE IDEAL CONVEYOR BELT



Is the one that will carry stone, ore, coal, wet or dry material, holding buckets firmly and securely; will stand all kinds of exposure, and resist the heaviest strains during a long period of service. This is what the **LEVIATHAN BELT** has done, and we quote the following from a letter from the New York Steam Co.:

"We have used Leviathan Belting for four years, up to 24-inch by 8-ply, elevating and conveying coal. Some of the Belting is outside, exposed to freezing weather; some in a steam bath. In both conditions the results have been very gratifying, over 500 tons having been handled in ten hours time."

MAIN BELTING COMPANY,
1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.
SEND FOR PRICE LISTS AND SAMPLE.



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

Hercules Hoists Are Sold the World Over.

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Assessment Notices.

SAILOR CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of July, 1899, an assessment (No. 1) of eleven cents (11c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 318 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of August, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 18th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors
M. C. LUND, Secretary.
Office—318 Front street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of July, 1899, an assessment (No. 14) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
F. METTMANN, Secretary.
Office—237 12th street, San Francisco, California.
The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of July, 1899, an assessment (No. 75) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
WM. A. M. VAN BOKKELEN, Secretary.
Office—Room 9, 320 Sansome street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of July, 1899, an assessment (No. 116) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on FRIDAY, the 18th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 7th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
E. L. PARKER, Secretary.
Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

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DELINQUENT SALE NOTICE.

NATIONAL CONS MINING COMPANY Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 7) levied on the 7th day of June, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert	No. Shares.	Amt.
C Rehn	77	1,000	$50 00
C. Rehn	161	150	7 50
A Rehn	176	250	12 50
G. F. Volz	85	1,000	50 00
W. G. Loewe	122	500	25 00
F. H Schuster	139	500	25 00
F. Wuesme	154	1,000	50 00
W. F. Hatch	219	100	5 00

And in accordance with law, and an order from the Board of Directors, made on the 7th day of June, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on TUESDAY, the 1st day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California.
Office hours from 1 to 3 P. M.

DELINQUENT SALE NOTICE.

SILVER KING MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Pioneer Mining District, Pinal County, Arizona Territory.

Notice.—There is delinquent upon the following described stock, on account of assessment (No. 21) levied on the 1st day of June, 1899, the amount set opposite the name of the shareholder, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Frances A. Sackett (N.Y. issue).	41	100	$25 00

And in accordance with law, and an order from the Board of Directors, made on the 1st day of June, 1899, so many shares of said parcel of stock as may be necessary will be sold at public auction at the office of the company, No. 310 Pine Street, Rooms 15 and 17, San Francisco, California, on TUESDAY, the 8th day of August, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

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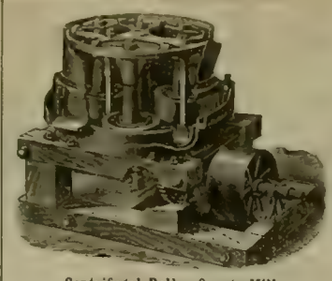
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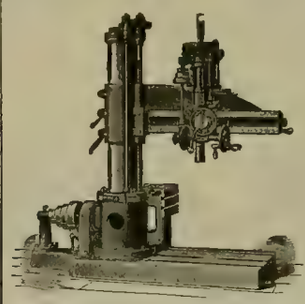
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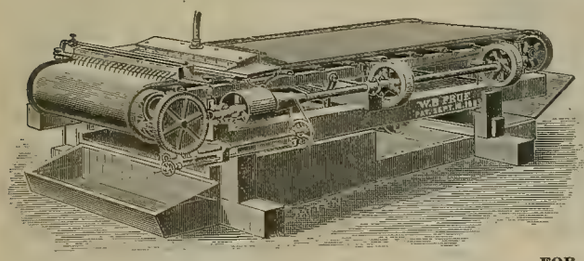


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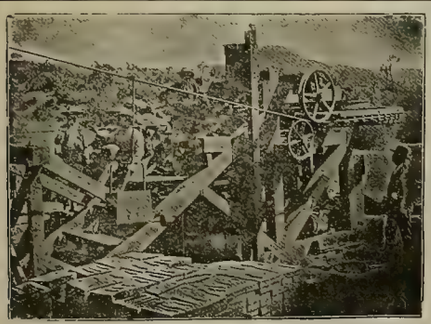
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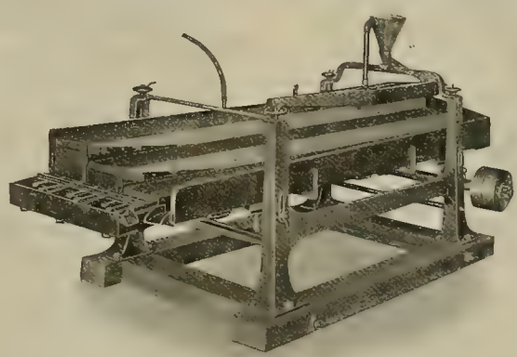
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No. 2039.—VOLUME LXXIX. Number 6. SAN FRANCISCO, SATURDAY, AUGUST 5, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Gigantic Vertebrate Fossils of Wyoming.

A party of geologists from the Northwestern University, headed by Professor A. R. Crook, is now in Wyoming for the purpose of exploring the fossil fields of that State in the interest of science, at the invitation and expense of the Union Pacific Railroad Co., to whose passenger agent, E. L. Lomax, this paper is indebted for the accompanying cuts. The party is accompanied by Professor W. C. Knight of the Wyoming State University. Wyoming has been referred to as the geological wonderland of the world. Within its borders are the most extensive fossil-bearing terranes known to science, and here are found the most gigantic specimens of land animals that ever had an existence since the world began, beside which the largest elephant of modern days becomes a pigmy. The largest of these fossil colossal animals was discovered last August by W. H. Reed of the Department of Geology of the Wyoming State University, ninety miles northwest of Laramie city. It was a Dinosaur, measuring 130 feet in length, 35 feet in height at the hips and 25 feet at the shoulders, the petrified skeleton of which, it is thought, will weigh 40,000 pounds. In the Yale museum at New Haven, Conn., is a gigantic Brontosaur, an animal of a kind similar to the Dinosaur above referred to. This also came from Wyoming and from the same formation—the Jurassic. The skeleton was restored by Professor Marsh in 1891. It was 70 feet in length and is presumed to have weighed in life 80,000 pounds, being surpassed in this respect 50,000 pounds by the new discovery. This animal, the skeleton of which is represented in Fig. 1, was 25 feet high at the hips and 16 feet at the shoulders. Fig. 2 illustrates a section of the vertebra of the animal and is 44 inches in height. Its femur is more than 6 feet in length. Two of these enormous bones are shown in Figs. 3 and 4. The femur of the Dinosaur recently discovered is 8 feet in length. The body of the Dinosaur is comparatively short but very thick. Mr. Reed says of the animal, the skeleton of which he is restoring: "An accurate idea of the Dinosaur is out of question. The ribs of this animal are about 9 feet in length, his tail 60 feet, his neck 30 feet, his abdominal cavity with lungs and entrails removed would have formed a room 34 feet in length, 16 in width and arched overhead probably 12 feet in height, a space in which forty people might be seated. A round steak from the ham of the animal would have been 12 feet in diameter and would have had a solid bone in the middle 12x14 inches, with no hole for marrow. The smallness of his head is a peculiar thing. I should say the head of this colossal Dinosaur was not larger than a ten-gallon keg. He must have been a very sluggish creature, as his brain cavity would certainly not warrant the belief that that organ weighed to exceed four or five pounds." Fig. 6. represents the reconstructed skeleton of the Aceratherium Tridactylum, a huge mammal having three toes to each foot. There were also camels, dogs, cats, rhinoceroses, elephants and monkeys, great sea monsters, fish, etc., and fossil leaves prove conclusively that in the early ages Wyoming was clothed with trees of tropical and semi-tropical verdure. Wyoming has no equal as a fossil field, and while expedition after expedition has taken away material by the carload, the fields are large and hundreds of square miles have never been visited by geologists. The numerous mountain ranges have tilted the rocks and erosion has cut deep valleys leading from them, which makes it possible to examine the formation in detail.

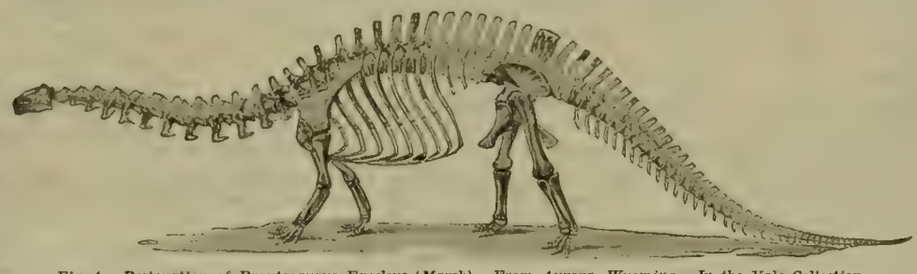


Fig. 1.—Restoration of Brontosaurus Excelsus (Marsh). From Aurora, Wyoming. In the Yale Collection.

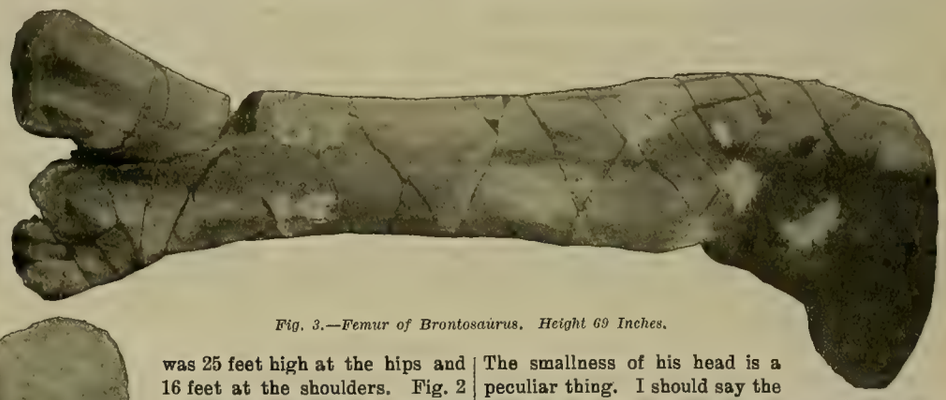


Fig. 3.—Femur of Brontosaurus. Height 69 Inches.



Fig. 2.—Dorsal Vertebra of Brontosaurus. Height 44 Inches.

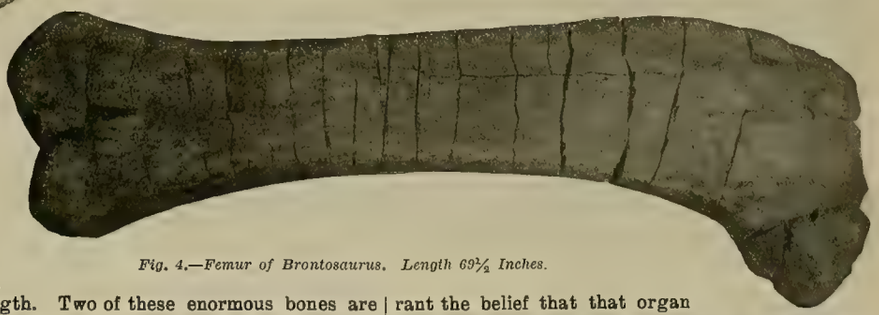


Fig. 4.—Femur of Brontosaurus. Length 69¼ Inches.

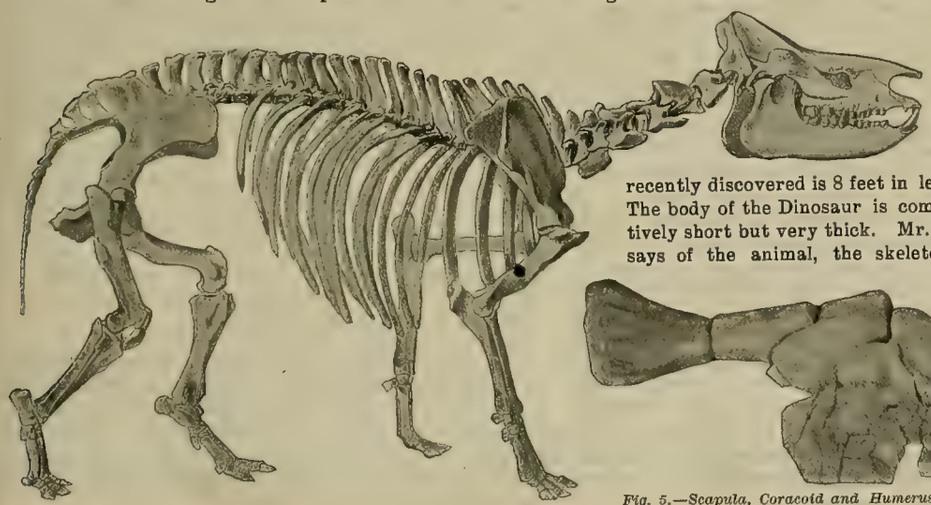


Fig. 6.—Restoration of Aceratherium Tridactylum (Osborn).



Fig. 5.—Scapula, Coracoid and Humerus of a Large Dinosaur. Length, Scapula and Coracoid, 44 Inches; Humerus, 42 Inches.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Restoration of Brontosaurus Excelsus; Dorsal Vertebra of Brontosaurus; Femur of Brontosaurus; Scapula, Coracoid and Humerus of a Large Dinosaur; Restoration of Aceratherium Tridactylum, 141. Oil Well—Upright Fold; Inclined Fold; Overturned Fold; Folds Cut Down by Erosion; Folded Strata; Oil Line Developed on One Slope of Fold; Oil Line Developed on Both Slopes of Fold, 144. Fold at Modello Oil Wells, Ventura Co., Cal.; Fold on Piru Ranch, Ventura Co., Cal.; Portion of Recumbent Fold, San Pedro Peninsula, Los Angeles Co., Cal., 145. Oil Line on One Slope of Fold, on the Other Destroyed by Faults; Position of Strata Previous to Formation of Fault; Position of Strata Subsequent to Formation of Fault, 146. Latest Mining and Metallurgical Patents, 147. Dredger "Lippencott" at Placerville, Boise Basin, Idaho, 149. Cyanide Plant at Progresso Mines, La Paz, Lower California; Bottom Discharge Door of Leaching Tank; Small Experimental Cyanide Plant; Large Experimental Cyanide Plant, 150.

EDITORIAL.—The Gigantic Vertebrate Fossils of Wyoming, 141. Capitalization and Dividends; Petroleum Mining; Haste in Paying Dividends; Quotations of Lake Copper; Miscellaneous, 142.

MINING SUMMARY.—151-52-53.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 166.

MISCELLANEOUS.—Concentrates, 143. Notes on the Oil-Yielding Formations of California, 144-145-146. Boring by Diamond Drill; Accident at the St. Lawrence Mine, Butte, Mont., 146. Latest Mining and Metallurgical Patents, 147. Some Experiences of a Working Miner; Hawaiian Island Volcanoes; Dredging in New Zealand, 148. Dredging and Mining in Boise Basin, Idaho; The Precipitation of Gold From Cyanide Solutions, 149. Tanks for Cyanide Plants, 150. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recent California Dividends; Recent Mining Incorporations; Commercial Paragraphs, 153.

In British Columbia mines and elsewhere the labor troubles were adjusted a few weeks ago by operating under a contract system. This seems to give satisfaction, as the mines continue to run and no trouble has as yet appeared in the camps where this system was adopted.

Copper for immediate delivery in large lots seems to be obtainable in the Lake Superior region. The Calumet & Hecla Co. recently sold 5,000,000 pounds of metal at 18½ cents per pound for immediate delivery. It is the established policy of the company not to sell for extended future delivery.

The smelter strike in Colorado has not yet been settled. The board of arbitration officially suggested a wage scale which was declared to be acceptable to the workmen, but the American Smelting Co. says it cannot pay the scale without an increase of expense, and as they have already reduced the charge of ore treatment to the minimum figure the new scale can only be adopted by adding the additional cost to charges. This will affect the miners directly.

Adventurers from Klondike and Alaska continue to bring conflicting reports as to the richness of the mines of that country; but a glance at the condition of the great majority who are returning should satisfy anyone that the chances for making a sudden fortune are no better than they are in the mining regions of the United States. A large amount of gold is coming from the North, it is true, but it represents a vast amount of labor, hardship, privation and death, and the most of it belongs to the transportation companies, having been taken in by them at their stores and offices for supplies sold, and for transportation. Where the names of individuals appear as possessing large amounts in gold, these statements are nearly always grossly exaggerated. One statement was observed that a miner packed $60,000 in nuggets on his back over the mountains. This amount of placer gold would weigh more than 250 pounds, and there are few men who can lift it, to say nothing of carrying it. Many of the returned stampeders are "broke" but would rather have it appear that they are the possessors of considerable wealth for obvious reasons.

Capitalization and Dividends.

Much stress is laid upon the amount of capitalization of mining companies. Numerous corporations are formed for the purpose of operating mines of more or less merit, and these are capitalized at sums ranging all the way from $5000 to $30,000,000 and more. At the beginning of operations it is often the case that the mine is a prospect justifying capitalization at a merely nominal sum, but not infrequently enterprises of this character branch out with a capitalization of $5,000,000 to $10,000,000. What useful purpose this excessive capitalization serves does not appear. Of the numerous mining corporations now in existence and operating in the United States less than twenty on the dividend-paying list have paid dividends exceeding their capitalization, while there are about an equal number which may, in the course of a few more years of success, equal to the past, be able to pay an amount in dividends near their capital, and perhaps exceeding it, but there are hundreds of companies which have never yet, and in all probability never will pay an amount approximating one-tenth of their capitalization, and there are a great many more that have never paid any dividends at all, and never can, whose capitalization runs from $1,000,000 to $10,000,000 and over. The most noted instances of mining companies that have paid dividends exceeding their capitalization are that of the Calumet & Hecla, which has paid $62,850,000 on a capitalization of $2,500,000; the Boston and Montana, with a capitalization of $3,750,000, has paid $10,775,000, and others have paid 200% to 300% on their capital, but these are exceptions.

With the financier who is not a miner an estimate is made of the amount of a dividend on the basis of interest on capital invested. Thus a mine pays $50,000 each month in dividends and the company is capitalized at $12,000,000. In a year this company will pay its stockholders, if dividends are not interrupted, $600,000, which is 5% of the capital stock. Stock in this concern may be quoted at par or above it without there being anything to demonstrate that the dividends will continue long enough to justify any such conclusion. At the rate indicated it would require twenty years to recover an amount equal to the capitalization (which in this case may represent the price of stock), and this allows for no interest on the investment.

Mining is legitimate when properly conducted, and dividends are the prime factor in the business, but those who pay excessive prices for stock simply because it is in demand are likely to suffer financial loss. As soon as the stock of a paying mine leaves the realm of legitimate business and enters the speculative it is no longer a safe investment, but must be placed on the same plane as other risky investments.

Petroleum mining is now attracting more attention in California than at any previous time. Oil has been known to exist for many years in certain districts hundreds of miles apart, but it is only within recent years that the industry has grown to large proportions. The field near Newhall and in the Puente hills in Los Angeles county have been producers for years, and more recently the Coalinga, Fresno county, and Santa Barbara fields have been opened and produced largely. Within the past two years, however, wells have been put down in new territory and the known field has been extended materially and is still growing broader. Within the past few weeks there seems to be a growing tendency to create a "boom" in oil development, and oil developing companies are being organized *ad libitum*. Without doubt, most of these companies are being organized for legitimate operations, with tracts of land so situated, geographically and geologically, that there is a reasonable probability, if not assurance, of success. There are others, however, which, unfortunately, do not possess any of the essential features of success and which are wildcat operations pure and simple. A perusal of the various prospectuses would lead the investing public to believe that all that is necessary is a tract of land, a tall skeleton frame, called a derrick, a deep hole in the rocks, and fortune will gush up from the earth and stockholders will only be required to sign the company's books to receive their dividends. That this fortunate termination of oil enterprises is not always realized is a well known fact. Dry holes and water holes are far more numerous than even mediocre pumping wells. It is also a fact that the wells which have thus proved failures have in almost every case been sunk haphazard, without the slightest regard to the geological conditions which control the occurrence of petroleum. In this issue is commenced the publication of a series of illustrated articles on petroleum in California, by W. L. Watts, which clearly explains the conditions under which petroleum occurs in California.

August 1, 1898, Lake copper was quoted at 11½ cents per pound. August 1, 1899 it was quoted at 18½ cents a pound, an increase of 7 cents. That this means a large increase in revenue to copper mining companies everywhere, without material increase of cost, is evident. Under the stimulus of high price for the metal it would naturally be supposed that the production of the largest mines would be greatly increased, but such, strange to say, is not the case. In some instances there has been a notable increase in output, but in others, where it was expected, it did not materialize. A great mining enterprise is usually run at or near its full capacity, and to increase it at short notice is not possible. It involves not only the opening up of more territory in order to obtain increased output of ore, but it necessitates often an increase of hoisting capacity, and possibly the sinking of a new shaft, but even were it possible to increase the output of ore the metallurgical department would in most cases be unable to take care of it. This is particularly the case where stamping and concentration are necessary. Large concentrating mills and reduction works, such as are employed in the treatment of copper ores, cannot be built at short notice. Mines which ship to custom smelters can largely increase their output by increasing their shipments, but not so with large mines which have reduction plants of their own. In some of the largest copper producers the companies have not received the full benefit of the highest prices, as they were sold several months ahead at the lower figures. The outlook for the coming months, and particularly for 1900, is that the copper production will be largely augmented by the additions now being made to the large mines and reduction works, and the springing up of new enterprises which will help to swell the total production.

Haste to pay dividends on the part of a newly organized mining company often operates to the great disadvantage of the concern later, and sometime in its collapse. Dividends are undoubtedly a desideratum and the object for which mining companies are organized, but it is better to set aside the first profits of operation as a contingent fund to replace the surface plant in event of loss by fire, or to enlarge it if necessary or desirable. When this can be done without making a call upon stockholders the stock of the company is always held at a higher figure than where assessments are levied. An Oregon company recently organized paid a dividend within a month of its organization from the proceeds of ore milled which had been extracted from the mine by former owners. It is to be hoped that it is only the first of a long series of dividends, but, generally speaking, it is an excellent maxim to "make haste slowly" when declaring dividends. Most of the large and successful mines of the world carry large treasury balances, and any irregularity of operations at the mine are unnoticed by stockholders, as dividends continue regularly. The business of a mining company should be conducted with as much care and foresight as that of a bank.

A well-known mine owner and operator has been quoted as saying: "A mine that will not pay under any kind of management is not much of a mine." In a great measure this is true, but it is also equally true that good and experienced management has made a success of mining operations where poor management failed absolutely.

The duties of a mine manager are manifold. He should be an engineer, a metallurgist, a chemist and assayer, a good business man, and must possess, above all, that peculiar element known as common sense. All of the above qualifications are not absolutely essential to success, but to attain the highest success the most of them are.

Concentrates.

THE steamship Oceanic is 704 feet in length.

NELSON, B. C., miners are paid $3 for eight hours work.

IN the shut-down of the Parrot smelter, Butte, Montana, expects to suffer less from smoke.

COPPER was first discovered on Lake Superior in 1844, but no metal was shipped until the following year.

LIMESTONE and quartzite should not be referred to as dykes, as they are both sedimentary. Dykes are eruptive.

MONTANA codes are compiled from California law and have been adopted by Gen. Otis as the law of and for the Philippines.

THE Yuba county, Cal., Superior Court has made an order transferring the hydraulic mining suit to the U. S. Circuit Court at San Francisco for trial.

SO FAR as known the deepest working in Canada is at the Eustis mine, Eustis, Quebec, where in mining for pyrites a depth of 2500 feet has been attained.

IT is said that several thousand dollars in coarse gold was picked up in early days on the surface of the ground on the summit of Rich hill, in Yavapai Co., Ariz.

THE Oxford Copper Co. of New York recently received 250 tons of copper coins for melting, the metal being worth more for commercial purposes than for coin.

THE Carson, Nev., assay office pays coin or San Francisco exchange for bullion over 500 fine in gold if it does not contain more than fifty fine ounces silver in any one deposit.

MEMBERS of the Canadian Mining Institute, which meets next month, propose visiting San Francisco during the September session of the American Institute of Mining Engineers.

A CLASTIC ROCK is one made up of fragments of older rocks, as sandstone. A rock of this description will reveal its structural condition at a glance under the polarization microscope.

IRON ORE must be analyzed before its value can be determined. A high percentage of iron does not always signify a valuable ore. The occurrence of sulphur and phosphorous in an iron ore is detrimental.

THE greenish-gray rock so common to the Coast Range of California is not diorite, but sandstone, and appears to have been formed largely from granitic detritus. A rock of this character is known as arcose.

TO FIND the horse power of a belt's transmission, multiply the width of the belt in feet by the number of hundred feet the belt has traveled in one minute: e. g., a belt 2 feet wide running 150 feet per minute equals 300 H. P.

E. D. PETERS JR. in his work, "Modern Copper Smelting," defines pyritic smelting as "the fusion of sulphide ores by the heat generated by their own oxidation, and without extraneous heat, such as carbonaceous fuel, the electric arc, etc."

LIQUID ASPHALT is being employed to sprinkle the highways of Kern county, Cal., near Bakersfield. The indications are that the experiment will prove successful. Crude petroleum has been successfully employed elsewhere for the same purpose.

METASOMATISM is thus defined by Dr. G. F. Becker of the U. S. Geological Survey: A change effected by the action of mineral solutions having an extraneous origin, but not necessarily or usually involving a total replacement of the material acted upon.

QUESTIONS are easier asked than answered, and inquirers must exert a reasonable degree of patience. It is not always practicable to give immediate accurate reply to technical queries, as such inquiries often have to be referred to specialists.

THE gold-in-the-goose stories that annually come from Oregon and Washington, alternated with tales of fir bark assaying "high in gold," are slightly varied this season by allegations from Seattle and Tacoma of the discovery of gold in a duck's crop.

THE Privy Council of England has ruled that the British Columbian law making it unlawful to employ Chinese underground in the coal mines of that province is unconstitutional, the judgment of the full court of the province to the contrary being set aside.

DYKES accompanying veins are not always older than the veins; often they are younger and cut the vein. In many instances the vein is later than the dyke and has formed wholly within the dyke, while as often a vein is found at contact with the dyke and country rock.

LIGHT requires eight minutes and eighteen seconds to pass from the sun to the earth. When one looks at the sun vertically it is seen not where it actually is, but where it was eight minutes and eighteen seconds prior, its true place being in advance of its apparent place.

WHERE a narrow strip of slaty or schistose rock is found in contact with a vein in granite this strip is usually of metamorphic origin, being the granite altered by shearing and compression to a shistose or slaty condition. This effect is also often observable along veins in diorite, diabase and, in fact, in most massive rocks.

TO DETERMINE the amount of water evaporated in a boiler, take the mean between the widths of the two levels at the beginning and end of a space of fifteen minutes. Multiply the constant length of water surface with this mean width, and multiply their product by 4. This gives the amount evaporated in cubic inches.

FOR convenience in handling timbers in a large mine, winzes should be cut in or near the foot wall of a vein, reaching from level to level. Timbers to be used in the stope are lowered or run down through the winze and delivered on the floor where they are to be used, saving much time in underground hoisting; and the winzes also improve ventilation.

THE trouble with the machine-driven countersunk rivets is probably because the rivets are a trifle too long. The excess material spreads out under the die and overlaps the hole. Being thin, this edge hardens quickly, and then no amount of pressure will upset the body of the rivet any further. It will appear tight until chipped, when it is often found to be loose.

ZINC should not be used in contact with copper, iron or lead, as voltaic action is set up, especially when moisture is present, thus destroying the zinc. Salt, lime, water containing lime, and acid woods are also very destructive of it. When first exposed to the action of the atmosphere, it is speedily corroded, but the film of carbonate of zinc thus formed protects it from further oxidation.

IN the State of Michigan the wages of miners working in mines owned by a corporation take precedence over a mortgage even though the mortgage may have been recorded and the money advanced thereon prior to the performance of the labor and for which the wages accrued. The statute gives them a preference over all other debts and claims of every character except taxes, fines and penalties.

STEARINE, in a chemical sense, is the name of the ethereal salt of glycerine, present in all neutral animal fats. Industrially and commercially, it is applied to the solid mixture of fatty acids, principally palmitic and stearic, obtained in the decomposition of fats, and employed for the making of candles, but the name more correctly describes the hard fat obtained from neutral fats by pressing, and is occasionally used in this sense.

WHERE a windlass is employed either under or above ground, it will be found a great saving to pass the rope over a sheave wheel suspended above the shaft in line with the bucket, and to construct a runway for the skip or bucket extending above the level or windlass platform. By arranging an automatic dumping bucket, such as described herein in the issue of July 22nd, the bucket may be dumped into a car, saving much time.

TO PRESERVE wire rope laid under ground, or under water, coat it with a mixture of mineral tar and freshslaked lime in the proportion of one bushel of lime to one barrel of tar. The mixture is to be boiled, and the rope saturated with it while hot; sawdust is sometimes added to give the mixture body. Wire rope exposed to the weather is coated with raw linseed oil, or with a paint composed of equal parts of Spanish brown or lampblack with linseed oil.

THE influence of a dyke cutting a vein is not unfrequently noticed in the concentration of mineral (often gold) along its course. In the Bandarita mine, Mariposa Co., Cal., a well-defined vein is found in a black slate formation. The vein has been extensively explored, and was found uniformly low grade except where a dyke crossed the line of the lode, and here a pocket or shoot was found lying in the vein along the dyke, from which it is said $40,000 was taken in a few days.

A BOOSTER is a machine inserted in series in an electric circuit to change its voltage, and may be driven either by an electric motor or otherwise. In the former case it is a motor booster. A motor generator is a transforming device consisting of two machines—a motor and a generator—mechanically connected together. A dynamotor is a transforming device combining both motor and generator action in one magnetic field, with two armatures or without an armature, having two separate windings.

AN item in a Virginia City paper, widely copied, that the Joshua Hendy Machine Works of San Francisco has bought the machinery of four Comstock mines illustrates one advancing phase of mining matters. The machinery so bought, when new, cost hundreds of thousands of dollars. It was good in its day, but became obsolete. It now goes as old iron to the foundry, and will be melted up and made into new and improved forms of mining machinery, perchance to go back in its new form to again do duty on the Comstock.

SOME geologist has calculated that it has taken Niagara Falls 360,000 years to cut its way upstream a distance of six miles. Large masses are detached from time to time and in this manner the falls gradually are progressing upstream. Others who have studied the effect and rate of errosion say that it has required 400,000 years for the Grand Canyon of the Colorado river to cut its way down 11,000 feet or more into the rocks of Arizona. Such calculations are not of material importance or benefit, as there is insufficient data upon which to base them.

WHERE several co-owners abandon a claim, and one of them desires to relocate, he must proceed to "advertise out" his former partners. The Supreme Court of Utah has rendered a decision in point in which it holds that such relocations inure to the benefit of all original joint locators and that the relocator holds the title thus acquired in trust for them. The court points out that the proper course of procedure is for the one relocating to "advertise out" the others in the manner prescribed by the federal statutes, in case he desires to become the sole owner.

COPPER and lead do not readily form homogeneous alloys, to obtain which the two metals must be melted together beyond the fusing point of copper and then quickly chilled. When such an alloy is gradually heated to the melting point of lead, part of the latter may be separated from the copper, the copper retaining some lead remaining as a porous mass. To remove the copper from the lead an addition of zinc is necessary. Ordinarily the percentage of copper in lead does not interfere with mechanical use; it appears to benefit by protecting the lead against the action of sulphuric acid.

SHAFT REPAIRING may be expeditiously conducted by constructing in one of the compartments—pump compartment preferred—a box or chute of 2-inch plank built in short sections and extending from one level to the next above. As the old pieces of lagging, rock fragments and other debris are removed they are thrown into the chute, descending to the level below, where they are loaded into the skip or car and sent to the surface. The larger timbers cannot be handled in this way, of course. As the work proceeds downward sections of the box are removed to keep pace with the work, and much valuable time is saved.

EASTERN estimates figure that the total value of the mineral production of the United States in 1898 aggregated $709,816,750. The amount was $648,804,899 in 1897. The 1898 production included $65,082,440 in gold and 58,763,127 ounces of silver. The copper production was 535,900,232 pounds; the lead production 228,475 tons; zinc, 114,104 tons; flasks of quicksilver, 30,499; barrels of petroleum, 51,774,465. In addition, there were $23,024,960 gold, 39,748,000 ounces of silver, 36,055,352 pounds of copper, 89,209 tons of lead and 7,127,784 pounds of nickel refined and prepared for market in this country from foreign ores and base bullion.

THE percentage of copper water in various mines of Butte, Montana, varies greatly. The water is pumped from the mines and discharged into large tanks or long lines of sluice boxes set on low grade and containing iron scrap, wrought iron being best for the purpose. Anything is taken for the tanks—old rails, pipes, boilers, tin cans and iron frames. The amount of iron required to precipitate a ton of copper is also a variable quantity. The greater the surface of iron exposed the more rapidly does the copper precipitate. If the water escaping from the tanks or boxes still contains copper, more boxes or tanks are added. Copper water containing twenty to fifty grains copper to the gallon should pay very well when handled in large quantity and with an unfailing or long-continued supply.

THE chemical elements as at present known are seventy-four in number, as follows: Hydrogen, lithium, sodium, potassium, rubidium, cæsium, glucinum, magnesium, calcium, zinc, strontium, cadium, barium, mercury, boron, aluminum, scandium, gallium, yttrium, indium, lanthanum, neodymium, praseodymium, samarium, gadolinium, terbium, erbium, thulium, ytterbium, thallium, carbon, silicon, titanium, germanium, zirconium, tin, cerium, lead, thorium, nitrogen, phosphorus, vanadium, arsenic, columbium, antimony, tantalum, bismuth, oxygen, sulphur, chromium, selenium, molybdenum, tellurium, tungsten, uranium, fluorine, chlorine, manganese, bromine, ruthenium, iodine, osmium, iron, nickel, cobalt, copper, rhodium, palladium, silver, iridium, platinum, gold, argon, helium.

A LOCAL enrichment of mineral veins is often noticed difficult to understand, and in other instances the cause is apparent. In the Mammoth mine, Grub Gulch, Madera Co., Cal., is an instance. The Mammoth vein is the result of silicification of mica slates of the Calaveras formation. It is a large vein and low grade. About 200 feet from the surface a fault occurs which is plainly marked but the displacement is so small as to be scarcely noticeable, but it seems to have had a direct effect on the deposition of gold in the vein, which for several feet above the fault plane became enriched and which near the fracture was very rich, showing much gold. Below the fault plane, however, the value dropped to almost nothing with no other apparent change in the character of the vein. This enrichment was of purely local occurrence and did not extend far from the shaft.

THE 540 stamps of the Alaska-Treadwell mill on Douglas Island, Alaska, crush three and one-third tons of ore every twenty-four hours. At the Tyro mine, near Coulterville, Mariposa county, Cal., the mill crushed one and one-quarter tons per stamp, and at the Gold Hill mine, Calaveras county, Cal., six tons per stamp were crushed in '95. The weight of stamp in each of the above mentioned mills is 850 pounds. The screens were of different degrees of fineness and there may have been some difference in height of discharge and in the width of the mortars, but these three instances demonstrate that no arbitrary capacity per stamp can be fixed upon with equally satisfactory results on all ores. In the case of the Tyro the ore was quartz and the gold fine and rather difficult to save. At the Gold Hill it was free and coarse, easily saved and the ore consisted of a mixture of soft material and hard quartz which give large capacity.

IT often occurs that where two neighboring mines are consolidated under one ownership and it is necessary to connect them by levels that drifts are found already driven some distance toward each other from the respective shafts of the two mines, but these drifts are not at a common level, though near it. It being desirable to utilize the cuttings already made, the difference in elevation of the two drifts may be made use of by constructing an ore bin and chute at the place of intersection, as was done in the Wildman-Mahoney mine at Sutter Creek, Cal. In this instance the connection was made and the Wildman drift was about 15 feet higher than that of the Mahoney. An ore bin was constructed here, to receive ore from the Wildman. A car was run underneath the chute, filled and trammed to the Mahoney shaft. The device proved an economical adjunct to the operations of the mine, and saved the driving of several hundred feet of new drift.

THE oxidation of the upper portion of gold-bearing veins and deposits undoubtedly often results in enriching that portion of the vein. The slow disintegration of a porous gangue, or one made porous by the oxidation of sulphides, offers an unequaled facility for the gold thus freed to settle deeper into the porous portions of the rock, but this process is largely mechanical and will probably account for comparatively few instances where the upper portions of gold-bearing deposits are found enriched. It is not unlikely that the process of oxidation of iron sulphides, nearly always present in gold-bearing ores, forms iron sulphate, which, being a solvent of gold, dissolves the fine particles of gold released from the matrix, and this gold-bearing solution, passing downward by gravity into the porous rock mass, under favorable conditions redeposits its gold, thus enriching the deposit in its upper part and possibly depositing, under some conditions, considerable quantities of gold at one place, forming pockets.

IN large veins a great deal of ore is sometimes lost by the settling of the superincumbent mass of ore upon the timbers of the first few sets above the sill floor, and this weight crushes the timbers and forces them out of line to such an extent that cars can no longer be trammed through the gangways. When this occurs, bulkheading and filling must be resorted to at once to prevent complete collapse. When a case of this kind occurred at the Anaconda mine, Butte City, Mont., and the timbers on the sill floor were forced out of line, the stope was filled with waste and timber as radidly as possible and the level abandoned. A lateral drift was then run in the foot wall 60 feet from the vein, and from it at distances of 60 feet and directly opposite the chutes in the abandoned stope a square set was placed. At each such station a raise was put in and carried up on an incline to the ore body above the filled stope. The drift was in solid granite, but as the raises approached the vein the rock was found decomposed, and required careful timbering. The raises were timbered with square sets, though had the foot wall country been solid no timber would have been required. Through these raises nearly all the ore lost by settling was recovered, by timbering with square sets and filling.

Notes on the Oil-Yielding Formations of California.

By W. L. WATTS, assistant in the field to the State Mineralogist.

[These notes are a portion of a report by Mr. Watts on the petroleum-yielding formations of such districts of California as he has examined. It is understood that his notes are to be published in the form of a bulletin by the State Mining Bureau. Through the courtesy of A. S. Cooper, the State Mineralogist, the MINING AND SCIENTIFIC PRESS is allowed to publish portions of Mr. Watts' notes in advance, in order that the information they contain may be placed before the public at the earliest possible moment.—ED.]

The Value of the Petroleum Industry to California.—It is only of late years that the importance of the petroleum interests of California has been recognized. The value of our petroleum industry is far-reaching. It is represented by the amount of foreign capital expended in the work of extracting and handling the oil, by the price obtained for that portion of our petroleum output which is exported by California residents, and by the value of that portion which is consumed in California. The part consumed in this State constitutes the bulk of our petroleum output, and is used chiefly as fuel, thus becoming one of the leading factors in our commermercial economy. Realizing the importance of these facts, A. S. Cooper, the State Mineralogist, has continued the work of accumulating data concerning our petroleum industry, and the opening of new oil fields widens the horizon of research. Those who are acquainted with the subject recognize the magnitude of the work; they know of the many things required to be done before the details relating to the petroleum industry in California can be so set forth as to be readily assimilated by the public.

Geological Features Pertaining to the Occurrence of Petroleum in California.—There are two phases of geological investigation upon which a right understanding of our petroleum deposits depends: First, a knowledge of the area over which the petroleum-yielding formations extend; second, a knowledge as to the possible course, length and width of the oil lines, or the lines along which remunerative wells can be obtained. With a good topographical map, the first of these propositions can be shown without the expenditure of much time and labor. The second proposition, upon which alone a correct estimation as to the value of our petroleum deposits can be based, must be worked out by a careful study of the structural geology pertaining to the subject under investigation.

To those who explore the hills and mountains of the Coast Range there are few things more interesting than the curiously folded condition of the rocky strata. In California the student of structural geology has not to search very far before he finds natural illustrations of the types of folds he has seen in his text books. In some parts of the world such folds are many miles in breadth, but in the Coast Range the conspicuous folds are generally narrow ones. These small and conspicuous folds usually constitute portions of larger folds, which, although they are more important than the small folds in the formation of hills and mountains, are not so easily detected unless a large area is carefully mapped out and studied. The small folds are, however, of great importance in determining the course and the width of oil lines. It is in order, therefore, to speak of the more common types of folds and structural forms which are familiar to all students of geology, and to say a few words about their relation to petroleum mining.

Types of Folds.—First, the upright fold, as shown in Fig. 1. The strata forming the sides or limbs of this fold slope away at equal angles of inclination from the axis of the fold. Now, provided the structure is not complicated by faults, it is obvious that wells sunk on opposite sides of this fold, and at points equidistant from its axis, would strike the stratum of oil sand at the same depth.

Second, the inclined fold, as shown at *C* (Fig. 2). In this fold the strata forming one side or limb of the fold slope away from the axis at a greater angle than do the strata forming the other side or limb of the fold. If wells were sunk on opposite sides of this fold at points equidistant from its axis, such as at points *A* and *B*, it is evident that a well sunk at point *A* would strike the oil sand at a much less depth than would a well sunk at point *B*.

Third, the overturned fold, as shown at *D* (Fig. 2). In this case a well sunk at point *C* would penetrate the oil sand on both sides of the fold. When erosion has worn away the crown of an overturned fold, as shown in Fig. 3, a geological problem presents itself which in many circumstances requires the investigation of a wide area in order to obtain a satisfactory solution.

Illustration—*D* (Fig. 3) shows mistakes which are quite likely to be made by drilling on an overturned fold. If an outcrop of oil sand had been discovered at point *K*, the dip at the outcrop would coincide with *OM*, the axis of the fold. Unless the structure of the formation were known, it would naturally be supposed that the dip of the oil sand stratum was fully shown by the exposed rocks at point *K*. If well *G* were drilled the oil sand would be struck at point *I*, and the oil sand stratum would be penetrated lengthwise between *I* and *N*. This would lead to the erroneous conclusion that a very thick stratum of oil sand had been penetrated. If well *J* were drilled with the intention of striking the oil sand at *O*, it is obvious that the oil sand would be missed altogether. This illustrates the advisability of exhausting all the evidence in sight concerning the structural geology of a locality before wells are located.

It is quite probable that in many instances the dip of strata greatly increases at short distances from anticlinal axes. Moreover, as the axis of a syncline is approached the strata may be pushed over so that they dip backward towards the axis of the anticline, giving the fold a fan-shaped structure, as shown on the right in Fig. 4. If oil-yielding formations were folded in this manner, it is obvious that, although the oil sand might be struck at a reasonable depth near the axis of the anticline, as in the case of wells *A* and *B* (Fig. 4), a very short distance farther down the slope of the fold the oil sand might plunge to so great a depth that it could not be profitably reached by the drill.

Photographs of Folds.—Figs. 5, 6 and 7 illustrate the plication met with in the Coast Range. Fig. 5 looks like an upright fold, especially at the point photographed. Investigation showed that the strata forming the side of the fold on which the derrick is situated dip at a less angle than do the strata on the opposite side of the fold. The fold is, therefore, inclined. Fig. 6 is a good representation of an inclined fold. Fig. 7 illustrates the contortions to which rocky strata are subjected, and of which the overturned fold is a type.

Depth to Which Strata are Affected by Folds.—A question here suggests itself as to the depth at which the rocks cease to be affected by folds. It is evident that where the axes of the folds are close together strata inclined at a moderate angle could not extend to a great depth; but where the angle of the dip approaches the vertical the lowest portion of the inclined strata may be deeply buried. A simple calculation shows that in the case of folds the axes of which are 1200 feet apart, other things being equal, the greatest depth attained by strata dipping at 50°, 60°, 70° and 80°, respectively, would be: At 50°, 715 feet; at 60°, 1039 feet; at 70°, 1648 feet; at 80°, 3403 feet. In any case there is little doubt but that the smaller folds disappear as great depth is attained, and that strata in the zone underlying them are affected by greater folds, to which the smaller folds are secondary structures.

It is reasonable to suppose that compressed folds do not extend to a great depth in a uniform curve, but that the rock masses have been readjusted by reciprocal movement. Wherever there has been so much geological disturbance as is the case in the Coast Range it is evident that structural conditions must be modified, not only by faults and fractures, but also by the thinning or thickening of the softer strata, by reason of the compression to which they have been subjected.

Illustration of an Oil Field.—A suppositious case will illustrate the relation of anticlinal folds to oil lines. Thus, let Fig. 8 represent oil-yielding strata as *C C* and *O O* and the enclosing rocks thrown into an anticlinal fold, the axis of which extends between points *B* and *E*. *H H* is the line of outcrop or the line along which the oil sand comes to the surface. An examination of this outcrop and a study of the geological structure of the formation would enable operators to determine a suitable point at which to sink their first well. The derricks shown in this illustration indicate that an oil line has been developed on the east side of the fold. It will be observed that the oil line runs parallel to and at no great distance from the axis of the fold.

Distance *D A* represents the breadth of the oil line, which is supposed to in-

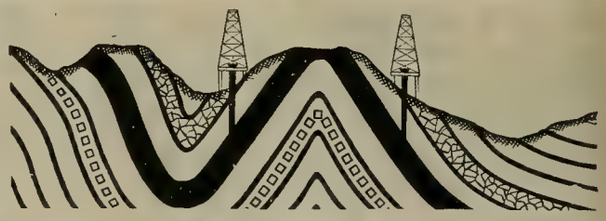


FIG. 1.—UPRIGHT FOLD.

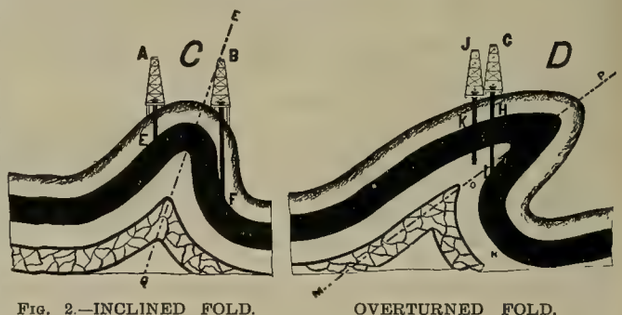


FIG. 2.—INCLINED FOLD. OVERTURNED FOLD.

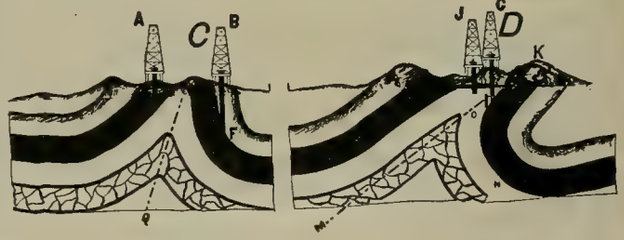


FIG. 3.—FOLDS SHOWN IN FIG. 2, CUT DOWN BY EROSION.

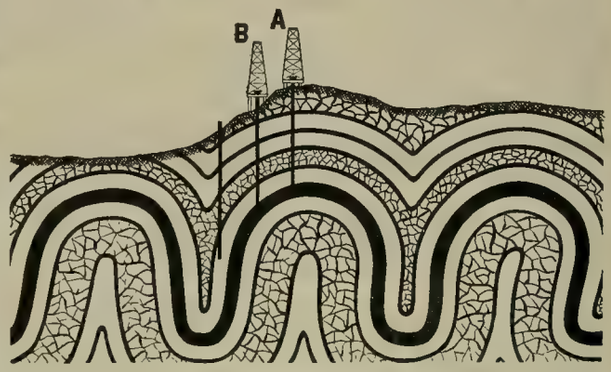


FIG. 4.—FOLDED STRATA.

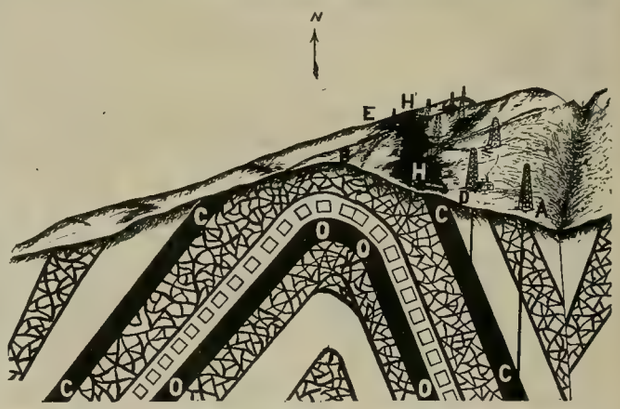


FIG. 8.—OIL LINE DEVELOPED ON ONE SLOPE OF FOLD.

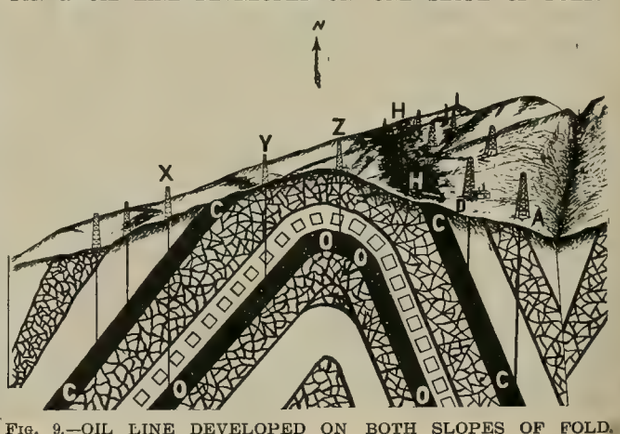


FIG. 9.—OIL LINE DEVELOPED ON BOTH SLOPES OF FOLD.

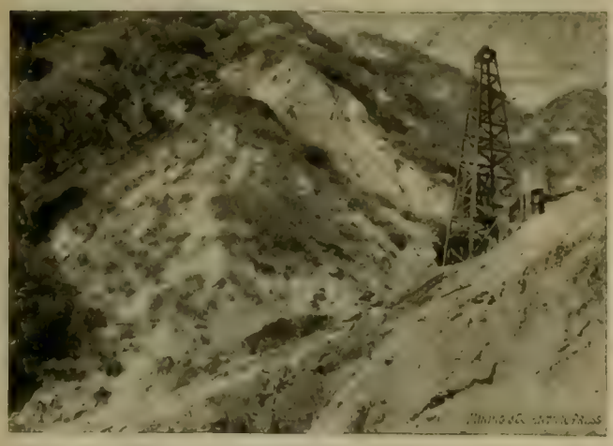


FIG. 5.—FOLD AT MODELLO OIL WELLS, VENTURA CO., CAL.

clude only two rows of wells, for east of point *A* the oil sand might lie too deep to be profitably reached by the drill. If investigations showed that the geological formations had been thrown into a fold, such as that shown in Fig. 8, and an oil line had been developed on the east side of the fold, it would be reasonable to expect the existence of a similar oil line on the opposite or west side of the fold and that, like the oil line on the east side, it would run parallel to and at no great distance from the axis of the fold, as shown in Fig. 9. On the west side of the fold the angle of the dip is less than it is on the east side. Therefore, the oil line is wider on the west than on the east side of the fold, thus permitting more than two rows of wells to be drilled with profit.

In order further to prospect the territory, well *X* might be deepened, and a second stratum of oil sand discovered. It is obvious that a discovery of a second oil sand would greatly increase the value of the territory, for not only might wells be drilled, which would tap both strata of oil sand, but remunerative wells such as *Y* and *Z* might be drilled and derive their oil entirely from the second oil sand. It might be that while one side of the fold furnished valuable oil territory, the formations on the other side might be so crushed and broken that remunerative wells could not be obtained; or, as shown in Fig. 10, the oil line might be cut in two by a fault, or a part of it might have slipped down to too great a depth for the oil sand to be reached by the drill.

As previously mentioned, the dark line *H H* on the east side of the fold represents the outcrop of oil sand with seepages of oil. On the west side of the fold the slope of the hill is supposed to be covered with alluvium. The line of outcrop of any stratum is the line along which it comes to the surface.

In prospecting for petroleum or any other mineral the outcrop is a most important guide. Thus, supposing the black line *H H* to be the oil sand, an examination of the outcropping stratum would show the direction in which the oil sand extends, and the angle at which it dips or is inclined. Consequently, the depth at which the oil sand could be struck by drilling at any distance from the outcrop might be calculated. When, however, the exposed rocks are situated near the axis of a fold, or the fold of which they form a part is overturned, they are by no means an infallible guide as to the prevailing angle of the dip. In locating an oil well the character of the fold affecting the rocks about to be prospected should be taken into account, as demonstrated by the type folds described in this paper.

In most instances, however, only glimpses of the outcrop can be obtained. As in the case of stratum *O O*, the oil sand may be covered by a great thickness of overlying rock, and the existence of oil-yielding formations may be indicated only by an oil spring, or they may have been accidentally discovered by drilling. When such buried oil-yielding formations have been discovered on any particular fold, and the position of the oil sand with regard to the enclosing rocks has been determined, the probable course of the oil lines may be ascertained by tracing the course of the fold. It is quite important to ascertain whether or not the oil sand lies conformably beneath the rocks which cover it; or, in other words, whether or not the oil sand is folded in the same way as the rocks which are exposed at the surface. In hills and mountains, however, it is more than likely that the prospector will be assisted by glimpses of the oil sand in ravines and canyons, where the overlying rocks have been cut through by erosion.

Faults May Form Oil Lines.—There are structural conditions of the rocky strata besides that of folding which may determine the existence and the course of oil lines. The most important of these are faults. As there are many who may not have studied structural geology, it might not be out of place to say a few words on that subject.

Faults are breaks or displacements in the rocky strata, whereby blocks of the earth's crust have been elevated, depressed or pushed over one another. Where only depression or elevation has taken place, they are called normal or gravity faults; where pushing over has occurred, they are called reversed or thrust faults. The fractures are occasioned by the stretching or compression of the rocky strata. In the case of thrust faults, the controlling power is the thrust or stress occasioned by the compression; and, in the case of gravity faults, it is the force of gravity.

In areas of great compression, like that of the Coast Range, it might be supposed that all the faults would be thrust faults; but in many instances the fracture which occasioned the fault is nearly vertical to the plane of the horizon, in which case the force of gravity in many instances controls the thrust.

The class of faults most likely to result in the formation of oil lines are those which have been caused by fractures extending in the direction of the strike of the formation, and which have allowed blocks of the earth's crust to slip past one another so that they are arranged in the form of steps.

Let Fig. 11 represent a series of rocky strata enclosing a stratum of oil sand, the dip being at an angle of about 30°. If well *Z* is 2000 feet deep, the oil sand west of this well would be too far below the surface to be profitably reached by the drill. Let us suppose that, owing to fractures at points *B* and *D*, a fault was formed by block *B D* slipping down, as shown in Fig. 12. When erosion has worn away the surface, as shown in Fig. 12, two oil lines might be formed, and the oil might be reached by wells of moderate depth between points *E* and *B*, as well as between *B* and *D*.

In Fig. 12 a gravity fault is used for purposes of illustration, and it will be observed that the fracture slopes toward the block which has slipped down. Thrust faults, when the fissures which formed them are nearly vertical, might produce similar results, so far as the multiplication of the oil line is concerned; but in the case of thrust faults the fractures would slope toward the block which has been elevated. When faults are close together the rocks are likely to be so crushed that the oil line has been destroyed.

Lines of geological disturbance may show faults at one point and a well marked fold at another. The question of faulting or folding is determined by the character of the rocks, the thickness of the strata, and the conditions to which it is subjected. In the movement which occasioned the faulting or folding, other things being equal, deeply buried strata are more likely to be folded than to be fractured or faulted; while with less deeply buried strata the reverse is the case; and beds of soft material are likely to be more crumpled and folded at an acute angle than are harder rocks.

Folds and Crossfolds.—In many localities the rocks are found to be affected by more than one order of folds. In most instances we find dominant folds which have controlled the prevailing strike and dip of the formation, and crossfolds which have a different strike to that of the dominant folds. At points where the crossfolds strike the axis of the dominant folds, the tendency is to form domelike elevations or to occasion a great complexity of geological structure by plication and fracture.

Complex Structure Demands Careful Study.—The foregoing remarks on structural geology are sufficient to indicate the structure which in most instances controls the course of oil lines in a country where the geological formation has been much disturbed.

So far as observation has been made, the oil lines in California are governed by structural conditions, such as are mentioned in this paper. A continued study of the development of our oil fields will still further show how nearly the facts disclosed by the drill conform to the recognized types of geological structure; and a record of such observations cannot fail to be beneficial to the development of the petroleum industry.

Where the rocks are closely folded, as they are in most of the oil districts of California, drillers are likely to meet with anomalous experiences, owing to faulting and shifting incidental to the rearrangement of rock masses, and this necessitates extended observation and great care in making deductions.

Oil Lines May be Followed Into the Valleys.—The folds and geological structures to be seen in the hills and mountains where the rocks are exposed do not necessarily terminate in the uplands; they also extend beneath the alluvium of the valleys. Oil lines that have been discovered in the hills and mountains may be followed into the valleys where the rocks are covered with alluvium.

It is to be expected that oil lines in countries where there has been much geological disturbance would be broken and of irregular extent; this is found to be the case in California. In this State the longest unbroken oil line yet developed is that of Second Street Park, at Los Angeles, which is a little more than a mile in length.

The Business Risks of the Oil Prospector Classified.—The business risk of prospecting for oil varies greatly. Oil prospecting propositions may be divided into two orders:

First, the "orthodox" proposition. In this case the prospectors have in view a definite oil-yielding stratum, which has proved remunerative in adjacent territory, and from which stratum they expect to obtain their oil. Moreover, they have sufficient geological evidence in sight to warrant the assumption that the oil stratum they have in view forms an oil line through the territory they are about to prospect.

Second, the "wildcat" proposition. In this instance the prospectors have no definite oil stratum in view which has proved remunerative in adjacent territory, or they have not sufficient geological evidence in sight to warrant the assumption that an oil-yielding stratum, which is known to be productive in adjacent territory, forms an oil line through the land they are about to prospect.

In prospect wells of the first order the least risk is taken where the outcrop of an oil sand, which has proved remunerative in a certain oil field, can be actually traced through the territory to be prospected, and the geological structure of the locality is known.

More risk, however, is undertaken where there is no outcrop of the oil sand, although the strike and dip of a remunerative body of oil sand in an adjacent oil field are known, and the rocks overlying the oil sand can be traced to the territory about to be prospected. When an oil line has been developed on one side of a fold under conditions shown in Fig. 8, and an outcrop of oil sand has been discovered on the other side of the fold, propositions to prospect this

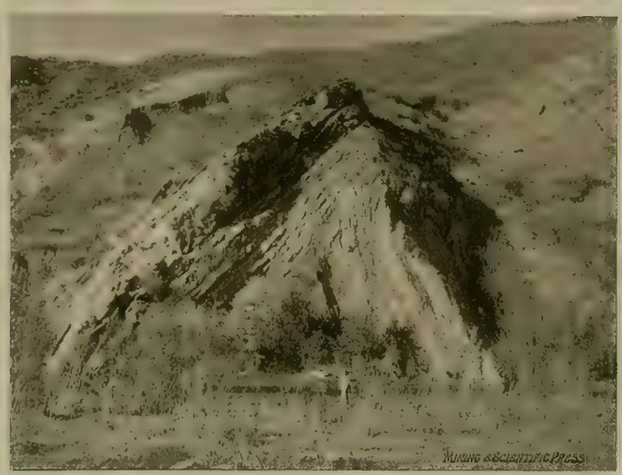


FIG. 6.—FOLD ON PIRU RANCH, VENTURA CO., CAL.



FIG. 7.—PORTION OF RECUMBENT FOLD, SAN PEDRO PENINSULA, LOS ANGELES CO., CAL.

side must be classed among the more risky "orthodox" propositions.

Most oil mining enterprises which have for their object the development of new territory, especially when operations are conducted at a distance from any known oil field, are "wildcat" propositions. Some idea of the conditions regulating the amount of risk involved in such enterprises may be gathered from the following statements:

The least risky "wildcat" proposition is the case in which the strike and dip of a remunerative stratum of oil sand in an oil field adjacent to the territory about to be prospected has been ascertained; and although there is no further geological evidence in sight, it is found after carefully platting a map of the territory that if the stratum of oil sand were extended in the direction of its strike, without any material alteration of the angle of the dip, it would

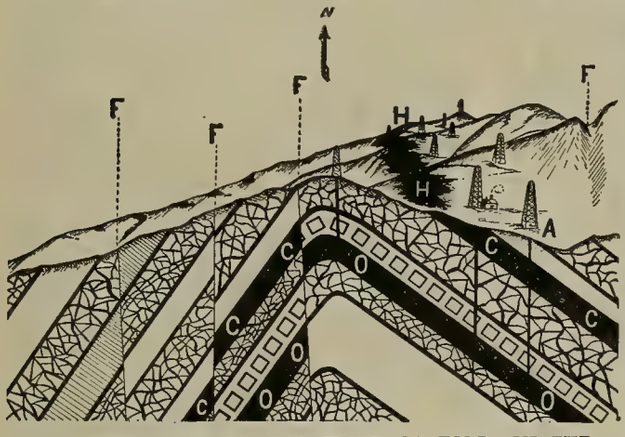


FIG. 10.—OIL LINE ON ONE SLOPE OF FOLD, ON THE OTHER DESTROYED BY FAULTS.

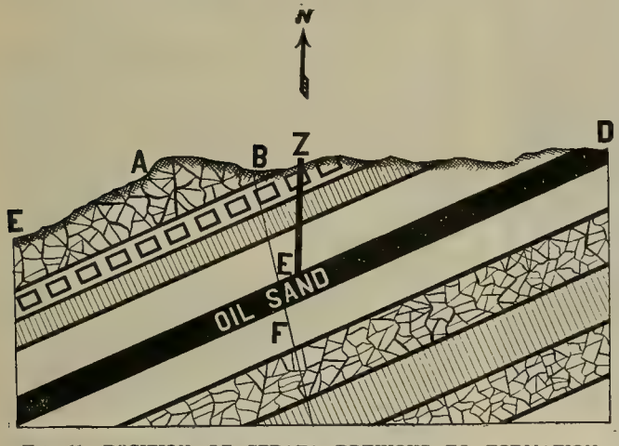


FIG. 11.—POSITION OF STRATA PREVIOUS TO FORMATION OF FAULT.

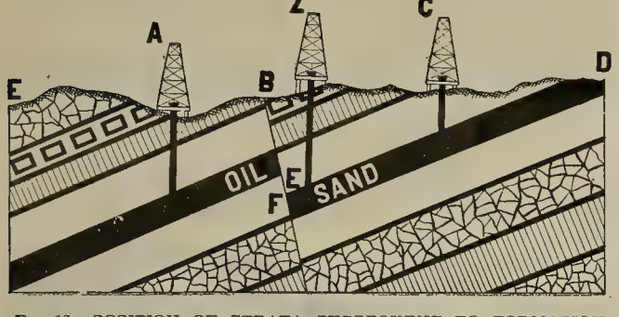


FIG. 12.—POSITION OF STRATA SUBSEQUENT TO FORMATION OF FAULT.

form an oil line across the territory to be prospected. It is a more risky "wildcat" proposition to prospect the side of a fold opposite to that on which an oil line has been developed (as shown in Figs. 8, 9 and 10) in cases where surface indications warrant the assumption that the same sequence of formation exists on both sides of the fold, and yet no outcrop of oil sand has been discovered on the side about to be prospected.

It is a still more risky "wildcat" proposition when a stratum of oil sand has been discovered, concerning which nothing is known except that the sand gives evidence of containing oil, and a well is sunk for the first time to determine whether or not the oil sand contains oil in remunerative quantities.

It is a much more risky "wildcat" proposition where no outcrop of oil sand has been discovered, but where a well is sunk in a certain formation because it shows some irregular seepages of petroleum, or because the formation appears to be similar to that containing a remunerative body of oil sand in other places.

It is well for oil prospectors to study the risk they are about to take before expending money, and care should be taken to control sufficient territory that they may have sufficient room to develop their oil field, in case their venture proves successful. No one should undertake the more risky forms of prospecting unless he can well afford to lose the money to be put into the enterprise.

(To be Continued.)

Boring by Diamond Drill.*

By J. T. COLE.

A recent announcement had been made that the boring on the Murray Flats, initiated at the joint expense of the Victorian and New South Wales Governments, has been abandoned and the apparatus removed. The cause suggested is the cost of the work. During the last few years I have had considerable experience in diamond drill boring, inasmuch as I put down a couple of bores on the Charters Towers gold field to depths of 3006 feet and 1660 feet respectively. The strata pierced consisted mostly of granite of adamantine hardness, with a few reef formations or channels at intervals. In places the granite was full of heads and joints, and it was here that at first I lost a few of the diamonds by fracture. I then adopted a different system of setting the diamonds in the boring crown. Instead of setting the stones at regular distances in the face of the bit or crown I fixed them in groups of twos or threes, closer together than is usually the custom, leaving between the groups spaces of sufficient area to put in four plugs or pins of iron. These were firmly tamped in and left a shade long, so as to project a little beyond the exposed portions of the diamonds. The result of this is, that before the diamonds come into operation the iron plugs are gradually worn away until each diamond comes into work without undue prominence, and the risk of fracture when coming into contact with the hard jointy rock is thus obviated.

For some time past the price of Brazilian carbons and borts have been almost prohibitive, specially selected stones costing as much at £8 per carat, and during the few years I spent a lot of time trying to find a substitute for Brazilian stones. For a long time I was in constant communication with diamond mine owners and diamond buyers in Bingara, Inverell, and Boggy Camp (N. S. W.), and I constantly received samples from these places. Unfortunately, the bulk of the stones from the New England mines are very small, very few individual stones weighing 1 carat, and the greater proportion of them were full of minute feathers or flaws. Captain Rogers, of Bingara, and Mr. Dasey, of Boggy Camp, supplied me at different times with at least 100 stones, weighing in the gross about 50 carats, the largest being 2¼ carats in weight. Out of these I had, perhaps, twenty really excellent stones. Though somewhat small for drill purposes, the hardness was undeniable, and here I may mention that in the Brazilian product it is not only the hardness, but the toughness or temper, that makes them so reliable for this class of work. Rough stones from other parts of the world are frequently just as hard, but have not the temper, and, like a too hardly tempered tool, fractures and chips when brought into work. The highest price I gave for these Australian stones was, I think, 26s. per carat. While on this subject I may proffer an opinion that I believe it is quite possible that in the search for gem stones a great many excellent stones for drill purposes are overlooked and thrown away, as this class of stone has neither the brilliancy nor the satin-like appearance of the rough gem stone used for jewelry purposes.

Failing to obtain a sufficient supply of Australian stones, I turned my attention to the hardening of steel, and though I tried electrical hardening and other modern methods, I could not attain anything equal to the hardness of tool steel, manganese steel, which is non-magnetic and unannealable, or the natural chrome steel of Tasmania. I am aware that steel is extensively used as the boring tool in drills, with considerable success, in the sandstones, slates, and shales of coal formations, and at times even in the softer basalts, and if some time be given to experiments in the hardening of steel or other metals, with the view of finding a cheap substitute for diamonds, it is within the range of possibility some alloy or combination of metals might be found to serve the purpose.

One possible reason that steel when in work in a bore so very soon loses its hardness or temper is, I think, the vibratory action on the steel bit when revolving causes the steel to become polarized, and as soon as this takes place the original hardness is lessened, and the tool quickly becomes useless. This, to a slight degree, can, I think, be prevented by having the lower coupling piece of the core barrel constructed of tough gun metal or other metal of a non-magnetic nature. Years ago, on one of the first drills imported into Victoria, and used under the direction of Mr. Griscombe, an American diamond drill expert, we set up several bits with natural chrome steel instead of diamonds, but failed to do any good, as we allowed the drill to revolve at too great a speed, and the Kilcunda sandstone simply wore away the steel like a grindstone does a chisel. Since then it has been discovered that if a similarly set tool is revolved very slowly the hard steel disintegrates the atoms of the sandstone and the tool lasts for a considerable time.

The above question is one of such grave importance to the mining community generally that I make no apology for offering these ideas or suggestions to the authorities having the direction of the boring operations in these colonies, and I think the mining men of Allendale are wrong in their opinion when they state that the drills are old-fashioned and obsolete, for I am aware that the Victorian Mines Department has kept entirely up to date in any improvements that have been brought forward for many years past. The only alteration would serve to make the machinery portion of the business a success is that the diamond drills should certainly be geared, so that a slow and powerful motion, well under control, should be designed, and thus give the departments opportunities of experimenting with steel or other likely substitutes for the expensive diamond.

* Condensed from *Australian Mining Standard.*

Accident at the St. Lawrence Mine, Butte, Montana.

TO THE EDITOR:—On July 19th there occurred a serious accident at the St. Lawrence mine, one of the properties of the Anaconda Copper Mining Co., at Butte, Montana, resulting in the almost total destruction of the right-hand reel of the large hoisting engine at this shaft, and the complete demolition of the double-deck cages, and the five-ton skip that was hung under them, as well as the ruin of the 2700 feet of cable, which was hopelessly kinked and snarled in its fall. Fortunately there was no loss of life, although two men were quite seriously injured, and all things considered, the property loss was small, the damage being confined generally to the wrecked reel and the front of the building.

The accident was caused by the end of the floating lever attached to the valve mechanism of the right-hand brake engine being disconnected from the link connecting it with the hand lever, while some minor repairs were being made, and when the machinist went to connect up again, he lifted the end of the floating lever, thus admitting steam to the brake engine, and releasing the brakes, whereupon the cages, which were hanging in the shaft without being on the chairs, started down the shaft, and had gathered such velocity before the runner could reach the platform from the floor (where he was occupied at the time) that it was found impossible to catch the runaway reel with the friction clutches (which were not in gear at the time that the reel started), and the reel quickly attained a rotative speed that was sufficient to destroy it, throwing the fragments of the outer rim and the light reel arms all over the front of the engine house, tearing the brickwork out, breaking the massive front brake post and the bed plate that it was anchored to, wounding two men who were seated on the outside of the engine-house, and finally parting with the rope that was torn free of the bolt in the reel center, the slack end of the rope demolishing the railings and floor plates at the head of the steel head frame and going down the shaft in a hopeless tangle of steel wire and tar.

Calculation would indicate that the speed of the reel, as the cages neared the bottom of the shaft, must have been not less than about 350 revolutions per minute, a speed that no wheel 16 feet in diameter could stand, and the comparatively small amount of damage is a matter of surprise and congratulation.

Butte, Montana, July 22nd, '99.

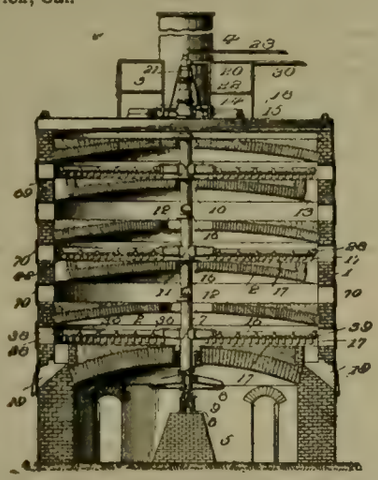
A GREAT scarcity of pig iron and ore has developed in Cleveland and dealers are not trying to sell iron for shipment before January 1st next, and none can be had for shipment sooner than September 1st. The output of the Lake Superior iron mines is large but the development of the various iron districts has not recently kept pace with the increasing demand and the metal is daily becoming more scarce.

Latest Mining and Metallurgical Patents.

Patents Issued July 25, 1899.

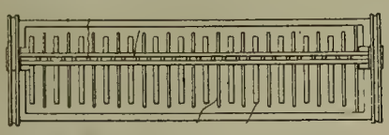
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROASTING FURNCE.—No. 629,023; L. T. Wright, Keswick, Cal.



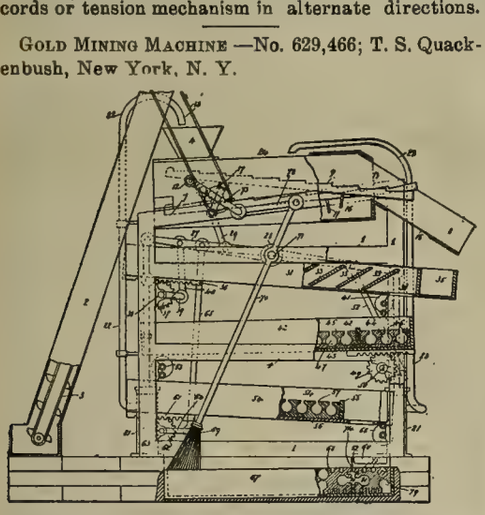
A roasting furnace, the combination, with a series of floors, of a central hollow shaft, hollow arms carried thereon over the respective floors, an open-bottomed pipe inserted in shaft, an intermediate closed-bottomed pipe in shaft into which the first pipe discharges at the bottom, open-ended pipes leading from the intermediate pipe into the hollow arms, and feed and exhaust pipes connected to the first pipe and hollow shaft; a spider between the first pipe and the shaft, supporting, closing the top of, the intermediate pipe, open-ended pipes leading from the intermediate pipe into the hollow arms, and feed and exhaust pipes connected to the first pipe and the hollow shaft; sleeves secured to the shaft, hollow arms having their ends inserted in sleeves, and threaded outside sleeves, threaded collars on threaded portions and secured to sleeves, and a feed pipe for supplying water to hollow shaft and arms.

APPARATUS FOR ELECTROLYSIS.—No. 629,043; J. T. Morrow, Great Falls, Mont.



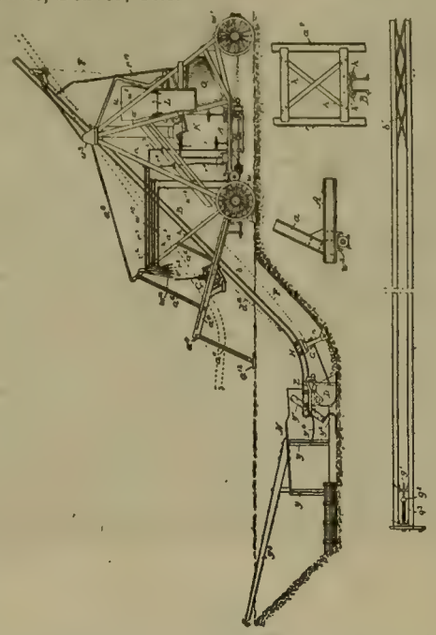
In combination with an electrolytic tank and with the anode and cathodes thereof, a reedboard, a series of reeds supported therefrom, and mechanical means for moving the reedboard to and fro transversely. Guideways and guides for transverse movement of the reedboard, one or more cords or other tension mechanism and rollers and means for actuating the cords or tension mechanism in alternate directions.

GOLD MINING MACHINE —No. 629,466; T. S. Quackenbush, New York, N. Y.



A machine for treating ores, a separating mechanism comprising a box or casing having an inclined bottom and carrying rackbars arranged in longitudinal parallel position, and a transverse shaft having oppositely projecting cranks connected to the respective rackbars, the rackbars being provided with pins or fingers projecting from their lower edges with respect to the inclined bottom and having their free ends opposite the carrying cranks provided with a smooth or unobstructed bottom edge which slides over and is supported upon the edge of the upper end of the box or casing on a plane above the inclined bottom of the latter, whereby the rack of the top edge of the bars feeds from the upper end of the casing and the projecting bottom fingers feed in a reverse direction downwardly to the lower end of the inclined bottom of the casing.

EXCAVATING APPARATUS.—No. 629,576; H. C. Lowrie, Denver, Colo.



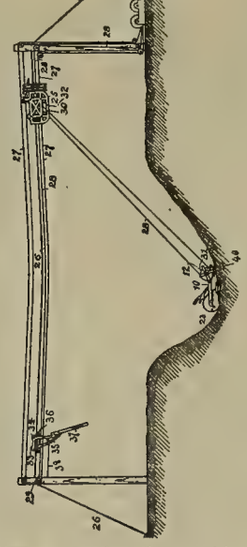
An excavating apparatus, the combination of an incline having a scoop or other earthworking tool or tools supported and guided thereby and adapted to travel thereon, means for controlling the earthworking tool or tools, and means whereby the incline may be adjusted longitudinally without varying its inclination, and its inclination varied without varying its longitudinal adjustment.

LAMP BRACKET FOR MINERS' CAPS.—No. 629,692; T. R. Jones, Wilkesbarre, Pa.



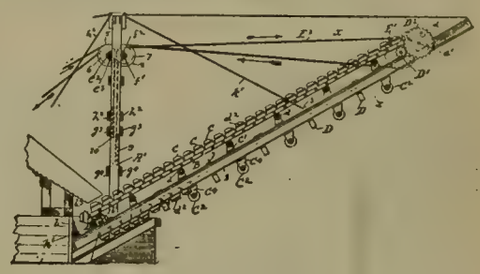
A lamp bracket for miners' caps consisting of a plate adapted to be vertically arranged in front of the cap and having its upper and lower ends adapted to be secured to the crown and peak thereof respectively, plate having a rearwardly and downwardly bent portion near its upper end, a longitudinal slot in its upper portion extending through bent portion and a perforation in the rear of the bent portion and in line with the slot.

EXCAVATING AND CONVEYING APPARATUS.—No. 629,695; F. B. Knight, New York, N. Y.



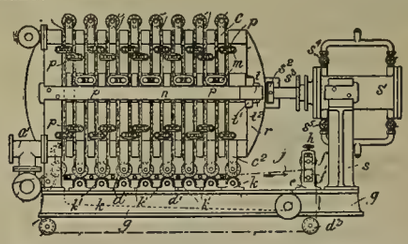
A digging scoop bucket, in combination with a series of teeth arming the digging edge of the base thereof and a tooth arming the digging edge of each side thereof adjacent to the base; each of said side teeth being double plow-shaped and having its point directed in a line diverging from the side line of bucket; a rigid bail, means whereby bail is rigidly held in a fixed position with respect to the body of the bucket except when the same is dumping, a pivotal connection with the forward end of bail which constitutes the point of draft in digging, point of draft being immovably located forward of a plane extending from the extreme forward digging teeth connected with bucket perpendicular to the base plane of bucket.

ELEVATOR FOR GOLD DREDGERS.—No. 629,602; R. H. Postlethwaite, San Francisco, Cal.



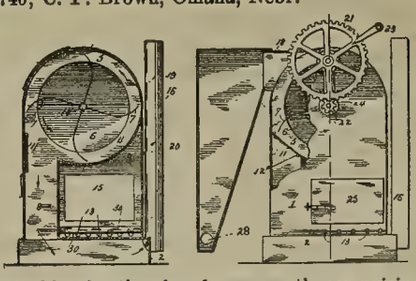
The combination with a platform and an endless carrier or elevator movably mounted, of a sheave E' for imparting motion to the elevator, a drive drum E', sheave on platform out of alignment with sheave or upright sheave frame on the platform, a series being adjustable toward and from the others and a single cable for transmitting power from the drive sheave to the sheave E' working on sheaves and on the series of sheaves in frame. A drive sheave E^2 out of alignment with and whose axle is parallel of the sheave E', a sheave frame between sheaves 9 and 10, one of which is vertically adjustable mounted on frame with their axles at an angle to the axles of sheaves E' and E^2, sheaves 5, 6, 7 and 8 mounted on frame with their axles parallel with the axles of the sheaves E' and E^2, and a single endless cable passing over sheaves. The combination of the ladder, an endless carrier working thereon comprising a series of buckets each provided with side flanges, supporting rollers for the carrier mounted on the ladder upon which rollers side flanges rest, and drive means. A support, with an endless carrier thereon having a series of buckets each having in addition to the carrier a fixed supporting surface, a series of rollers for supporting the under run of buckets and with which the supporting surfaces engage, and means for driving the carrier.

FILTER PRESS.—No. 629,642; J. Wilson, Glasgow, Scotland.



A filter press, the combination with the filtering frames carrying at one end rollers for the passage of the filtering cloth, and plates provided at opposite ends with rollers for the passage of the filtering cloth; of means for moving the filtering cloth, and means for cleaning the same. The combination with a cylinder, and a piston working in cylinder, piston having an extension through the rear cylinder; of a swinging block in rear of cylinder, and a screw carried in swinging block to engage the end of rearward extension of the piston rod, for securing the piston at the end of its forward stroke.

HEATER FOR THAWING FROZEN EARTH, ETC.—No. 629,740; C. P. Brown, Omaha, Nebr.



A machine for thawing frozen earth comprising a casing having therein a heating chamber with an open bottom and closed sides and a smoke pipe, and having therein over and next to the heating chamber a combustion chamber, and above the combustion chamber a drum, a passage connecting the combustion chamber and the drum, a passage connecting the drum with the heating chamber, and a fan in the drum for drawing the products of combustion from the combustion chamber and forcing them through the heating chamber, and means for operating the fan.

Some Experiences of a Working Miner,

NUMBER XXVII.

Written for the MINING AND SCIENTIFIC PRESS.

The I—— H—— mine was a success and paid dividends to its stockholders. It was fortunate in having a practical, common sense manager, who knew the difference between ore and waste and also the difference between a capable man and one who was not. His wisdom showed itself in the employment of men to superintend the various branches of the enterprise, each of whom was well chosen for the duties he was called upon to perform. This is a very important matter to mine managers. One man can not do all the work nor look after all its details personally. One day at the P—— mine I saw the high-priced superintendent assisting in unloading a wagon load of pipe, while twenty of his laborers stood about, helplessly looking on with their mouths open, while a foreman sat astride a horse, offering suggestions. You may rest assured that M——, who was manager of the I—— H—— mine, was not that sort of a manager. He had men employed to handle pipe, logs and heavy machinery; but he didn't handle it himself, as his time was worth more in some other capacity than that of laborer. He was not afraid of work when work was necessary, for one day a top man rushed breathlessly into the office and shouted that a bad cave had occurred in the mine. M—— ran to the mine and descended on the cage, without stopping to change his clothes. He stood there and gave directions and took a hand himself, reassuring his men by his confidence and presence, and in a few hours what had been a very dangerous job was safely completed and the danger was past. He knew just what should be done, issued his orders calmly, but positively, and the men could plainly see he understood his business, and entertained a greater respect for him than before. The I—— H—— main shaft started in a barren formation, but reached a large and valuable ore body in depth. The success of the mine naturally stimulated prospecting all about the neighboring region, and numerous companies were organized and shafts started, without sign of mineral of any kind, and most of them failed to find anything of value below. One company, the M—— Consolidated, started a shaft and put up a fine plant. For more than 200 feet the shaft passed through barren material and was still without ore. One of the directors of the company retained me to make an examination. We went to the mine and, after looking about for a short time, I inquired what was the object of the shaft. I was informed that it was for the purpose of opening a mine like the I—— H——.

"But you have not got here the same formation," I explained; "you are too low."

"Too low!" exclaimed the M—— man. "How's that? We are at least 100 feet higher here than the I—— H—— shaft."

"Yes," I replied; "so you are. Your shaft starts at a higher altitude than the I—— H—— shaft, but the formation which their shaft was sunk to reach and in which they find their ore body is not here at all. It laid at a higher geological horizon and the limestone has all been removed by erosion, and you have sunk 200 feet below the lowest portion of their ore-bearing stratum."

This was news to him, but it clearly demonstrated the foolhardiness of blindly sinking a shaft without first having an examination made to ascertain its advisability.

* * *

Often while working at the P—— mine I would take a shotgun or rifle and stroll out into the wilderness of the mountains, sometimes going several miles. Game was not abundant nor altogether lacking. There was also quite a variety of it, even though scarce. Jackrabbits were most common, but when a fellow went hunting them he was quite as likely to find a bear. On these trips I often noticed the peculiar flinty, nodular masses in the limestone and lying loosely about the surface, but paid little attention to them. I had been taught that flint was a most unlikely material in which to find gold, and I do not remember having ever picked up a piece and giving it even a casual examination. I left the P—— mine, and forgot all about the flint; but one day a farmer, who is supposed to know more about hay and potatoes than gold ore, was out prospecting in this limestone country and the poor innocent picked up a quantity of this flint. He knew so little about it that he even paid to have it assayed, and it carried about ten ounces of gold to the ton. He gathered up a lot of this miserable flint and shipped it to the smelters and now he is said to be rich. The only satisfaction I can derive from this is that I was not the only miner who had looked with disdain upon the flint cropping from the limestone. Since then I have seen several places where these chert-like nodules of silica in limestone were rich in gold and silver. I prospect everything now.

* * *

There are numerous instances where prospectors seem to have been guided by some fate to the spot where wealth would reward a very small effort. Although luck seems to be a very important element in the success of a prospector's career, it should always be remembered that the man who discovered a mine and is called lucky did not find it sitting around home. He was out scouring the mountains, creeping the brush or climbing over piles of boulders in search of a vein.

L—— and R—— were out on a trip searching for a vein which would make their fortunes, but would have been satisfied with anything in which there was some pay. For days and weeks they hunted the hillsides, and, though they discovered numerous veins, none were rich enough to induce them to work. Each morning they would get up, start off and tramp, one going in one direction, the other in another. Nightfall found them back at camp with their bags full of rocks from the veins found during the day. L—— had been up at B—— creek three different times, but found nothing. He went the fourth time, and, by the merest chance, decided to go up the mountain toward a red spot he could see from the gulch, and there he found a vein a foot wide. He took a small quantity of the ore down to the creek and washed it in a hornspoon. It was a fine prospect; he hastened back to get a little more of it and investigate a little closer. He found the vein on the opposite side of the little gulch, and samples from there also prospected well. They moved their camp to the locality next day, worked a little on the vein, and finally started for the nearest town, nearly 100 miles away. Their rock proved to be rich; they were soon shipping it by the carload, and each made a fortune. Now, luck favored these men, but they would have had no such luck had they remained in town, finding fault on account of their bad luck.

MINER.

Hawaiian Island Volcanoes.

The eruption of Mauna Loa and Kilauea now in progress on the island of Hawaii make the geological structure of those islands of unusual interest at this time. Capt. C. E. Dutton, in the fourth annual report of the United States Geological Survey gives a lengthy and interesting description of the Hawaiian volcanoes. The following is from that report:

There are twelve islands in the Hawaiian group, all of them volcanic. Four of them are mere barren rocks, four are large islands, the remaining four being inferior in size but habitable. All of the large ones are lofty and mountainous. The culminating peaks of the island of Hawaii, the largest and most southerly of the group, are Mauna Loa, 13,700 feet, and Mauna Kea, 13,900 feet. The summit of Haleakala, on East Maui, is 10,350 feet in altitude. All of these elevations are in relation to sea level. Hawaii is ninety by seventy-four miles and contains 3950 square miles; Maui is forty-eight by thirty miles, and Oahu is forty-six by twenty-five miles. The city of Hololulu is on the southerly side of the latter island.

Soundings about the various islands have determined that these volcanic piles are only the summits of gigantic mountains rising above a comparatively level region on the floor of the Pacific ocean. These soundings have determined that the slopes of the mountains as seen above sea level continue at slightly increased angle for a distance of thirty to fifty miles from the shore and range from 14,000 feet to 19,000 feet in height before sea level is reached, which on adding the additional altitude above sea level gives them the great altitude of about 30,000 feet.

Mauna Loa (the great mountain) is the largest mass of volcanic material in the world. In other lands there are more lofty volcanic mountains but these stand upon elevated platforms and are comparatively diminutive cones. Regarding the platforms as the base, these cones of lava do not begin to equal Mauna Loa. Mount Shasta, Mount Hood and Mount Rainier, melted into a single mass, would still be far inferior to the Hawaiian volcano.

Mauna Kea (the white mountain) is also a colossus among volcanoes only exceeded in size by its neighbor, Mauna Loa. Mauna Kea is 200 feet higher but is steeper and not so broad of base as Mauna Loa, which at sea level is seventy-four by fifty-three miles. Iceland volcanoes have in times gone by erupted an equal amount of material, but not within a century. At a single eruption Mauna Loa has been known to send forth more lava than Vesuvius has since the days of Pompeii. Mauna Loa and Kilauea, near it, are noted for the singularly quiet character of their eruptions. (The latter is the crater famed for its lake of fire.) Only rarely are their eruptions preceded by violent earthquakes and subterranean rumblings. Those vast jets of steam blown miles high, hurling stones, cinders and lapilli far and wide, so common to volcanic eruptions are almost unknown here. There is something of the sort but only in a feeble sort of way. The lava rises in these craters, and passing over the rim, flows down the mountain slope for miles, and on numerous occasions has reached the sea. The absence of cinder cones is noticeable. Their summits are broad flat tables with deep pits sunken into them.

There are cinder cones at Mauna Kea and on other volcanoes on the north end of the island. All of the lava is basaltic, and contains a large amount of olivine. The entire slope of Mauna Kea is covered with these symmetrical cones, all of which have truncated tops showing the presence of the central crater. Some of them rise to a height of 1000 feet and are about three-quarters of a mile broad at the base. The slope of Mauna Kea varies from twelve to twenty degrees, while that of Mauna Loa is from four to seven degrees. Mauna Loa is wholly built up of successive lava flows and Mauna Kea of fragmental material.

The islands at the northern end of the group have not been disturbed by volcanic eruptions for thousands of years, as evidenced by the lack of fresh lavas. The surface rocks have decayed and disintegrated into soil and the islands are noted for the luxuriance of the tropical vegetation. Even Mauna Kea has been inactive for a long period, and a rank growth of grass clothes the volcano to near its summit. This grass is long and coarse and of light straw color, giving to the mountain a light color, to which is probably due its name.

Dredging in New Zealand.

The success that has attended dredging enterprises in New Zealand is now turning a large amount of local attention to its more energetic prosecution. Its general effect upon the production forcibly appears in the official returns of export for April. The total for that month was 33,343 ounces, valued at £130,509, as against 15,220 ounces, valued at £56,948, for the corresponding month of last year. This means that gold production was more than doubled, and by the official return the increase is largely attributed to the progress of the dredging industry. It is worthy of note that in the April number of the New Zealand *Mines Record*, a Government publication, a return is given of the yields obtained by thirty-two dredgers, the total being in round numbers 3120 ounces. This stands for but a small proportion of the 18,123 ounces of general increase, but it adds force to the common assertion that but a limited amount of the gold obtained by dredging is reported for publication, the disposition being to conceal, rather than to proclaim, results. In further support of this presumption, it may be mentioned that in the fuller returns of export for the the quarter ending March 31, 1899, the total yield from the Otago province, where the majority of the dredgers are working, is 37,642 ounces out of a gross total for the South Island of 57,598 ounces, and for the colony of 92,818 ounces. This shows that the dredging province alone has returned more than all the northern gold fields, notwithstanding the heavy and constant yields of such mines as the Waihi, Waitekauri, Crown and Talisman. Besides this fact, the reported return for April of 3120 ounces from thirty-two dredgers will apparently stand some supplementing, so the local men evidently think, therefore there is a dredging boom in present progress which threatens to develop rather large proportions. Sections to be worked under lease, should leases be granted, are being marked off in every direction. Among them, no doubt, are sections that never will be worked, except on the share market, whether leases are granted or not. It is even reported that it is intended to float a company with a capital of £200,000 to take up Lake Waihola and work it with a fleet of dredgers. Company promoting is proceeding in the usual reckless manner that always follows upon a mining success. A Wellington contemporary says: "Before the prospectus of Alpine No. 2 Gold Dredging Co. was issued, the whole of the shares (4800) available for subscription were taken up. As a favor, one speculator in Wellington secured 100 shares, and before he had actually signed the application form he was offered a premium of 2s 6d per share on which he had paid nothing. The Moa Flat Dredging Co., with a capital of £10,000, was floated in Dunedin in the course of a few days, and the Central Electric Co., with a capital of £7000, was floated before the prospectuses reached the public. Of these shares, 500 were reserved for sale in Wellington. Immediately following the letter of advice, a telegram was received by the broker quoting the shares at a premium of 6d. Considering the enormous capital issued during the past three months in Dunedin for dredging purposes, the consumptive power of the speculators in the southern cities must be regarded as marvellous." Herein is suggested both the desirable and the undesirable proportions the industry may develop in Australia. The New Zealand Government officially states in its last issue of "Papers and Reports Relating to Minerals and Mining" that no great damage is done to the land by dredging, but it can be harrowed and grass sown again, if necessary; that the streams are not polluted to any extent, nor filled up with gravel; that the whole material can be raised, washed and deposited again with very little eventual surface damage. This is scarcely calculated to restrain dredging operations, nor does it indicate any alarm for the future. That the new branch of mining industry has so largely increased the gold production, and thus increased the purchasing power of the consumer, to the great benefit of the producer, can scarcely be regarded with indifference either in New Zealand or Australia.—Melbourne Mining Standard.

Dredging and Mining in Boise Basin, Idaho.

TO THE EDITOR:—Within the past year there has been a marked revival in mining operations in Boise Basin. Idaho City, Centerville, Pioneerville, Placerville and Quartzburg are the principal points in the district, each being the center of activity in its part of the basin. The revival is seen in the building and operation of gold dredgers, in the usual method of hydraulic work and the opening of various quartz mines. More's creek, Grimes' creek and their numerous tributaries, which drain the basin into the Boise river, are well watered, the surface channels changing frequently from one side to the other of the broad bed of sand and gravel that marks the course of the stream. The actual width of the surface channel is usually from 15 to 30 feet in the basin streams, though the bed of alluvial material varies from half a mile to a mile in width and ranging in depth from 20 to 40 feet from surface to bedrock. This condition, accompanied by an abundant underflow of water, forms a favorable one for operating the gold dredger. In some places this bed of sand and gravel may be classed as new material—that is, it was deposited there by the operations of nature; while in others a considerable depth of it is made up of tailings deposited by the operations of hydraulic giants on the banks and bars which rise in benches on either side of the stream. In the beds of new material the values are quite uniform from the surface downward to within a few feet of the bedrock, where the richest stratum is found. At Placerville, where one of the largest dredgers is at work, the material thus screened and washed passes out through an iron flume 4 feet wide and 125 feet long, in the bottom of which are slats and Hungarian riffles for saving the gold.

Other dredging companies have been organized and all possible grounds have been secured by option and it is not impossible, nor improbable, that Boise Basin will contain twenty-five operating dredgers within three years.

The Basin branch of the Twin Springs Co. is operating two giants, with 200 feet head of water against a bank 100 feet high, near Idaho City. This property was sold last year to this company by K. P. Plowman of Boise. The work is in charge of H. L. Woodburn.

Ashby Turner is developing some hydraulic claims on More's creek, above the Boston & Idaho property, and getting ready for next season's work. He is largely interested in bench grounds along the stream, which are best adapted to the ordinary hydraulic work.

Nine miles below Idaho City a bedrock flume two miles in length is being put in to develop pressure for hydraulicking. The work is in charge of Mr. Taylor.

The mountain rim which surrounds the basin on the east, north and west is attracting interest now. Extending from the Gambrinus district, east of the basin, to Quartzburg, west of it, is theoretically a crescent-shaped mineral zone, and considerable exploration is going on for the purpose of proving the theory. Thus far an encouraging outlook is presented.

The Illinois, in Gambrinus, was recently bonded to



DREDGER "LIPPENCOTT" AT PLACERVILLE, BOISE BASIN, IDAHO.

bedrock is reached at 40 feet depth, and the first 20 or 25 feet comprises tailings and wash from the old hydraulic workings, and, while the values in this debris would not of themselves pay for working, the result is highly satisfactory when handled in connection with the richer strata below.

The Boston & Idaho Gold Dredging Co., comprising Boston people, have grounds taking in about nine miles of More's creek, below Idaho City. They have one dredger, of the Risdon type, in successful operation, and are building another of the dipper type. Their Risdon dredger ran several months last year and began its season's work this year about April 1st. Where it is now working the bedrock is reached at 23 feet, the principal values being found within a few feet of the bedrock. Their new dredger will have two 5-foot grizzles. Supt. Rupert Winters states the operations thus far have been profitable and satisfactory.

At Centerville and Placerville Boston parties are represented by one power company and three dredging companies. The Basic Co. have an eight-mile flume on Grimes' creek, whereby 350 feet pressure of water is developed and a 600 H. P. electric power plant is operated. The Bullion, Boise and Bedrock Dredging companies each has a dredging boat, two of which have been operating some time and the third was launched on the 15th inst. Two are on Grimes' creek and the third at Placerville, on Wolf creek. These dredgers, in a general sense, are of the Bucyrus type, having a working capacity of 2500 yards each per twenty-four hours, and are electrically operated by the Basic power plant. The four companies mentioned are under one management. The dredger "Lippencott," in operation at Placerville, has thirty-eight elevator buckets, each of 5 cubic feet capacity, and a 4x15 feet revolving screen, below which is the centrifugal pump. The

William Williamson and others of Spokane, the amount stated to be $30,000 and the time eighteen months. It is his intention to develop the property.

In the same district the Washington mine, belonging to Woolly & Plowman, recently opened an 8-foot ledge of high-grade, gold-bearing quartz. On this property are two parallel ledges, one of gold and the other silver, 30 feet apart. A shaft sinks 300 feet, on the bottom of which are drifts on the vein. The Washington has a 10-stamp mill.

The Lucky Boy, adjoining the Illinois, is equipped with a 10-stamp mill, which is running. A tunnel cuts the ledge at 300 feet depth, and crosscutting to hanging wall is in progress. The ore is said to have cleaned up $8 per ton. This property belongs to John P. Reno of Pittsburg, who purchased it last year for $22,000.

Farther northward is the Elkhorn and Mountain Queen, both under bond to L. C. Ferree, J. M. Jackson, John Kinkaid of Denver and H. L. Hollister of Boston. The Mountain Queen has a 20-stamp mill and is being further developed by an 800-foot crosscut tunnel, which will cut the ledge at 370 feet from the surface, the same ledge being opened by an upper tunnel, above which the ledge is stoped to the surface and longitudinally for 1000 feet. The ore therefrom is said to have averaged $8 per ton on the plates. In the lower tunnel a blind lead was encountered, 6 feet wide, running $5 per ton.

The Elkhorn has a 5-stamp mill in operation. This is an old mine, with considerable amount of ore in sight. Its location is within two miles of the Washington. Mr. Ferree stated that $100,000 would be expended in development and equipment in Boise Basin.

The Twin Sisters, near Centerville, is being developed under the management of E. F. Blain. A new mill is to be erected. This property belongs to parties owning the Trade Dollar at Silver City.

D. E. Coughanour has sold the Iowa group at Quartzburg to the Le Roi people for $150,000, the deal having just been closed by W. B. Heyburn for the purchasers. It is asserted the new owners will spend $100,000 in improvements. WASCOTT.

Idaho City, Idaho, July 17th, '99.

The Precipitation of Gold From Cyanide Solutions.*

By A. H. HARTLEY.

The tailings and slimes to which these remarks apply were produced from the battery of a private mine called the Ulundi, belonging to Thomas Andrews, situated on Fever creek, fourteen miles from Barberton. The ore for the most part was free milling and highly oxidized, and contained a considerable quantity of copper. The tailings varied in value from 5 dwts. to 8 dwts. of gold per ton. After treatment they assayed from 16 to 36 grains. The residues did not vary according to the richness or poorness of the tailings, but according to the cleanness of same. Sometimes the pulp from the battery carried as much as 60% of slimes, and never less than 45%. The tailings, however, were always leachable, and would have been clean had it not been for the presence of from 10% to 15% heavy clay or earth, which would not float off with the slimes and which was certainly detrimental to proper treatment.

Regarding precipitation, the rate of flow of solution through the boxes averaged from 1 to 1½ tons per cubic foot of zinc in twenty-four hours, or from half an hour to three-quarters of an hour's contact.

The following were the strengths of leachings and assay results (results of gold assays stated per ton of 2000 lbs.):

	Gold	
KCy.	*Head of boxes.*	*Foot of boxes.*
.05%	19 dwts.	Trace.
	39 dwts.	4 grains.
	10 dwts.	Trace.
.1%	10 dwts.	Trace.
.14%	16 grains.	Trace.

I found that to continue the treatment which gave these leachings as much as 4 lbs. of cyanide per ton of tailings would be consumed. By using weaker solutions the extraction of gold from tailings continued equally as good, while the cyanide consumption fell to 2 lbs. per ton. The solution assays were now as follows:

NUMBER 1.

	Gold	
KCy.	*Head of boxes.*	*Foot of boxes.*
.02%	8 dwts.	Trace.
.05%	13 dwts.	Trace.
.04%	1 dwt.	Trace.
.002%	2½ dwts.	Trace.

NUMBER 2.

Strength of leachings, KCy.	*+ KCy at head of box.*	*Gold at foot of box.*
.000%	.02%	Trace.
.006%	.05%	6 grains.
.008%	.05%	Trace.

When commencing slimes treatment the increased quantity of solution necessitated the percentage of cyanide again being reduced, in order to keep the consumption within reasonable bounds, and to ensure good precipitation the zinc shavings were dipped in a solution of lead acetate. The precipitation continued as good as before, the average strength of solutions leaching from the tanks being .009% KCy, with the addition of KCy at head of boxes .02%.

Gold at foot of boxes, traces; and without the addition of cyanide to head of boxes the following were the solution assays:

	Gold	
KCy.	*Head of boxes.*	*Foot of boxes.*
.02%	1 dwt.	Trace.
.007%	20 dwts.	Trace.
.004%	2½ dwts.	Trace.
.006%		Trace.
.009%		Trace.

and so on with little or no variation.

The consumption of cyanide now figured at ½ lb. per ton of ore, with as good results as when 4 lbs. per ton were consumed.

It will be seen from the foregoing figures that the precipitation was as good without the addition of cyanide at the head of the boxes as it was with it. When at times the zinc became "dead"—that is, when no action could be observed in the boxes—the addition of a small quantity of cyanide, say $\frac{1}{10}$ lb. per ton of solution, did not bring it into an active state, though the use of caustic soda or a much larger quantity of cyanide did. One objection made to the lead-zinc couple method of precipitation at a former meeting was that aeration necessary for the effective solution of gold in tailings or slimes hindered precipitation in the boxes. This objection would not hold good under the circumstances quoted above, as, if these solutions were not aerated, few are; but this fact never hindered precipitation, as these figures show.

In my opinion these unusually good precipitations from very weak solutions were caused by the presence of copper. If this be the case, copper-bearing ores would seem to present no difficulties whatever

*Journal of the Chem. and Met. Soc. of South Africa.

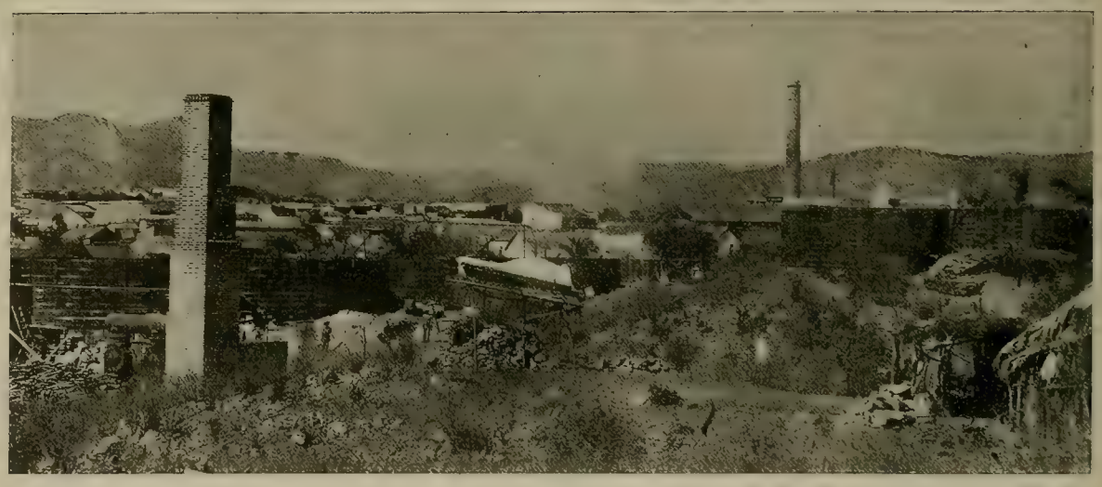
to the successful treatment of tailings and slimes by the usual zinc method of precipitation.

The resulting cyanide bullion for nine months' work at the Ulundi mine averaged 850 fine, which was obtained by ordinary fluxings, without any special refining agencies. This would show that the copper dissolved from the ore and precipitated on the zinc did not materially affect the fineness of the bullion.

Tanks for Cyanide Plants.

Every season sees the erection of new cyanide plants, which as a rule range from 5 to 200 tons daily capacity. Some time ago the Pacific Tank Co. shipped to La Paz, L. C., what is said to be the largest cyanide plant ever constructed on the Pacific coast.

The plant is almost a duplication of the Simmer & Jack Works of South Africa and consists of eight 40-foot diameter leaching tanks 10 feet high, three 25,000-gallon solution tanks, ten gold solution tanks and the necessary sump tanks and extraction boxes. The plant is working a huge pile of tailings which accumulated at the El Progresso mines. The filling of the leaching tanks is accomplished by means of a ropeway. Water is a scarce article at the mine and all leached tailings have to be shoveled out. To facilitate the discharging of the leaching tanks, each tank is provided with four bottom discharge doors which open directly over car tracks laid in tunnels underneath each tank and the tailings are dumped directly into ore cars. Builders of these tanks find P. & B. paint a valuable adjunct to their success.



CYANIDE PLANT AT PROGRESSO MINES, LA PAZ, LOWER CALIFORNIA.



FIG. 2.—BOTTOM DISCHARGE DOOR OF LEACHING TANK.

Fig. 2 shows the bottom of discharge door designed by the Pacific Tank Co. to meet the requirements of these large tanks. The doors have an 18 x 18 inch opening. They swing under the bottom of the tank and offer no obstruction, are kept tight by square flax packing let into the edge of the door, and are operated entirely from beneath the tank, leaving the entire capacity of tank available for ore.

The difficulty of keeping wooden tanks of this size water tight has been solved. Each stave has a groove cut into the top ½ inch wide by 3 inches deep, forming a complete channel around the upper edge of the tank. This channel is kept constantly full of water, a drip cock renewing whatever amount is evaporated, and to keep this channel from being filled up with dust and dirt a special moulding is used to act as cover to the channel. This process is patented by the Pacific Tank Co., who make a specialty of constructing cyanide plants.

Fig. 3 is a new design of an assayer's cyanide plant with a capacity of 100 pounds. This little plant is crated and shipped complete, including frame, as shown in cut.



FIG. 3.—SMALL EXPERIMENTAL CYANIDE PLANT.

The small tank shown at the highest elevation is to be used as a solution tank, while the tank just below it is intended for a leaching tank, and is fitted complete with false bottom and duck filters. The zinc box shown below the leaching tank has six compartments and is fitted with wire screens ready for use. The lower tank is the sump tank, which is provided with an outlet which facilitates the drawing off of the weakened solution, to be transferred to the solution tank again, where it is made up to full strength. The solution enters the leaching tank through the bottom and is drawn off through the same pipe; but to aid the discharging of the eachedtailings, a union connection will be found just below the leaching tank. This can be easily disconnected, and the leaching tank may then be lifted off and the contents dumped out.

In a similar way the zinc box can be removed by giving the elbow a quarter turn; the box can then be taken out and the contents of each compartment can be removed without difficulty. For parties desiring tests on a larger scale, an experimental plant of three tons capacity has been designed, of which Fig. 4 is a sectional view. This plant consists of one solution tank, three leaching tanks with false bottom and duck filters, one zinc box complete, one sump tank and one vacuum pump.

The leaching tanks included in this plant are 4 feet deep and offer no difficulty for a practical working test. The pump is a rotary force pump and is connected in such way that the same can be utilized as vacuum pump also, when the solution is drawn from the leaching tanks.

The cut also illustrates the general arrangement of these cyanide plants, where the aim is to fill and discharge the solution from the different tanks by gravity. The solution tanks, of which there are generally two, are placed at the highest elevation, the leaching or percolating tanks being on a lower level; the extraction boxes on a level below the leaching tanks and the sump tank at a still lower level. On the same level with the extraction boxes are generally placed the solution pump, the cleanup tank, zinc lathe and

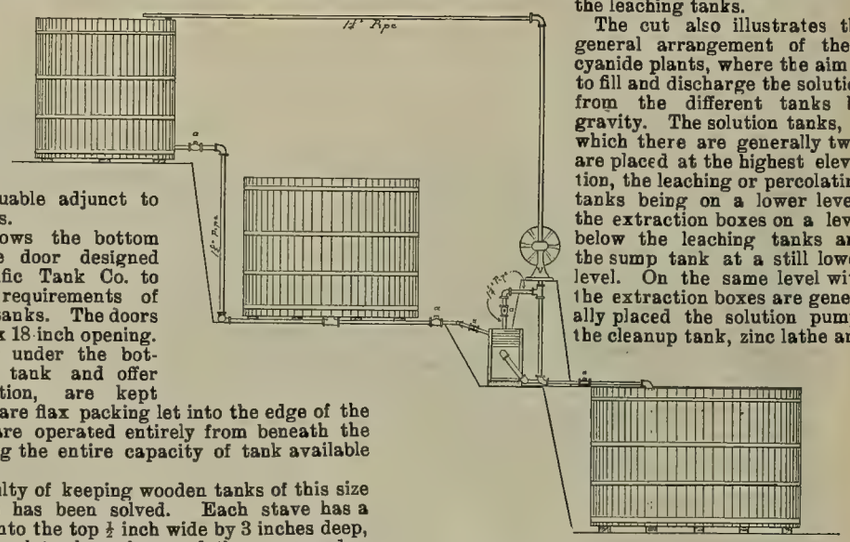


FIG. 4.—LARGE EXPERIMENTAL CYANIDE PLANT.

engine, as this level is practically the lowest. The sump tanks are simply receptacles for catching the weakened solution as it comes from the extraction boxes and are often set below the ground.

A new catalogue of everything pertaining to cyanide plants has just been issued by the Pacific Tank Co., San Francisco and Los Angeles, California, of interest to miners and cyanide workers; a copy will be mailed to any one upon application.

ACCORDING to Chas. Richet, the struggle for existence is a contest for carbon. The activities of life depend upon the force set free by the burning carbon and hydrogen in oxygen, these three elements being the essential foods, the oxygen being abundant for all purposes, while the available carbon is only one three-hundred-thousandth as much. Life is a small quantity of carbon in very complex and instable combination. This carbon is continually uniting with oxygen in slow combustion, passing from one form to another and ending in carbonic acid, which the sun's heat, through the chloroyhyll of plants, decomposes, the carbon reappearing, first in the vegetable, then in the animal, and so on. There is an incessant circulation of carbon, kept in motion by the sun's heat.

THE *Journal of Geology* announces the discovery of a new mineral which, as a fuel, is claimed to be superior to coal. The substance, which is of a lustrous black color, is found on the island of Barbadoes, and is called by the natives "manjak." It is thought that manjak is "petrified petroleum," quantities of petroleum being found on the same island. It contains only 2% of water and 27% of solid organic matter, thus surpassing in utility Trinidad asphalt, in which 30% of water is contained, and which has hitherto been classed as the finest fuel.

IT is said that the diamond drill when put down in the zinc field of southwest Missouri strikes ore almost anywhere. The ore occurs at several horizons to a depth of 1000 feet.

Mining Summary.

ALASKA.

The last report from the Alaska-Treadwell is the first under the addition to the mills. There are two mills in operation, the original one of 240 stamps and the new one of 300 stamps, the latter being run with water power, which can only be done through a portion of the year. Last month the two mills crushed 54,376 tons ore of the value of $92,000. There were 1090 tons sulphurets saved of the value of $40,760, making a total of the month of $132,760. The actual bullion shipment for the month was $141,805, the largest in a long time, if not the largest ever reported. The expenses for the month were $37,500. Considering the amount of ore handled this shows a cost of 69c per ton. The value saved from ore treated averaged $2.44 per ton.

Dr. Hultberg, the Swedish missionary who first found gold at Cape Nome, reports at St. Michael that several promising quartz properties have been found in the Cape Nome district. The discoveries were made July 1st and are in the mountains back of the creeks. There are a great many idle men to be seen about Anvil City, though there is a demand for labor. This idle crowd intended passing a resolution throwing open the district for relocation and jumping the best claims. Such an action would have resulted in bloodshed and there is no telling where the trouble would have ended, because many men would have defended their claims with their lives. Nome is no place for a person in winter if he is not well supplied with warm clothing and sufficient means to provide himself with comforts. The winters are severe, the thermometer often falling to 60° below zero, the cold being intensified by the sea

ARIZONA.

The Dark Horse M. Co. has been incorporated at Phœnix, with branch offices in several cities. The incorporators are J. W. Crooks, W. F. Harsey and G. Caulfield of Boston, Mass., and G. H. Savage of Butte, Mont. The capital stock is $1,000,000.

At Fool's Gulch the old Cornish rolls in the mill have been removed and ten stamps substituted, which are now crushing iron sulphuret ore, which is being concentrated. Sufficient ore is in the bins and on the dumps to keep the mill in operation for five months. One shaft is down 1000 feet, with drifts at every 100 feet, some of which are 500 feet in length. Another shaft is down 500 feet. W. A. Clark is Supt.

Prescott *Journal-Miner*: The report comes from White Picacho district, southeast of Prescott, that a rich strike was recently made in the Winter's group of claims. In the shaft at 70 feet the ledge narrowed from 4 feet to 3 feet, but the ore increased greatly in richness and the vein widened to 3½ feet. In sinking the 70-foot shaft the hanging wall was lost. It is estimated that two-thirds of the ore will carry from $60 to $100 in free-milling gold. The balance is base, carrying copper and gold.

Tucson *Star*: At the Helvetia a diamond drill has been used to ascertain the value of the various claims in the group. The drill has shown rich ore in large veins. Several shafts have been sunk and three tunnels have been driven into the hill. One shaft is down 250 feet; others are down 200 feet. One of the tunnels has been run 350 feet and the contract has been let to drive it another 100 feet. The tunnel is in 125 feet and a winze sunk 55 feet and a drift 50 feet. The air compressor will be run by a double expansion engine. The hoists are run by gasoline engines. The smelter will be ready for ore within sixty days. On the Advance, in addition to copper, paying gold ore is found.

CALIFORNIA.

Butte.

The discovery of petroleum on the farm of G. Wickham, two miles west of Gridley, is reported. A shallow well, used for watering stock, yields quantities of petroleum daily.

The Spring Valley mine of Cherokee has been sold to an Eastern syndicate. The new owners have prospected the mine and have ninety days in which to make out the papers, get the deeds in shape, and pay down the coin. It is said Supt. Hellman of the Spring Valley Co. and W. P. Lynch made the deal. It will be opened as a drift mine. It was formerly worked as a hydraulic mine and from it there was taken $2,000,000.

Oroville *Register*: A 10-stamp mill will be erected on the Golden Trout mine on the South Fork of Feather river, to be run by water power. It is the intention of the company to build a ditch and bring in water to run an electric plant, when electric power will be used in both mine and mill. J. R. Watson, Jr., is Supt.——At the Little Hope mine M. Lambert is Supt. Twenty-three men are employed in the mine. There is a 10-stamp mill on the mine run by water power.

Chico *Record*: It is reported that T. Couch, the capitalist, who has interests along Feather river, below Oroville, has contracted with the Risdon Iron Works of San Francisco, Cal., for three large dredgers for November delivery. The Butte County Electric Power Co., which is putting in a plant above Centerville, has contracted to furnish Mr. Couch 300 H. P. for use in running the dredgers. This will make nine dredgers on the river, as there are five operating, and an additional one is being built.

Calaveras.

The California Exploration Company has bonded the Union mine, south of San Andreas, for $150,000. The property has been extensively equipped and developed. There are several shafts, mills, etc., all of which need repairing.

Calaveras *Prospect*: It is reported that fine ore was struck this week in the 400 level of the Demarest mine, six miles south of San Andreas. The ore shows free gold and high-grade sulphurets. The mill is running full time.

Mokelumne Hill *Chronicle*: Some time ago in sinking a sump below what was regarded as bedrock in a mine near Camanche sand and gravel were found, the so-called bedrock being lava. With a drilling apparatus Mr. McSorley sank four holes, the deepest 310 feet, and found that under the lava there was an ancient river bed, yielding coarse gold. A shaft is being sunk and is now down 65 feet. The gold-bearing gravel is 23 feet thick. It is 160 feet to the true bedrock, which consists of sandstone. [If the formation underlying the gravel channel found by the drill is really sandstone, as above stated, it is not improbable that the true bedrock has not yet been reached, as the bedrock in the vicinity of Comanche is all diabase or rocks of a similar type.—ED. M. & S. P.]

Del Norte.

Del Norte *Record*: Another shipment of ore has been mined and is in readiness for transportation to the Selby works near San Francisco from the Union copper mine. This shipment will consist of fifteen tons. The returns recently received by the Union company from a ten tons consignment has demonstrated that those of moderate means may profit from copper mining in Del Norte county. Yates and Murray, shareholders in the Union, have gone out to the mine to direct its working. J. W. McGowan, also an owner, states that the shaft at the north end of the claim is reopened, and good results are expected from it. From that shaft ore was formerly profitably shipped. The ore from that part of the lead, besides containing a good percentage of copper, yielded an average of $18 per ton in gold. J. W. McGowan and W. Crawford have a copper discovery of recent location on Myrtle creek hill from which they took out in one day 25 sacks of high-grade ore. This mine is on the same lead with that being worked by the Bailey Brothers——W. Magruder recently discovered a copper mine on the Klamath river, a short distance below Orleans Bar. He reports large ledges of the rock impregnated with copper, some of which is metallic.

El Dorado.

(Special Correspondence).—The Granite Hill G. M. Co. is the name of the Colorado company operating the Cambrian mine near Coloma, where they have just finished a 10-stamp mill, which this week began work. Leonard Thomas is Supt.

Coloma, Cal., July 30th, '99.

Near Kelsey Hayward & Lane are putting in a steam hoist and pump on the Santa Clara mine, which they recently bonded.

Mountain Democrat: The mines about Kelsey are becoming paying properties. That owned by Ryan & Job on the Brigham place, formerly known as the Carr mine, has paid from the start, the rock assaying $20 in gold and $8 in silver. The work is hindered by water.

El Dorado *Republican*: A pocket hunter who has been prospecting on China hill below Shingle Springs for two or three years, last week made a rich find and has been taking out gold at the rate of $200 a day. Up to last Sunday he had taken out $800 and expected more.

Placerville *Nugget*: The German mine, four miles south of El Dorado, closed down recently, caused by inability to secure water for power. Fourteen men were employed. Nothing will be done until power can be secured.——At the Griffith Con. a new station is being cut at the 750 level. The work of sinking will continue to 1050 feet. The next station will be at the 950. Crosscutting on the 300-foot level has opened a new ledge of milling ore, 800 feet north and 300 feet east of the shaft.——At the Crown Point they are crosscutting on the 500 level.——The custom mill is crushing 100 tons of ore from the Gebienhein quartz mine.——Next week a run will be made on ore from the Elliot mine, near the Ribbon Rock.——Larkin Bros., owners of the Oro Flamme mine, south of Placerville, are making arrangements for the development of the property. A test run of fifty tons made at the custom mill a short time ago returned $9 per ton. The owners contemplate the erection of a 5-stamp water-power mill.——Work is to be resumed at the Toll House gravel mine, near Smith's Flat. The 10-stamp mill is being put in order. W. P. Stanley has associated with him R. N. Bulla, C. E. Lovett, J. H. Clark and G. H. Stanley of Los Angeles, Cal.

Fresno.

The Central Oil & Mineral Co. has been incorporated at Fresno, $500,000 authorized and $251,000 subscribed capital, directors J. A. and G. W. Giffin, G. W. Smith of Fresno, B. J. Rhodes, H. A. McCall of San Francisco.

W. H. Holabird of Los Angeles, Cal., has taken options upon a large territory in the Coalinga oil fields. He has had an expert in the field for some time.

Copper Mountain Mining and Development Company has been organized to do general mining. Directors, J. B. Hancock, W. D. Foote, W. P. Manley, M. V. Ashbrook, J. H. Sayre, J. G. Anderson, C. H. Williams, J. B. Henderson, J. E. Hughes, Fresno; capital, $1,000,000.

Kern.

(Special Correspondence).—Messrs. Hunt, Rayder & Pollard, recently from the Argus range country, report their camp in a flourishing condition. Assays made on their average ore goes $40 per ton, and is practically free-milling. Their best ore, which is a 9-inch streak, shows a value considerably more. The property is in Spring canyon, forty-five miles from Randsburg; plenty water and a good wagon road to the mines.

Kernville, Aug. 1st, '99.

The Bakersfield Fuel & Oil Co. of Selma has been organized to mine for, buy and sell oil. Directors—A. L. McPherson, Oakland; G. A. Damron, W. H. Shafer, Wm. Spencer, W. J. Berry, F. L. Keller, Selma; C. Lee, Bakersfield. Capital, $16,000.

Bakersfield *Californian*: The El Dorado Oil Co. has leased lands to two different operators, each of whom agrees to bore 36,000 feet the first year. At the end of that time the operators are at liberty to quit or do as much during each of the following two years.

Los Angeles *Times*: The Big Butte had a milling of forty tons of ore recently, which netted $2380. Another body of ore, 4 feet wide, has been found.——At the O.K. mine, one of the Black Hawk group, the shaft is down 157 feet. At a depth of 65 feet a drift was run 90 feet east, tapping a vein of milling ore 2 feet in width.——At the Black Hawk they are down 111 feet. A report from that mine states that from the bottom of the shaft is a drift to the west 125 feet, in which, at 100 feet, is a crosscut 50 feet each way.

Lassen.

Bieber *Gazette*: Gassaway Bros. are hauling forty tons of ore daily for the Golden Eagle mine at Hayden Hill ——J. Bowden, the discoverer of the Idaho mine, has sold his interest in the same to T. A. James.——The owners of the North Star mine have struck more pay dirt.——W. O. Kibble, the cyanide operator and chemist of the Golden Eagle M. Co., is experimenting on Golden Eagle ore with the bromo-cyanogen process. The 220 level of the Golden Eagle mine is developing well. The pay shoot is over 300 feet in length. Up to within a year ago this level was supposed to be exhausted.

Los Angeles.

The Butte Lode M. Co has been organized; directors—A. Jacoby, C. B Dickson, C. W. Howland, H. R. Smith, A. H. Thomas, J. V. Underhill, E. T. Pettigrew, Los Angeles; capital, $300,000.

The Brea Canyon Oil Co. of Los Angeles has been organized with a capital of $200,000; directors, W. G. Nevin, C. N. Sterry, E. L. Doheny, A. P. Maginnis, D. Murphy.

Mariposa.

Miners have gone to the Ferguson mine, on Bull creek, near Hite's Cove. They will clean out the old works.

The village of Coulterville, recently destroyed by fire, is being rapidly rebuilt.

Nevada.

A 10-stamp mill is being hauled to the St. Patrick mine, near Washington. The mill was formerly at the Taylor mine in El Dorado county.

The Crown Point mine, near the Idaho mine, Grass Valley, has been bought by W. B. Bourn, who recently purchased the Osborn Hill mine. A French company last worked the Crown Point. The Crown Point mine is reported to have produced $130,000, of which $80,000 was found in one bunch of ore, with much coarse gold. There is a shaft 400 feet deep on the incline, with drifts east and west. The vein averages 4 feet in width. The ore is quartz, carrying gold, galena and pyrites. Portions of the quartz are mixed with serpentine. An average value of ore, worked by Mr. Gauthier, has been reported at $17 per ton in free gold, with 3% sulphurets, averaging $60 per ton. The length of the pay shoot developed is 300 feet. G. W. Starr will be Gen. Mgr. of the Crown Point, as well as Mr. Bourn's other properties.

Placer.

Auburn *Leader*: At Gold Run the hydraulic mine has closed down, making their last cleanup for the season, as the water has given out.——At Dutch Flat the Nichols mine, the Polar Star, is closed.——At the Blue Lead gravel mine, near Dutch Flat, twenty-five men are employed in the tunnel and erecting a 10-stamp mill. This property was formerly owned by S. Jordan, but was sold to Sacramento parties. Mr. Jordan is superintending the mine. When the mill is running forty men will be employed.——At Bear Valley twenty-five men are putting in a couple of dams across the lower end of the valley for the South Yuba Water Co.——P. P. Ferron, chief engineer of the Jupiter mine, above Iowa Hill, says the Jupiter Co. struck gravel at 353 feet but have not yet reached the main channel, yet the gravel is rich. They are going to crosscut the channel. The bench gravel in which they are working now is 2 feet deep.——Thirty men are employed at the Van Avery quartz mine, and new machinery is being put in, among which is a new 10-stamp mill. A company from Des Moines, Iowa, are operating the mine.——The Bear River Hydraulic M. Co., operating on Bear river, three and a half miles from Colfax, expect to reach bedrock this week. Twelve men are employed. They are operating by use of the hydraulic elevator and work in two shifts.

Colfax *Sentinel*: The Gold Channel Gravel M. Co. are putting in a new steam engine to run the pump and hoist. F. P. Armstrong is Supt. and six men are employed. A shaft will be sunk to bedrock. The mine is a mile from Emigrant Gap.——The J. G. Peters M. Co. are developing their gravel mine at Green Valley. The company have one tunnel in 800 feet. Tunnel No. 2 has been started and is in 50 feet.

Plumas.

The La Porte Con. G. M. Co. of San Francisco has been organized to operate in this county; directors—W. A. Magee, H. J. Knowles, H. W. Bradley, C. D. Olney, M. L. Requa, Oakland; capital, $200,000.

Quincy *Bulletin*: At Granite Basin it is reported that Mr. Trowbridge has bought the Robinson mine. He is preparing to do development work.—G. and W. W. Hall have leased and are working the Altoona quartz mine, owned by T. F. Emmons of Greenville. The property is on the hill above the Green Mountain mine. A 6-foot vein of ore that will mill $7 per ton is being extracted and hauled to the Kettle mill.

Riverside.

Los Angeles *Herald*: A San Jacinto prospector claims to have discovered a mica mine in the vicinity of that town. A Los Angeles expert has visited the find and pronounced it one of value. Many claims have been staked out.

San Diego.

(Special Correspondence).—The recent fiasco of the placers in Lower California calls to mind the former rush to the Alamo district, seventy miles southeast of Ensenada. Major Russell of Los Angeles, who has just returned from there, related, with a reminiscent smile, that at that time all the waiters at the Hotel del Coronado, San Diego, left in a body for the gold diggings, and there was not a barber left in the town. Of the hundreds who went there but few remained, and to-day Mexicans and Chinese are working over the same ground wherever water can be obtained. But the output the camp has later developed is from the quartz mines, and during the eleven years which have elapsed since that first rush, not less than $1,500,000 has been taken out of the quartz properties. The Montezuma mine is now down 270 feet, and the pumping plant is raising 6000 gallons of water per hour. This is the only water available for the placer workings, and is carefully husbanded by the Mexicans and Chinese engaged in placer work. Major Russell has no hesitancy in saying that the mining laws of Mexico afford better protection to the mines than those of the United States, and that in his ten years' experience there his treatment at the hands of the Mexican officials had been all that could be desired. The camp depends for all supplies on San Diego.

San Diego, July 31st, '99.

(Special Correspondence).—The Grapevine district is about 8 miles north of Banner. The Rice district is about 6 miles northwest of Grapevine. The Dewey mine in Grapevine, over which the excitement is created, is reported to be a large ledge or deposit, from 10 to 100 feet wide, with an extensive outcrop. They have bonded it to Colorado parties, who have put down a prospect shaft 100 feet on the ledge, and it is said to look well. The ore is base, very little free gold on surface and none below 20 feet. Its assays average, so an assayer tells me, about $17 a ton. If the parties who have the bond take it, it may make a good camp. Most of the country around Grapevine is located. In Banner things are progressing. L. N. Bailey is driving a crosscut tunnel from the base of the hill through the Kentuck S. ground, using power drills, and is now in 700 feet, with 250 feet to go before the first ledge is cut. The other mines on the slate belt, between Julian and Banner, are waiting to see how the Kentuck S. comes out. If successful they will all be actively worked next winter. The Elevada mine, formerly Holland's, is being worked by Colorado people, who are driving a crosscut tunnel 600 feet to cut the vein under the Holland shaft. They are more than half way in. The Ranchita mine was sold by C. J. Couts to Gail Borden, who worked it for a few months, put in five more stamps and made other improvements, then suspended work, only keeping the water out. The Ready Relief continues work as usual. At Julian the High Peak mine is being worked, using a 12-H. P. gasoline hoist. The Owens mine is being pumped out by Riverside parties with a view of buying. The Helvetia has been idle all summer, but report says it will start up again soon. In both Julian and Banner there is considerable work going on by single individuals and some very good ore is milled.

Banner, Cal., July 28, '99.

Negotiations that have been pending since the conclusion of the lawsuits that engulfed the Golden Cross mines were concluded last Monday at a conference between J. Chandler, I. Trumbo, J. Waller and G. J. Trumbo. The company has decided to add a cyanide plant of 1000 tons daily capacity to treat the tailings that have accumulated. The 140 stamps will be concentrated under one roof and space provided to add 60 or 100 stamps as soon as known ore bodies are opened.

Shasta.

Los Angeles interviews with Geo. Mitchell deny the recent report that W. A. Clark had bought of J. H. Rathbun the copper deposits eleven miles from Redding.

The sale of the Bully Hill mine has caused some excitement, and now there is a rush to Copper City. Nearly the entire townsite has been fenced with barbed wire by squatters, and the country is plastered with location notices. The De Lamar Co. is making arrangements for extensive development. It will erect smelters and build a branch road to connect with the Southern Pacific. Stores, saloons, hotels and all sorts of business houses are being started at Copper City, which was once before a flourishing village about '78-'79.

The cyanide plant at the National mine, constructed by S. P. Poland & Co., is completed. The tailings pile is connected by car track with the plant. The National has 7000 tons of tailings from the stamp mill, and this Mr. Poland will undertake to treat by the cyanide process.

Redding *Free Press*: The ore team road from the Sam Houston mine in Old Diggings to the Sacramento river has been finished. The ore will be carried across the river to the Keswick smelters by means of a bucket tramway. J. Morton, superintendent for San Francisco parties who have a lease on the mine, is sinking the shaft with the purpose of going down 500 feet. The ore averages $14 a ton.——A sale of a three-quarter interest in the Oro Fino mine was made Thursday by J. C. Frick to C. H. Behrens. The Oro Fino is a developed property which adjoins the Mount Shasta on the west. G. A. Schroter of Shasta owns a quarter interest. Messrs. Behrens and Schroter will work the property.

Shasta *Courier*: J. H. Holland, who owns the Dolly Varden ledge, has 4 feet of quartz in the shaft. An assay of the ore showed $54 60 to the ton. The ledge is on Gambler's gulch, on Middle creek.

Siskiyou.

Yreka *Journal*: In the Cherry Creek and Deadwood mining districts mining is dull, in consequence of the scarcity of water.——The new company working at the Nehrbass place

on Greenhorn, adjoining the Blue Gravel mine, has built framework for the hoisting and pumping machinery and run the pumps day and night. The bedrock is several feet deeper than at the Blue Gravel mine; the shaft is down 115 feet, with bedrock 15 feet lower——The Sheba mine at Patterson Creek is turning out well. The ten-stamp mill is in operation day and night.

Tuolumne.

The sinking at the Gerrymander at Sonora continues. A large vein, pitching west, has been encountered 180 feet from the surface—the present depth of the shaft.

The Deadhorse mine at Carters is reported looking well. On the 1600 level they are taking out high-grade ore. Supt. Corkill has built a cyanide plant at this property for the treatment of tailings and sulphides. The latter were formerly shipped to Angels in Calaveras county.

The Genoa M. & M. Co. of Sonora, capital stock $1,500,000, has been organized; directors, G. B. Gianelli, G. B. Ventre, F. Cavalero, W. L. Beal, C. F. Brusie.

Sonora *Democratic Banner*: Development work has been resumed on the Yosemite Gold Mines at Second Gorotte. A shaft is being sunk on the Dewey and rock milling from $50 to $60 per ton is being taken out. The Sampson is being tunneled to tap the ledge 200 feet deep. Milling and hoisting machinery will be put on the property. The mines are under the management of H. Argall.

Sonora *Union-Democrat*: At the Santa Ysabel mine, Quartz mountain, the 700 level in No. 1 shaft was reached this week, and sinking will be continued. Development is progressing at many points and ore is being extracted from drifts on the 400 and 500 levels. Sixty men are employed. A 200 H. P. electric hoist was bought recently.——The Longfellow mine at Big Oak Flat is yielding rich ore.——The main shaft in the Mack at Big Oak Flat is down 335 feet.——Work on the Big Oak mine at Big Oak Flat has been resumed. A new 30 H. P. engine has been placed in position.

Trinity.

W. Maguire is reported to have found rich ore on Union creek.

G. Carr is still taking out pay from the Yellow Rose.

Tulare.

Porterville *Enterprise*: Two shifts are working in the Homestake mine, near White river, owned by Grover & Peck.

COLORADO.

On Monday, the 31st ult., the State Board of Arbitration filed its report on the investigation of the smelter strike. The decision it reached is a compromise between the demands of the smeltermen and offers of the American Smelting & Refining Co. The board has fixed a wage schedule on the basis of an eight-hour day for the inside men and a ten-hour day for yard men. The wages recommended average 10% higher than those offered by the smelter managers. The board stipulates that in case of an agreement to work longer than eight hours, the men shall receive pay at the same ratio of wages as recommended for eight hours. The question of union or non-union labor is ignored, and this point is the only obstacle in the way of reopening the smelters, as the men pledged themselves to abide by the decision of the board, and it is believed that the managers will accept the solution of the problem offered by the arbitrators.

The operating committee of the American Smelting & Refining Co., at a meeting held Aug. 1st, decided not to reopen the smelters in Denver and Pueblo at the scale recommended by the State Board of Arbitration. The committee published a card in which it says: "The decision of the Board of Arbitration cannot be accepted by the American Smelting & Refining Co., because it is unreasonable and unjust. The Board has undertaken to arbitrarily interfere with industrial conditions in Colorado, in a way which cannot fail if persisted in to bring about great hardships to the industries already established and to surely prevent new industries from establishing themselves here." It is reported that the company will reopen the Omaha-Grant smelter next week if enough men can be found who will accept the wages offered. The smeltermen's union will post a guard around this smelter and endeavor to dissuade men from working there, as was successfully done at the Globe smelter last week.

BOULDER COUNTY.

S. P. Roy discovered copper ore near the intersection or Boulder, Gilpin and Jefferson counties, now Roy Center, eighteen years ago. Two years ago a man named Wagner opened a copper claim with a 60-foot shaft, a tunnel 50 feet long and an upraise from the tunnel. He has a vein 3 to 6 feet wide, which gives returns of $5 to $12 per ton in gold, 11% copper and from $2 to $6 in silver. This is at Benson, four miles from Roy Center, where Little Beaver creek empties into Coal creek. Mr. Roy has located and opened several claims, from one of which he has had several mill tests. One lot of 3000 pounds milled $5 per ton in gold. One lot of 1800 pounds smelting ore returned $33.20; another of 2300 pounds, $86.40; and one sack of selected ore ran $500 per ton; all these values were gold. The country rock is limestone. Many specimens show masses of copper glance, while others are full of free gold.

CHAFFEE COUNTY.

The Buena Vista smelter commenced operations July 27th, after a close down of forty days, owing to the breaking of the power dam. This will cause the Black Prince and other properties at Leadville to resume shipments. The Little George shaft has material suitable for this smelter, besides a breast of 700-ounce silver ore.

Idaho Springs *Gazette*: The Texas shaft is 125 feet deep and the ore is said to be improving. A plant of machinery has been ordered and will be put in place in a few days, when sinking and drifting will be resumed.——Mr. Ireland of Idaho Springs has his Silk Finish shaft down nearly 100 feet and a mill is being talked of.——The Old Stonewall is to resume work in a few days under the management of J. J. Smith.——Two shifts are driving the Sierra Nevada crosscut tunnel. This property is making water so fast that it is impossible to sink without machinery.

CLEAR CREEK COUNTY.

Denver *Republican*: C. Parrott has made a rich find on Chicago creek, where he opened into quartz which runs 300 ounces to the ton, with a percentage of copper. The chunks of quartz are larger than a man's head and filled with free gold.——The Roadside mine is putting in machinery, with the intention of sinking. The vein shows high-grade mineral wherever prospected along the surface and also in the shaft.——In the lower level of the Shafter mine, Mgr. Shepherd reports a wide body of smelting ore.——Drifting in the Quaker mine 250 feet north of the shaft, Mgr. Ward reports ore bodies on both walls. It will be stoped and hauled to the Wilkie mill for treatment.——Lessees working in the Extension mine have opened rich ore on the west side of the shaft. The streak shows the entire width and runs $200 to $300 per ton.

DOLORES COUNTY.

The mines of Rico district will continue on the eight-hour basis.

The Silver Swan tunnel at Rico is to be extended 400 feet to tap the ore body found in the Cowdry claim of the Silver Swan group.

EAGLE COUNTY.

A pump has been placed in the Johnson mine, on New York mountain, and the mine will be drained and opened by the time the new cyanide mill is completed.

In Red Mountain district J. Dewar has reopened an old claim on which he did work years ago. He recently visited Bromley and thought the ore there resembled that in his claim; this led him to reopen the caved tuntel. The vein was opened up and found to be 6 feet wide, carrying a pay streak 1 foot wide that assayed $75 in gold, silver and copper—about 6% to 10% in the latter value.

GILPIN COUNTY.

Central City *Register-Call*: Hedden & Son are operating on the twenty-acre tract owned by Kountze & Ashley of Denver, and have taken a contract to sink 150 feet. They have a 4-inch pay streak carrying assay values of $160 per ton.——Stephenson & Babcock are working in Beaver creek, and with sluice boxes are cleaning up, it is reported, $7 to $10 per day to the man.——It is reported that the Fort Logan property, south of Boulder creek and near the Barr ranch, has been sold. It was being worked by local parties under a lease and bond in the sum of $15,000. J. H. Kemp of Eldora is said to have made the sale.——New York parties have become interested in a tunnel site in lower Moon gulch, near the Taylor property. Mr. Austin is in charge, and it is reported that when the tunnel is fairly under way an air compressor will be put in.——The Golden Gulch M. Co. has purchased fourteen claims running from Travis gulch south toward the Gold Dirt and Perigo properties, the deal having been made by R. Duncan of Boulder. A crosscut tunnel has been started from Travis gulch and is now in 50 feet, and the company will put in an air compressor. They also intend to sink three shafts to the tunnel level. In this group are the Hancock and Garfield, patented claims. A 22 H. P. steam hoist is to be placed at the deep shaft. W. W. Olds is Gen. Mgr. and Supt. The company intends to erect a 20 rapid drop stamp mill with a daily dapacity of seventy-five tons.——Fifty men are at work at the Perigo, operated by the Tonawanda M. & Leasing Co. All work is being done under the leasing system.——A. G. Elliott is building a revolving mill of new design, below the Perigo mill, with the intention of treating the waste from that mill.

GUNNISON COUNTY.

A twenty-ton concentrator will soon be in operation on the Eureka mine at Crested Butte, which has 5000 tons of an old dump which averages $10 per ton in gold, silver, lead and copper.

The Keystone mill at Crested Butte, when finished, will handle one ton per hour and put five tons of ore into one ton of concentrates.

The smelter at Marble is receiving ore and will soon be blown in.

Gunnison *News*: The Woodard G. M. & M. Co. is working its property at Spencer. Three carloads of machinery and supplies have been received, and the machinery is being put up and buildings are being erected. The shaft of the Tomboy lode, one of the group owned by the company, is being sunk.

Denver *Republican*: The Granite Mountain G. M. Co., in the Tomichi district, will have a pyritic smelter of the capacity of 100 tons per day in operation by the first of September. The grading and foundation work for the smelter has been completed. The mine is developed by a tunnel which has cut a number of veins, most of which carry ore. The success of the initial plant and the further development of mine will be followed by the erection of a duplicate plant, the power having been purchased with that end in view.

HINSDALE COUNTY.

Denver *Republican*: Two feet of rich ore shows in the Copper Hill mine, on Copper mountain. Under the old management ore running 1200 ounces silver and 30% copper was shipped, the lowest grade running 100 ounces silver and 20% copper.——The Fleece mill will soon be completed, employing 100 more men in mill and mine.——The Reynolds tunnel will cut the Vermont and Ocean Wave veins in depth and make a heavy production.——The Lellie tunnel is nearing the vein, and, when completed, will employ seventy-five more men.

LAKE COUNTY.

Leadville *Miner*: The recent discoveries on Breece and Little Ellen hills have caused a lively interest in undeveloped land on these hills and Evans gulch. The Guggenheim exploration syndicate is considering the purchase of ground, believed to be the ninety acres of patented ground embraced in the Diamond group, owned by J. H. Goodman of Leadville.——The owners of the Great Hopes, Nellie, Nora, Kathleen and other patented ground in Evans gulch believed to be on the ore chute are entertaining propositions from responsible parties for long lease, and bond offers have been made by responsible parties to the English owners of the New Elkhorn. All the drifts now being run at the Fortune mine are in ore. This, together with the way the Dollie B., Resurrection and New Monarch mines are opening, will continue to stimulate development in this vicinity.——The Sierra Nevada, Wells and Moyer, on the placer ground of the Iron-Silver Co., are not shipping iron or lead sulphides. The management is breaking sixty-five tons daily of zinc sulphides which go to Antwerp, Belgium, and conducting development work with the eight-hour system. In stoping the heretofore valueless zinc ore, the development of the iron and lead sulphide bodies is kept up. The company mill is being fitted up for work.

MINERAL COUNTY.

Creede *Candle*: G. Davis, Pres. United Mines Co., has started up their property. H. C. Rowley has the management of the mines, and the first work will be to retimber the shaft and pump out the water, when the Big Kanawah tunnel will be commenced to make connections with the Nelson tunnel.——Last week the Punxsutawney was bonded and leased to B. F. Thomas for $8000 by Segar & Terrel, the locators.——The Nelson tunnel has passed the Last Chance shaft and the Last Chance people are talking of making a connection between the two.——The Revenue Tunnel Co.'s new plant is erected and Mgr. Taff will start the compressors and put on a large force the first of August.

OURAY COUNTY.

The American mine at Ouray is shipping ore averaging fifteen ounces gold per ton and will produce $75,000 this year. The owners of the mine are lessees of the O. & N. tunnel and have taken $24,000 in gold from it this year.

The Humboldt mine at Ouray has been reopened by F. Farrish. Humboldt ore averages 200 ounces silver and $10 per ton in gold. It was one of the largest shippers in western Colorado eight years ago.

Ouray *Herald*: The miners of Ouray county will demand a continuance of the eight-hour day, which has been in force for some time.

SUMMIT COUNTY.

Breckenridge *Journal*: The Gambrinus lode, on the Little Georgia gulch side of Farncomb hill, shows gold, silver and lead. A test of the ore made at the Kilton sampler was satisfactory.——The Gold Dust leasers have made a good shipment.

TELLER COUNTY.

On the school section near Grassy, and on properties in the vicinity, shipments will soon recommence. The Colorado Midland Co., operating a lease on the school section, struck the first ore in this section last year. For several months it maintained a steady production and might be doing so now but for the fact that the shaft could not be deepened without being straightened. Instead of doing this the company put down a new working shaft farther up the hill. The old shaft has been abandoned and the machinery removed to the new location. The shaft is to be put down 250 feet before levels are run. The shaft is down 195 feet.

The Little Daisy of the Golden Hub Co., located in this section, is waiting for hoisting machinery. The shaft is down 118 feet.

The Orphan Bell G. M. Co.'s four claims—Orphan 1 and 2 and Ida Bell 1 and 2—comprising twenty acres on Bull hill, Cripple Creek district, have been bought by Colorado Springs capitalists for $210,000 cash.

Recently A. L. Dickerman of Boston, representing the Calumet & Hecla Co., bought five claims on an option secured a year ago for $85,000.

The Orphan Bell properties have shipped $350,000. The Arrow and the Orphan companies, each capitalized for $1,250,000, will be organized to operate the property.

N. Wilson, who recently took charge of the Dante on Bull Hill, outlined the work which has led to the recent discoveries in the property. One of the conditions of Mr. Wilson's engagement with the Dante Co. was the agreement that the property should be re-equipped. A new and larger hoist will be bought, new boilers will be put in place and air compressor and drills installed.

The Johnson shaft is down 450 feet, and it is the purpose to sink for another level, probably at 550 feet. Some crosscutting from the 450-foot level will also be done to cut the ore body found in the Close Shave lease, the new ore body opened up in the Whisper lease and the new one which is thought to be pitching in from the Gold Sovereign.

IDAHO.

What promises to be a gold district has been discovered up the Boise river, thirty-five miles from Boise City. Two ledges were opened last week on Badger creek from which rich assays were taken. Four more parallel ledges have since been found. One of these was struck July 30th. It was uncovered some time ago by a break in the flume of the Twin Springs Placer Co., but it was not observed until prospecting for lead was begun as a result of the finds of last week. This vein is 22 feet wide and shows free gold in considerable quantities.

MONTANA.

T. Holman, assistant electrician at the Rarus mine, was instantly killed July 28th while putting a carbon into an arc light. He held on to the frame of the light as he stepped from a board to the damp earth, thus establishing a ground connection.

Butte *Inter-Mountain*: J. A. Coram, H. A. Root and other capitalists of Boston have secured control of the Gem mines, north of the Speculator, and, it is said, will begin work under the direction of I. N. Merrill, who has had charge of the operation of the Cochiti mine, in New Mexico. The Gem mine was last operated by Frank & Whitmore.——It is reported in Butte that the Speculator mine, owned by J. Creighton of Omaha and the Largey estate, has been sold to the Amalgamated Copper Co., the purchase price being in the neighborhood of $1,000,000. It is said there is three-quarters of a million dollars worth of ore in sight. New machinery is being placed on the ground.

Inter-Mountain: A. Marcille, J. Chattelle and others have leased to J. Hore of Butte, for two years, the Black Rock claim in the Zosel district. The Black Rock has produced some rich ore. It adjoins the Emery on the west.

NEVADA.

A committee which has had the matter in charge has about decided to contract with the Truckee River General Electric Co. for electrical power for the Comstock mines at Virginia City. The proposition is to have the T. R. G. E. Co. furnish 5000 H. P. from a plant at Floriston, Cal., at $5 per H. P. per month, $8 for 1500 H. P. or less. The mining companies in the agreement are to give a $100,000 bonus, to be paid back by the electric company in rebates, the bonus to be secured by a bond. The electric company is to erect two wires; in case of breakage, it is to supply power from the paper mill plant at Floriston. Work is to be begun as soon as the contract outlined above is signed.

Mgr. Ross has sent the following telegram to the office in San Francisco, concerning pumping operations at the C. & C. shaft:

VIRGINIA, Nev., Aug. 3, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 16 feet 6 inches below the 1950-foot level station. The water has risen and fallen during the past twenty-four hours, while the elevator was working continuously. G. McM. Ross.

Pioche *Record*: A new strike at Stateline has been made at the Ophir group, samples showing 1458 ounces silver, 2.60% copper and $8 60 per ton in gold. The ore was found below the 150-foot level. The Ophir is now held on an option by R. J. Evans of Pioche.——C. L. Roe has sold his interest in the Vesuvius mine to Addison Bybee for $10,000. Mr. Bybee has also bonded the Challenge mine for $20,000. This mine has a large body of low-grade lead and a good percentage of copper. There are thirty men at work in the old camp. Out of eight claims being worked, all are producing copper ore that runs from 25% to 40%, first-class; second-class from 9% to 17% copper.

Randsburg *Miner*: At Searchlight, near the California line, the Good Hope has a shaft 130 feet deep. G. F. Colton, the owner, is taking out some good ore, mostly free milling. It is hauled by team twenty-five miles to Manvel, the end of the California Eastern R. R., then down to Blake thirty miles before it reaches the main line of Santa Fe, and none but the richest ores will bear the cost of transportation and leave anything for the owners.

NEW MEXICO.

The Arimer Con. Copper Co., with capital of $5,000,000, has been incorporated for the purpose of operating mines in Arizona and New Mexico. The incorporators are C. N. King, F. R. Vanderhoof, F. Golderbarn, J. R. Mulvaney, all of Jersey City, N. J.

The Golden Standard mine and machinery at Golden have been sold to J. R. Phillips of Denver by R. M. Carey and associates for $35,000.

OREGON.

The Twin Springs M. Co. of Idaho, which owns the Deer Lodge mine at the head of Rock creek, sixteen miles west of Baker City, after a shut down since last February on account of deep snow is to resume work. The mine is situated on the North Pole and E. & E. lode, crossing the mountains at the head of Rock creek, and was purchased last year by the Twin Springs Co. from Andy Hansen for $100,000, of which $15,000 was paid.

The Weatherby Bonanza G. M. Co. in Chicken district has declared a dividend of $1562.50 within a month of its incorporation. The funds came from a run of 935 tons of ore in the bins when the company bought the mine in June.

Boise *Statesman*: The Iron Dyke mine, belonging to the Northwest Copper Co., has been shut down, with the employes in possession. For three months there has not been a pay day and the men employed in the mine concluded to take possession of the property until paid. Guards were placed over the property day and night. For an extra precaution the men drilled a hole in rock near the mine and loaded it. This they intend to touch off, if attempt is made by the management to regain possession as a signal to the rest to fall in line.——The work on the Ox Bow tunnel is practically shut down, as the contractors are in arrears in the payment of their men.

UTAH.

The United States Mining Company, which has over $3,000,000 invested in Bingham properties, on the 1st inst. bought 22,000 of the 30,000 shares in the Centennial-Eureka mine in Tintic for $1,540,000. The mine has paid nearly $3,000,000 in dividends, all the proceeds of high-class ore. Second-grade ore has been thrown on the dump, as the company never built a mill.

Salt Lake *Tribune*: Reports from Bingham indicate a strike in the Ophir, owned by W. Robertson, assays from the ore showing 51% lead and gold and silver values from $10 to $15 per ton. It has been prospected for eight years. J. Aylward has charge.——A. F. Holden sold to the United States M. Co. the

McGinnis, a portion of the Cluster, the 1889 and After Thought mining claims at Bingham. The ground adjoins the main properties embraced in the United States Co.'s domain.—The contract for the enlargement of the mill of the Daisy M. Co., West Dip, has been let to J. Dederich. The plans provide for the addition of four leaching tanks, each of a capacity of 150 tons, together with new elevators and conveyors, the entire work entailing an expenditure of $10,000. With the enlargement, the plant will have a daily capacity of 250 tons.—The Boss Tweed M. Co. will straighten the shaft, which will be raised above the tunnel level to the surface. They will also purchase machinery.—Chief Sowawic has entered a protest against the Raven M. Co., to which an exclusive permit to mine elaterite and other hydrocarbons on the Uintah reservation was given by the Indians. The Chief claims that the Indians have derived no benefit from the operations of the company. J. H. McConnell, Gen. Mgr. Raven M. Co., says the complaint that Chief Sowawic lodges against his company is nothing but the ravings of an old man. The few whites who were originally opposed to the concession abandoned their opposition on the assurance that several hundred miners would be provided with employment. The men employed in the mines, it is claimed, do not number a dozen. The trouble that Sowawic has started threatens to grow.

WASHINGTON.

Northport *News*: On Galena mountain, in Flat Creek camp, the Globe Gold Field M. Co. has awarded a contract to J. Downing to extend the present tunnel 50 feet. Seven feet of ore matter now appears in the face of the tunnel. S. H. Whitney is Supt.

FOREIGN.

BRITISH COLUMBIA.

Victoria *Times*: The force on the Old Gold mine, Trout creek, is being increased and the property is improving.—Work was started August 1st on 200 feet of tunnel on the Guinea Gold & Scottish Canadian Co.'s properties.—A shaft sunk on the Klondike group has exposed a lead 4 feet in width which contains 6 inches of galena ore which runs 180 ounces silver, 50% lead and $4 gold.—At Rossland a change has been made in the management of the War Eagle and Centre Star mines.—J. B. Hastings has been appointed consulting engineer and resident director of several mining companies controlled by the Gooderham-Blackstock syndicate in British Columbia. Mr. E. B. Kirby of Denver, Colorado, has been appointed to succeed Mr. Hastings as general manager of the War Eagle and Centre Star mines.—At Nelson it is reported that not a mine has been closed down owing to the eight-hour law. They are paying $3.50 for an eight-hour day and would take on more men if they could get them.

Nelson *Miner*: On the Apex, situated on Big Four Mountain on Hidden creek, seven miles from the railroad, the ledge is in granite and carries manganese, iron and copper pyrites. The ledge runs from 4½ to 7 feet in width. Assays show copper $67.26, silver 60 cents, with traces of gold.

MEXICO.

Two Republics: The first shipment of ore from Guerrero del Oro (Golden Guerrero) arrived in Mexico and consists of seven tons and is followed by three more. In addition to this Professor Niven has 500 pounds of specimens, which have also arrived. These specimens are taken from the different mines in the Otitlan region of Guerrero. In nearly every case the specimens show free gold.

SOUTH AFRICA.

The total output of gold in the Transvaal for June amounted to 467,272½ ounces, an increase as against the previous month of 819¼. The new producers are Ferreira Deep, Roodepoort Central Deep and Lancaster West.

Personal.

H. BRATNOBER is in Australia.

VERNER Z. REED has returned to Denver, Colo., from London.

L. C. TRENT has returned from London to Salt Lake City, Utah.

RAPHAEL PUMPELLY is prospecting a mineral tract near Idaho Springs, Colo.

LOUIS JANIN AND W. S. KEYES have returned to San Francisco from Butte, Mont.

LEONARD THOMAS is Supt. of the Cambrian M. & M. Co., now operating near Coloma, Cal.

H. Z. OSBORNE of Los Angeles, Cal., is examining mining property in Trinity county, Cal.

WALTER KNIGHT is the new Supt. of the Marshal mine, San Andreas, Cal., vice J. F. Clapp.

W. A. CLARK of Montana is inspecting the United Verde copper property at Jerome, Arizona.

R. H. HERRON has returned to Los Angeles, Cal., from an examination of oil-bearing territory in Colusa county, Cal.

H. A. KELLAR, who built the furnaces at Keswick, Cal., has returned from Salt Lake City, Utah, to San Francisco.

N. S. WIGHT has returned to San Francisco after an extended series of successful mining transactions in Mexico and Arizona.

ROY D. HUNTER, representing the Sullivan Machinery Co. of Chicago, has returned to Denver, Colo., from Salt Lake City.

J. H. EARLE, formerly Supt. for the Mammoth, Utah, Co., has accepted a similar position with the Dalton & Lark at Bingham.

V. M. CLEMENT is in Bingham, Utah, having returned from London July 28. From Bingham he goes to the Cœur d'Alenes, Idaho.

CARL VON REISCHACH, E. M., Mgr. of gold mines near Delta, Shasta county, Cal., is in San Francisco on business. He was formerly Mgr. of mines in Mexico and Chile, and more recently with the Golden Gate mine of Grass Valley, Cal.

CAPT. THOS. MEIN is the president of the Mariposa Commercial Co, that will work a portion of the "Fremont Grant" in Mariposa county, Cal.

N. WILSON, formerly Supt. of the Moon-Anchor mine at Cripple Creek, Colo., has taken charge of the Dante mine on Bull hill, Cripple Creek.

JOHN HEINRICH AND C. BRUNER of the Mercur, Utah, mine, have gone to Grant county, Oregon, to inspect the May Queen, in which they are interested.

PAUL JOHNSON has about completed his Madera, Cal., engagement and goes to Greenwood, B. C., to build and operate smelting works for the B. C. Copper Co.

PH. DEIDESHEIMER returned to San Francisco the 1st inst. from a trip to Lone Pine, Inyo county, Cal., near which place he made an examination of mines that had not been entered for twenty years.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JULY 25, 1899.

629,649.—MATCH SAFE—J. Bond, Coulterville, Cal.
629,499.—TREATING HIDES—J. R. and J. S. Brown, Alameda, Cal.
629,515.—VESSEL COVER—B. G. Call, S. F.
629,742.—SELF-DRAINING VESSEL—Helen J. Carden, Bakersfield, Cal.
629,757.—CORRECTING COMPASS ERRORS—J. Christensen, S. F.
629,661.—PEW ROPE AND LOCK—Clark & Watson, S. F.
629,570.—CHAIN PROPELLER—L. Kohn, Oakland, Cal.
629,452.—WHEELED SCRAPER—G. W. Lovejoy, Tehachapi, Cal.
629,581.—CARBURETOR—F. L. Martenetti, Chico, Cal.
629,460.—CANE AND UMBRELLA—J. R. Nagell, Everett, Wash.
629,461.—POWER TRANSMITTER—R. F. Nichols, Altura, Cal.
629,602.—ELEVATOR—R. H. Postlethwaite, S. F.
629,523.—BOX FASTENER AND SEAL—W. C. Rarig, S. F.
629,701.—GAS GENERATOR—J. M. Schofield, Stockton, Cal.
627,474.—HARROW—W. Seckler, Corvallis, Or.
629,725.—WATER GATE—P. K. Shaffer, Redlands, Cal.
629,406.—LAMP HANGER—Thorp & Normart, Fresno, Cal.
31,393.—DESIGN FOR BANDAGE—D. D. McClure, Portland, Or.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOX FASTENERS AND SEALS.—W. C. Rarig, San Francisco, Cal. No. 629,523. Dated July 25, 1899. This invention relates to a device which is especially designed for the fastening and sealing of boxes and similar containers. It consists of two plates, one fixed to the box having an upwardly projecting free end with a beveled lug or lugs formed upon said end, and the other fixed to the cover of the box and movable therewith approximately in the plane of the upper end of the first-named plate, said movable plate being slidable over the companion plate, and having an opening adapted to engage the lugs of the lower plate. A tongue is formed within said opening which acts as a guide for the locking lugs and has a fastener to keep them in place after engagement. In conjunction with this a destructible seal is employed with means for enclosing it between the plates, said plates having openings through which the seal is exposed when they are interlocked. The opening and separation of the fastening destroys the seal in every case.

DEVICE FOR CORRECTING COMPASS ERRORS.—Jorgen Christensen, San Francisco, Cal. No. 629,757. Dated July 25, 1899. This invention relates to an apparatus which is designed for the correction of compass errors, such as deviation which may occur either by reason of masses of iron about the vessel or its cargo or from other source, and the device is also designed to obtain accurate bearings of or from any terrestrial object or celestial body. It consists of a counterbalanced suspended compass card turnable upon the central point and a surrounding ring within which it is suspended, said ring being also suspended in a compass bowl and having an indicator in line with the ship's head. A central disk is pivoted upon the compass plate and is turnable independently thereof. Arms project radially in opposite directions from the disk and have central radial lines. A light deflector is pivoted at right angles with said arms and turnable about its pivots and a vertical bisecting line is marked upon the deflector to coincide with the lines upon the arms. A shadow pin is set vertically upon the arm in front of the deflector and coincident with the bisecting line thereof.

Recently Declared Mining Dividends.

Weatherby Bonanza G. M. Co., Washington; dividend No. 1, ⅛ of 1 cent per share, $1562; Aug. 1.

Boston Get-There Zinc Co., Missouri; July dividend, 1%; payable Aug. 10.

Swansea M. Co., Utah; dividend No. 35, $5000; payable Aug. 10. Total $165,000.

Boston-Providence Zinc Co., monthly dividend, ⅛ of 1% on preferred stock and quarterly dividend of 1½% on common; Aug. 4.

Mammoth, Utah, $40,000; Aug. 1.

Republic, Washington, $35,000; payable Aug. 15.

Franklin Copper Co., Mich., semi-annual dividend, $8; Aug. 1.

Commercial Paragraphs.

THE Union Sampling Works, Denver, Colo., have been sold to H. E. Woods, an assayer of that city.

THE Rand Drill Co. are shipping air compressors, steel for drills and rubber hose to Clarkson & Co., Vladivostock, Siberia.

THE Westinghouse Electric & Manufacturing Co. of Pittsburg, Pa., are to build works at Manchester, England, and employ 5000 men.

A CONTROLLING INTEREST in the Stanley Electric Manufacturing Co. has been bought by the Sprague Electric & Elevator Co. for $150 per share.

THE Stillwell-Bierce & Smith-Valle Co., Dayton, O., have a contract for four turbine wheels for the Virginia Electrical Railway & Development Co. The price is about $20,000.

THE Denver agency of the Jeanesville Iron Works Co. reports sale to the Sun & Moon mine, Idaho Springs, of a duplex station pump; to the Bassick gold mines, Silver Cliff, a large station pump; to the Northern Coal Co. a station pump of 500 gallons capacity and to the Bankers mine, Leadville, Colo., a No. 7 sinker.

A NEW centrifugal concentrator and gold separating machine, manufactured by the Staahlgren Mineral Extracting Co. of San Francisco, has recently been tested on the ruby sand of Latuya bay on the Alaska coast. The experiment was conducted by Karl Staahlgren, the inventor of the machine, and it is claimed gave such satisfactory results that four additional concentrators will be shipped to the same point by the next steamer.

THE entrance examinations for the Massachusetts Institute of Technology have been held this year at the following points: Albany, N. Y.; Boston, Mass.; Buffalo, N. Y.; Chicago, Ill.; Cincinnati, O.; Cleveland, O.; Concord, N. H.; Denver, Colo.; Detroit, Mich.; Exeter, N. H.; Indianapolis, Ind.; Kansas City, Mo.; Louisville, Ky.; Manlius, N. Y.; New York, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; Portland, Me.; Poughkeepsie, N. Y.; St. Louis, Mo.; St. Paul, Minn.; Springfield, Mass.; and Washington, D. C. The total registration, 633, is seventy-eight more than last year, and the largest in the history of the Institute. Of these, 261 are preliminary applications for admission in 1900. A continually increasing proportion of applicants divide their examinations between two successive years. Entrance examinations are also held in Boston in September.

A GOOD scheme recently noticed and one which commends itself from its thoroughly practical character is the reading room which Irving & Co., the Los Angeles assayers, maintain as a regular feature of their business. The sign at the door reads "Mining Camp," and once within, the man interested in mining finds at his disposal files of all the latest mining journals, writing material and other conveniences. Along one entire wall is arranged a series of bins which are used free of charge for the display of ores, with the information necessary. The bullion buying feature of this firm's business is one of the surprising things about it, and nothing shows more clearly the advance which southern California has recently made in gold mining. Mr. Irving states that business is at present somewhat quiet, pertinently stating that "any man is a fool to stay out on the desert at this time of the year who does not have to." Their facilities for proper handling of all kinds of ore are unusually complete.

THE Denver Engineering Works Co. report several carloads of machinery already shipped to the two mills they are building for the Mountain Pride G. M. Co. and the Ault-Wiborg Co., in the vicinity of Breckenridge, Colo. Both of these mills are well advanced in construction and when finished will represent the modern type of concentrating mills in the State. The Mountain Pride mill will be operated by steam power and the Ault-Wiborg by electric. The Denver Engineering Works are now erecting at their works two pyritic smelting furnaces, for which they have recently received orders; a large traveling crane has been constructed especially for the purpose of putting these furnaces together before shipment, to insure that everything will go together properly. One of these furnaces will be erected in Leadville and the other near Atlanta, Ga. The total shipment to Georgia will comprise a fair-sized trainload. This company is also building a sampling plant, to be operated in conjunction with the Georgia smelter. Ten carloads of 16x36-inch Denver crushing rolls have just been shipped to Cripple Creek, for the large mill now being built by the Economic Gold Extraction Co. The demand for the Cammett concentrators built by this company has increased to such an extent that they have been obliged to enlarge their facilities for turning out these tables. Inquiries are received from all over the world. This company is making a specialty of these tables and are pushing them very rapidly into the market, where their success seems now well assured. The three 150 H. P. double drum electric hoists which they are building for the British-American Corporation at Rossland, B. C., are being put together at their works and will be set in operation and put under test previous to shipment. The demand for Denver Engineering Works machinery is now so large as to make it difficult to keep up with the work, and orders have accordingly been placed with several of the best machine tool companies for a new planer, drill press, boring machine and gear cutter, to cost approximately $15,000.

Industrial Notes.

—Wyoming's coal mines are producing 22,000 tons per day.

—Port Townsend, Wash., is shipping pig iron to San Francisco.

—Wages of unskilled labor in California have advanced 25% in the past ninety days.

—Jan. 1st, 1900, is now fixed as the date of completion of the Sierra Railroad to Angels, Cal.

—Los Angeles, Cal., men will build an electric railway between Santa Monica and Redondo.

—At Seattle, Wash., July 31st, the Snoqualmie Falls Power Co. started its machinery.

—The Northern Pacific Railroad Co. will build down the north bank of the Columbia to Portland, Or.

—The Standard Oil Co. is being fought by the territorial government in New Mexico, where the retail price of oil is 30 cts. per gal.

—The Humboldt, Nev., sulphur mines run 70% sulphur. The product in San Francisco is worth $31 per ton. About 1000 tons are annually shipped.

—The Mexican Mineral Railway Co. has been reorganized, and the new corporation proposes to immediately extend the line southward from Monterey to the City of Mexico.

—The '99 meeting of the National Irrigation Congress will be held at Missoula, Montana, September 25th, 26th and 27th. State, municipal and scientific organizations are entitled to send delegates.

—The Mexican Lead Co., with an authorized capital of $7,000,000, was incorporated at Trenton, N. J., this week, to operate lead and other mines in the Republic of Mexico. Capital stock $1,200,000 preferred, and $5,750,000 common.

—At Salt Lake, Utah, this week, the Central Pacific Railway Co. was incorporated to acquire the railroad land, land grants and franchises of the Central Pacific Railroad. The capital of the corporation is placed at $87,000,000. Thos. Marshall of Utah is named as president.

—The Standard Electric Co. proposes to establish three power plants—one in Oakland, one in San Jose, one in San Francisco, Cal.—then to distribute electrical power brought from the generators at Mokelumne Hill. It is stated that the company's water supply can develop 35,000 H. P.

—Work was begun this week by the Union Iron Works, San Francisco, on an unusually large merchant steamship for the American-Hawaiian S. S. Co, to carry freight from Honolulu to New York via San Francisco. The vessel will be 415 feet long, 51 feet beam, with a displacement of 12,000 tons.

—The American syndicate, of which the late Calvin S. Brice was the leading spirit, holds a concession from the Chinese Government for the construction of a railroad from Hankow to Canton, and a similar combination of British capitalists owns the right of constructing a line from Canton to Kowloon. For their common advantage these two syndicates have now entered into an alliance for the promotion and protection of their interests.

—The Panama canal is about one-fifth completed; the engineers call for a further expenditure of $100,000,000 before vessels may go from sea to sea. The workmen are negroes from Jamaica and other British colonies in the West Indies, who have been found to endure the climate better than any others, although they would be far from satisfactory as laborers to an American contractor. They are paid $1 a day in Colombian silver, which is worth about 40 cents in U. S. gold.

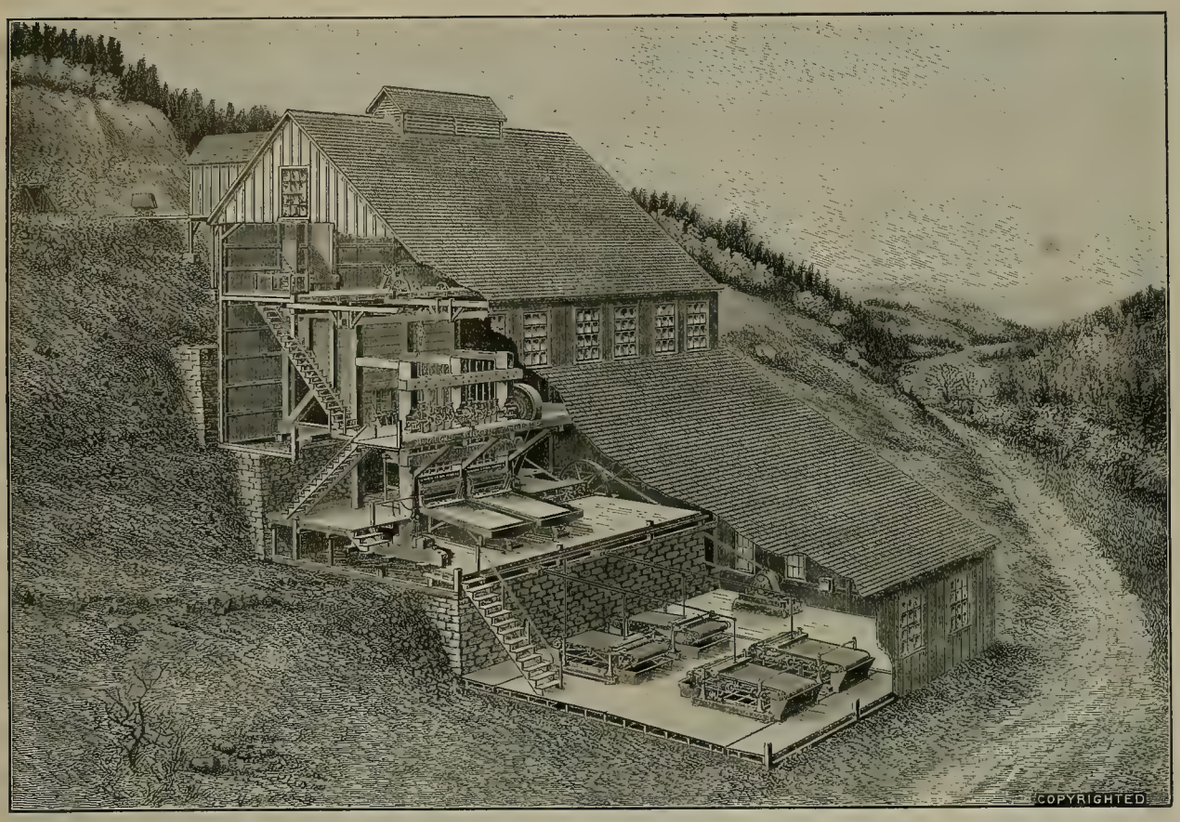
—The total increase in the exports of manufactures of the United States during the fiscal year just ended, as shown by the figures of the Treasury Bureau of Statistics, is in round numbers $48,000,000, and of this increase $33,000,000 is in manufactures of iron and steel. The total exports of iron and steel and manufactures thereof in the fiscal year '99 were $93,715,951, against $70,406,885 in '98. The exports of manufactures of iron and steel in '99 were more than double those of '96, and more than three times as much as those of '94.

—On July 17th the new treaty between Japan and the United States, negotiated in 1884 by Secretary Gresham, became operative, opening the entire interior of Japan to foreign residents and trade. Hitherto there were only five treaty ports—Yokohama, Nagasaki, Kobe, Hakodadi and Nigata. In these places foreigners have been able to live, to purchase property and to trade; but outside of these they could not even travel without a special permit. These five places are an insignificant part of Japan. Henceforth the entire interior of the Empire, with its populous cities and inviting fields of industry, is thrown open to foreigners. They may live anywhere, engage in any kind of business, and will be assured of protection.

—At the Salt Lake meeting of the subcommittee of the Industrial Commission this week, ex-Congressman C. E. Allen of the Centennial-Eureka mine said his mine used machinery, and he thought everybody connected with the mine was benefited by it. He did not think the Utah mine owners could afford to pay Colorado prices for mining, because the ore there is of a lower grade. He thought the Utah smelters had been benefited to some extent by the shutdown of the Colorado smelters. R. C. Chambers, Supt. Ontario mine, said that the mining interests of Utah were in a thriving condition. He was in favor of an eight-hour law and was fearful of the results of trusts. He thought the smelting trust was a stock jobbing scheme, and that the capital represented by the trust was more than the plants were worth.

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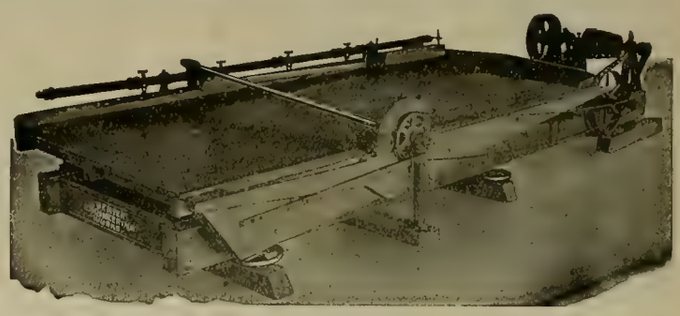
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THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

The perfect vanner motion given to the pulp by our head motion, together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes.

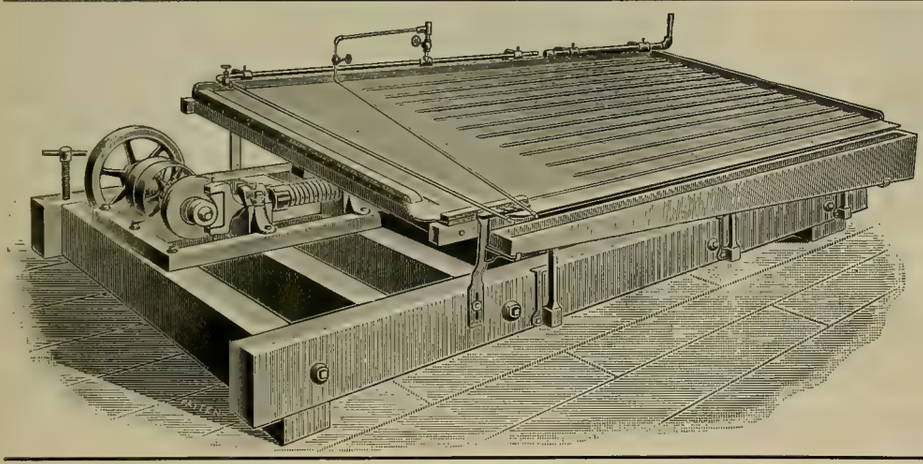
The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings.



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WITHOUT LOSS IN TAILINGS.

MAKES HIGH PRODUCT. | CAPACITY FROM 5 TO 10 STAMPS.

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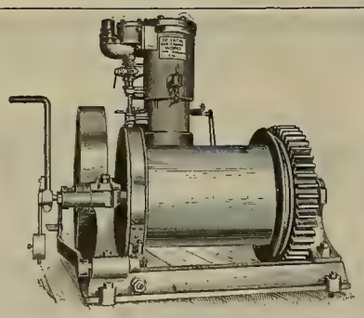
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Will hoist 3500 lbs. at 700 feet per minute. Made in sections not exceeding 1000 lbs. each.....$1400

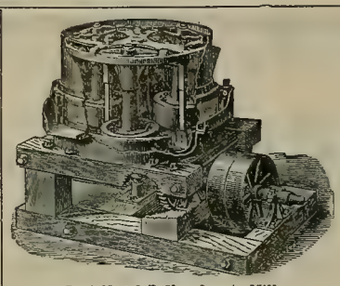
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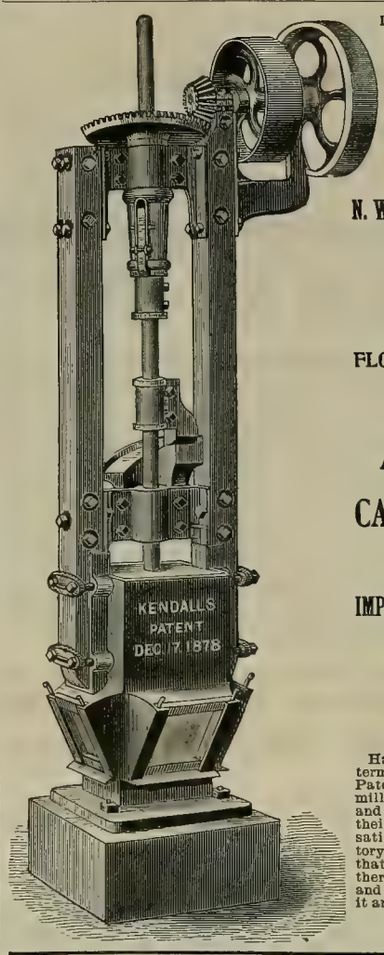
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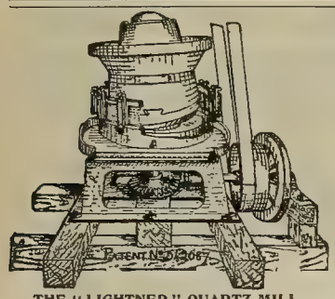
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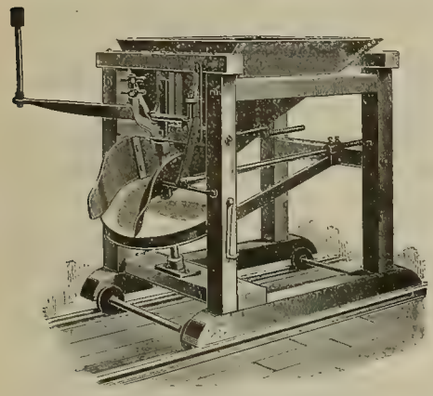
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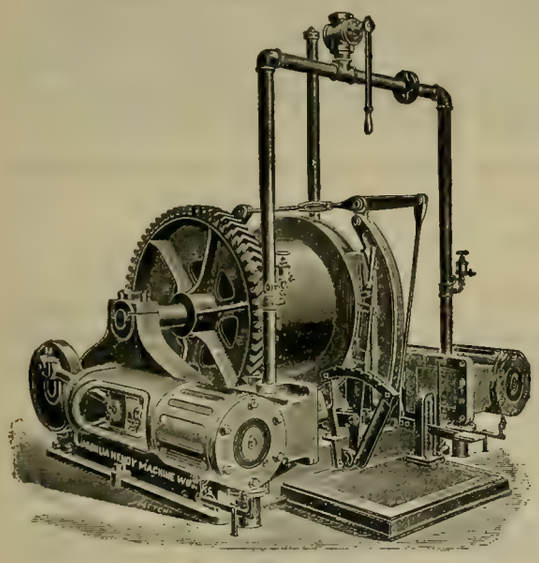
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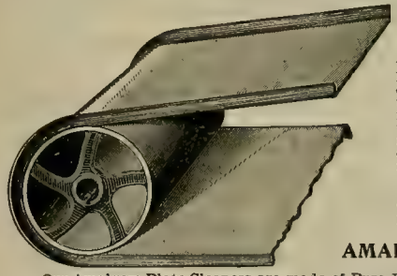
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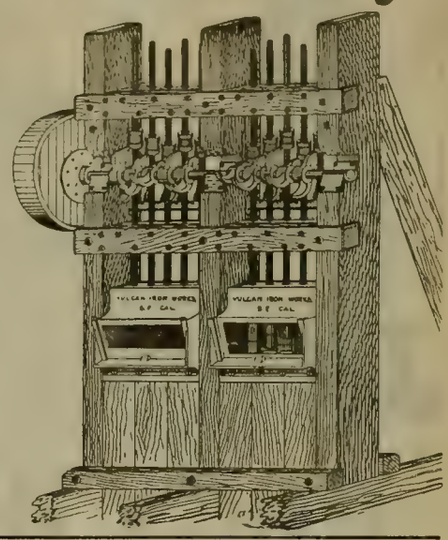
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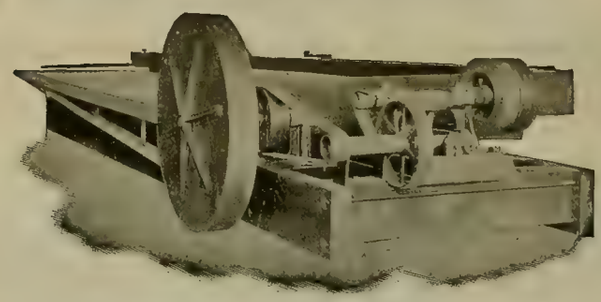
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One of these machines will take the place of two or three belt concentrators of any style and do very much better work.

We furnish superior Machinery and erect Stamp Mills, Hoisting and Pumping Works operated by Steam or Water Motors. Complete Concentrating and Smelting Plants for the concentration and recovery of gold, silver, copper and lead. Improved Power Drills and Air Compressors, Wire Rope Tramways, etc.

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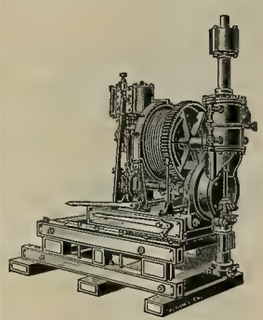
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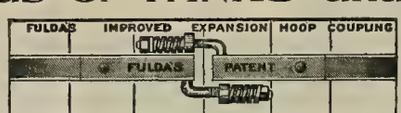
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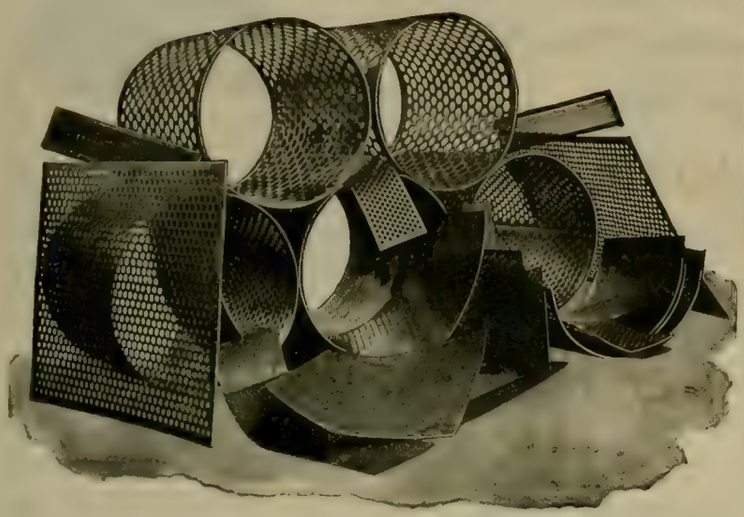
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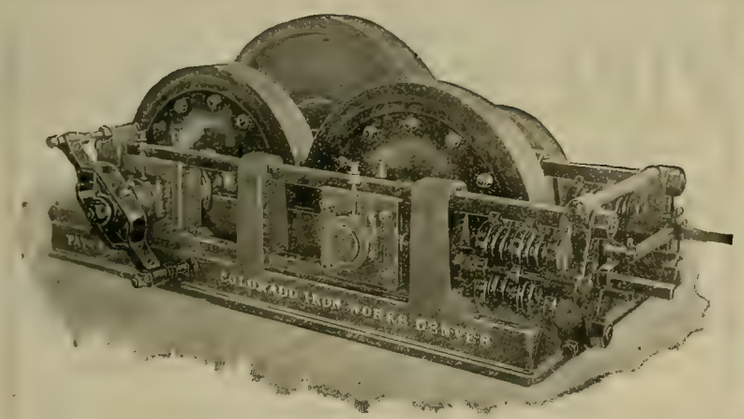
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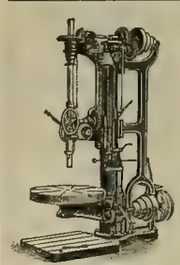
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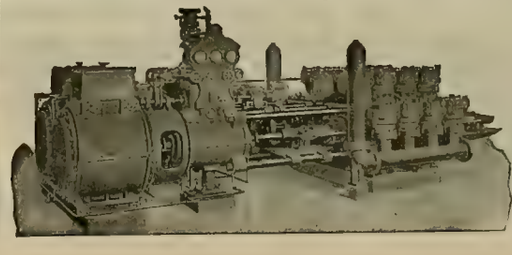
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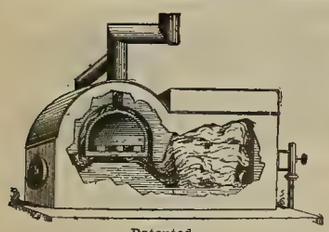

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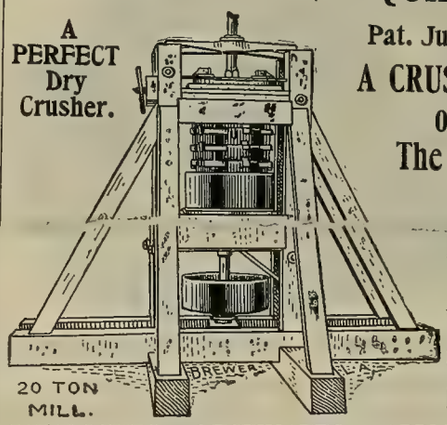
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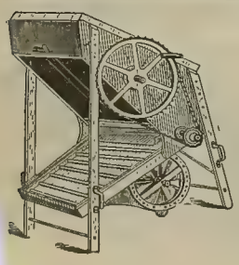
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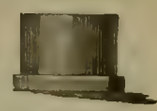
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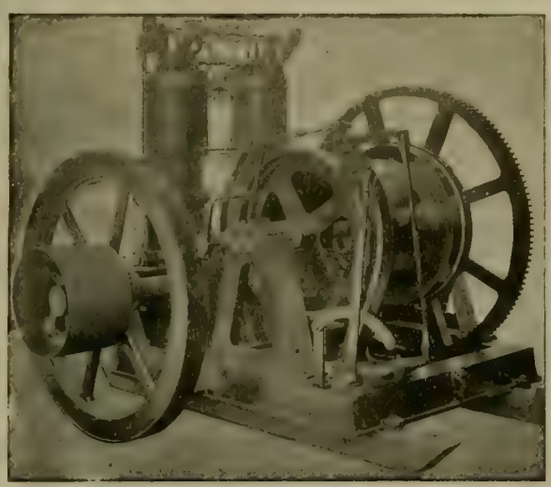



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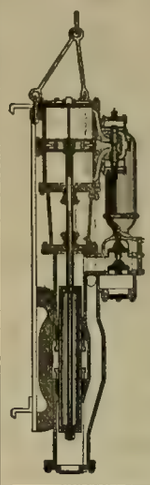
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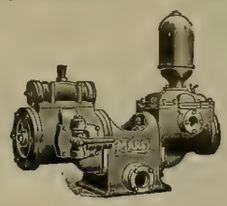
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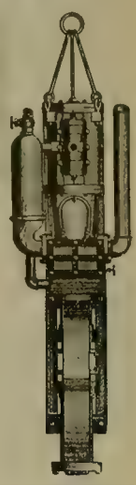
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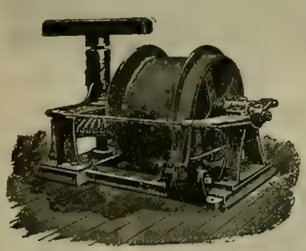
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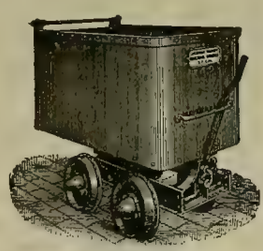
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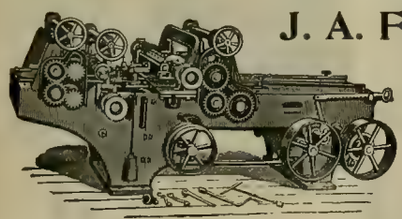
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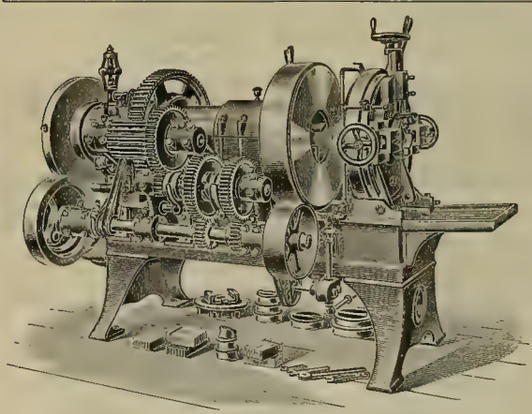
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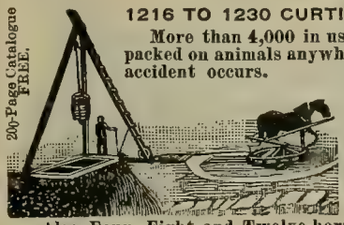


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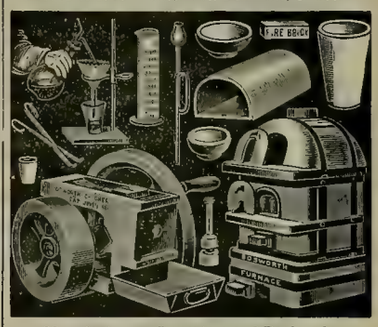
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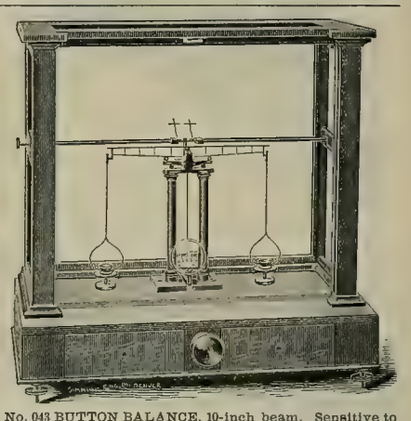
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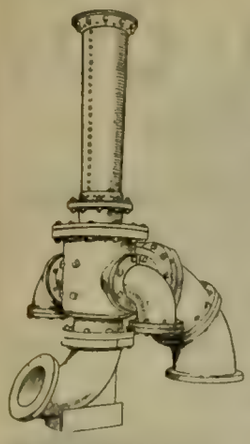


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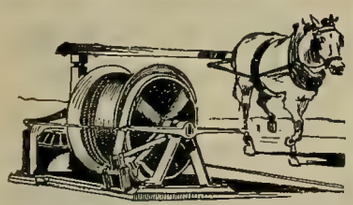
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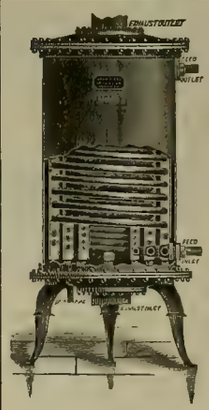
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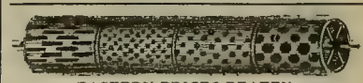


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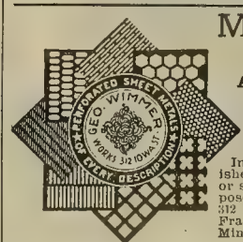


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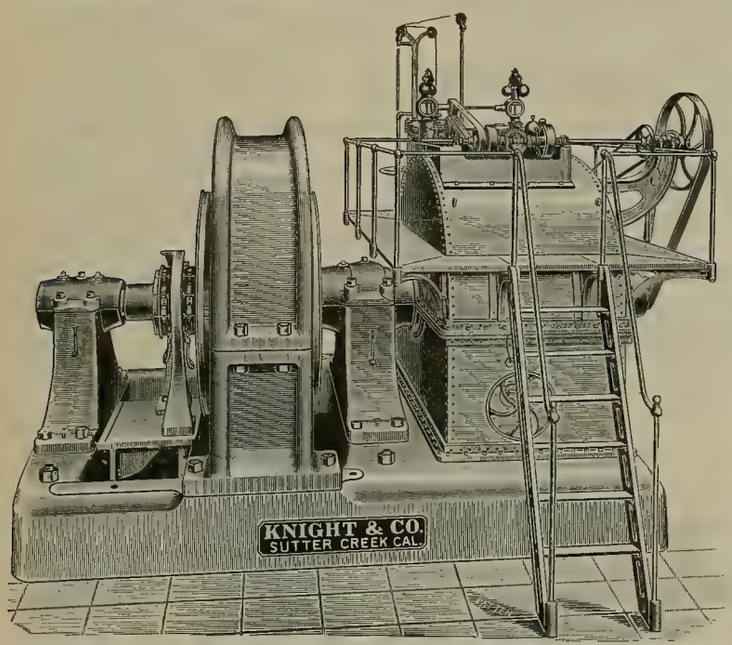
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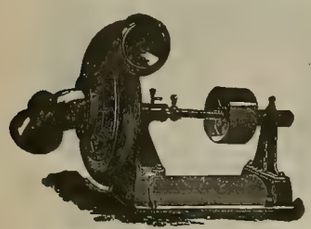
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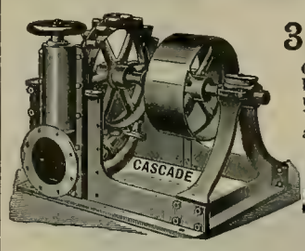
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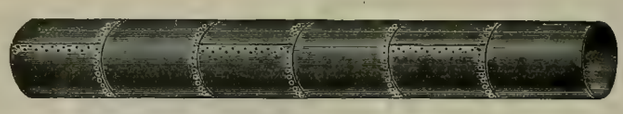
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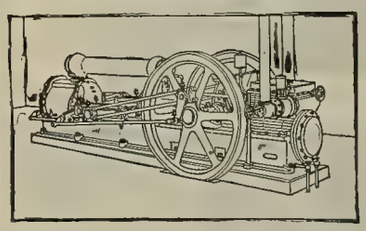
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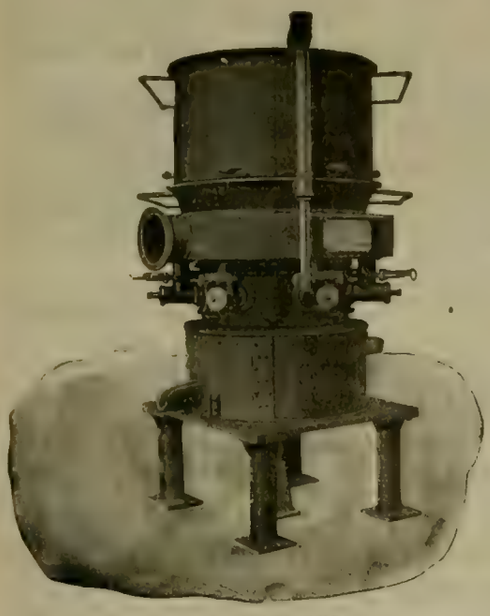
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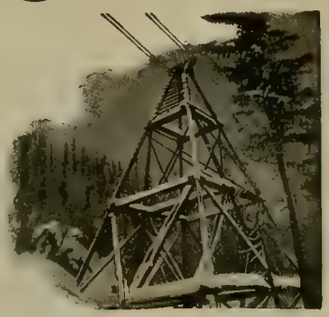
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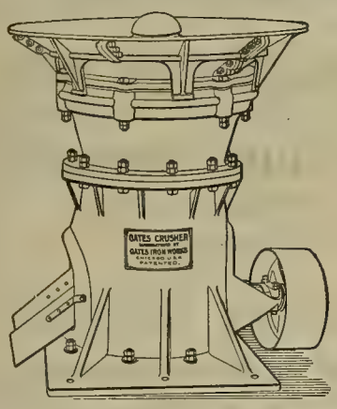
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SILVER.—London, 27¾d; New York, 60¼; San Francisco, 60¼; Mexican Dollars, 49@@50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports firmer, $4.40 bid, $4.57½ asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6½c; bar, 6½c.

COPPER.—New York reports Lake firm at $18.50; brokers' price, $18.50. Local—Mill copper plates, 23½c.

Copper remains unchanged, the demand being steady, without change in price.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Unsettled; $31.50@32.75; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4¼@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₩ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia.)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$7 50	Cumberland	$9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 3, 1899.

9:30 A. M. SESSION.

100 Best & Belcher	68c	800 Potosi	50c
100 Caledonia	73c	200 Sierra Nevada	67c
100 Con. Cal. & Va.	$2 35	400 Union Con	38c
400 Justice	08c	200 Utah	14c
100 Mexican	61c		

2:30 P. M. SESSION.

100 Ophir	$1 15	300 Sierra Nevada	66c
650 Mexican	61c	200 Bullion	09c
450 Gould & Curry	45c	500 Seg. Belcher	06c
550 Best & Belcher	67c	100 Overman	13c
500 Con. Cal. & Va.	$2 25	900 Justice	09c
100 Savage	24c	100 Caledonia	69c
550 Potosi	47c	500 Silver Hill	03c
100 Belcher	28c	500 Con. Imp	02c

Strong Endorsement.

The following testimonials to the non-conducting qualities of the Anti-Caloric Pipe and Boiler Covering speak for themselves:

SAN FRANCISCO, July 21, 1899.

To Whom it May Concern: I thoroughly endorse the insulating qualities of the Anti-Caloric Covering, having had considerable experience with it during a good many years. As an instance of its ability to retain heat, I might say in a recent experiment which I made to test the quality of oil clothing under extreme cold I constructed a box insulated with Anti-Caloric Covering, and used the exhaust from a small engine to do the refrigerating. I had no difficulty in maintaining a temperature within the box as low as 30 degrees below zero, and I feel sure that it is a valuable thing for use in cold storage. Very truly yours, E. A. RIX.

SAN FRANCISCO, Nov. 9, 1898.

Capt. Wm. Borrowe, Mangr. Cal. Anti-Caloric Co., 507 Market St., S. F.—DEAR SIR: Some time ago I requested you to make me a block of non-conducting material for experimental purposes, and you supplied me with two pieces, 12x6x1¾ inches, composed of diatamaceous earth, bonded by asbestos fiber. I subjected one of the blocks to the flame of a gas blowpipe applied directly against it for thirty minutes, and while one side of the block was at nearly a white heat the other side was cool, and the results of this experiment thoroughly demonstrate that these blocks will withstand a high degree of heat, and deter the passage of heat, and will answer the purpose for which they were made admirably. Yours very truly, E. C. JONES, Engineer.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. MONEY loaned, mines, MINING companies organized, their property explored, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated. EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

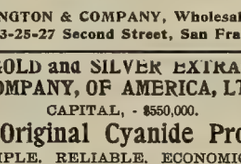
AIR COMPRESSORS, Rock Drills, Coal Cutters, Lift Pump, Pohle and Stone Channelers. Catalogues.
The INGERSOLL-SERGEANT Drill Co., Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO., 203 Fremont Street.

Quicksilver
—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

F. B. COOK & CO., MINES AND MINING,
Atlas Block, Salt Lake City, Utah.
Properties reported on and development work superintended for investors.

PACIFIC EXPLORATION COMPANY
Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.
The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.
TRADE MARK.

(M'ARTHUR-FORREST PROCESS.)
Gold Medal, Columbian Exposition, 1893.
MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by
The MacArthur-Forrest Cyanide Process.
ALMARIN B. PAUL, Agent,
27 Crocker Building, San Francisco, Cal.,
for California north of and including Mono, Madera and Merced counties; also for State of Nevada.
Samples assayed and fully reported upon. Particulars upon application.
Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; William Russell, Chief Chemist.
OFFICE: MCPHEE BUILDING, DENVER, COLORADO.

POSITION WANTED—By young man experienced in mill work, cyanide, assaying, and mining engineering; preferably to take charge of gold mill or cyanide plant. Technical graduate. Best of references to present employer and others. Address N. E. V., care this paper.

ELECTRICAL and STEAM ENGINEER, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

A Practical Mining Man Wants a Position as Superintendent or Assistant.
Good assayer and first-class shaft man. Will go anywhere. Six years with last company. Best of references. Address E. K., care this office.

POSITION WANTED by an experienced cyanide man, assayer and chemist, preferably in charge of a cyanide mill. Speaks Spanish. Technical graduate. Can furnish a good assay outfit if desired. Address W. J. P., care of this paper.

Millman of 15 Years' Experience
WISHES A SITUATION.
Will go anywhere in California. Can give the best of references. Address D. F., care this office.

WANTED, SITUATION
AS SALESMAN AND BOOKKEEPER IN MINING CAMP. Competent to take charge of store. Address S. E., this paper.

Underground Foreman
WANTS WORK.
Practical, experienced, intelligent, and up-to-date working of gold, silver or copper mines, whether small or large. Moderate salary. Good references. Address
C. L. LANG, Sonora, Tuolumne Co., California.

WANTED,
4-INCH BLACK PIPE; ALSO ROUND IRON FROM ½ TO 1¼.
Must be in fair condition. DYER BROS., 117-119 Beale St., San Francisco.

WANTED.
20-STAMP GOLD MILL,
Complete with Power, Feeders, Plates and Concentrators.
Must be nearly new and in first-class condition. Give full particulars and price f. o. b. cars or steamer, or as it stands. Address "ALASKA," care of Mining and Scientific Press.

FOR SALE. A New Wilfley Patent Concentrator, complete. Only been used a few hours. Also, about 600 feet of 7-inch iron pipe, 14 gauge; as good as new. BEAR RIVER GOLD MINING CO., Colfax, Cal.

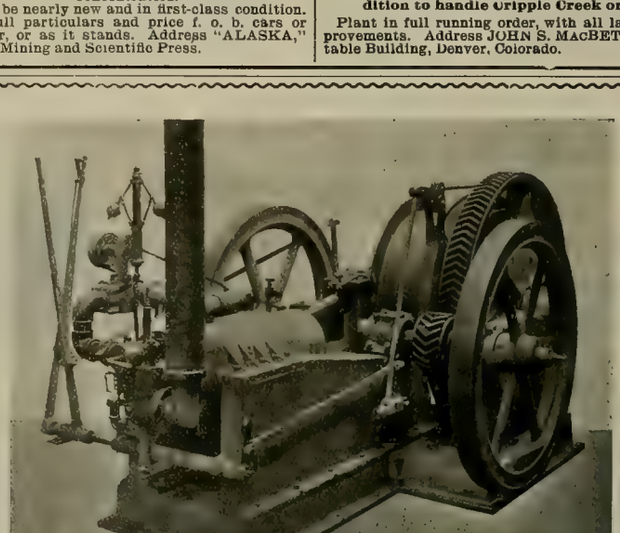
Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mining Properties
of merit, bought and sold. A specialty made of mines in Mexico and the Southwest. Whether a buyer or seller let me hear from you. Mines examined and reported upon.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Hydraulic Mines for Sale in Similkameen District, British Columbia.
667 ACRES. 5000 INCHES WATER IN DRIEST PART OF SEASON.
Two years' working bond will be given on favorable terms, or lease with option.
HOPE, GRAVELEY & CO.,
536 Hastings Street, - Vancouver, B. C.

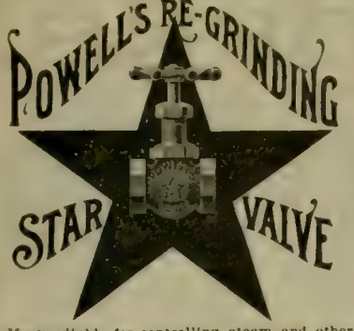
Mines and Machinery for Sale at Public Auction.
The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Elckhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.


Hercules Gasoline Hoist—Speed 385 Ft.; Load 2500 Lbs.
Hercules Hoists Are Sold the World Over.
HERCULES GAS ENGINE WORKS, 305 Market St., San Francisco.

ELECTRICAL ENGINEERING COMPANY,
MANUFACTURERS OF DIRECT CURRENT MACHINERY
For Power and Lighting Purposes.
SPECIALTY
Direct Connected Electric Elevators.
Estimates Given on All Kinds of Mining Apparatus,
ALSO REPAIR AND JOB WORK OF ANY KIND.
Manufacturers of Fouts Patent Rotary Grip Wheel for Logging or Tramway Use.
509-511 Howard St., - San Francisco.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street,
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION.



Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is in position on steam pipe.

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The Wm. Powell Co.,

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Carried in stock by Miller, Sloss & Scott, San Francisco.

A Small Sinker AT A Small THE Cost. MOORE SINKING PUMP.

Weight 450 lbs.

No outside valve gear. Valve requires no setting. Is simplicity itself.



Address: C. B. Boothe & Co., Los Angeles, Cal. H. H. Fielding, Denver, Colo. John Pool, Portland, Or. Geo. E. Scott-Strewell Hardware Co., Salt Lake City, Utah. Samuel Hill, Prescott, Ariz. Or M'f'r's,

UNION STEAM PUMP CO., Battle Creek, Mich.

Established 1852. Incorporated 1895.

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63 First Street, San Francisco, Cal.

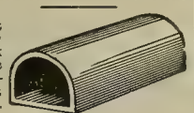
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FURNACES, SCALES, BALANCES, WEIGHTS, ETC. ALSO, MINE AND MILL SUPPLIES, CHEMICALS AND CHEMICAL APPARATUS.

Agents for Baker & Adamson's Chemically Pure Acids. A full stock always on hand. Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.



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REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO.
AKRON, OHIO.

Largest Manufacturers of Oil Filters in the World.

TUBBS CORDAGE CO.

(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. Extra sizes and lengths made to order on short notice

611 and 613 Front St., San Francisco, Cal.

Assessment Notices.

SAILOR CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of July, 1899 an assessment (No. 1) of eleven cents (11c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 318 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of August, 1899 will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 18th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. C. LUND, Secretary.

Office—318 Front street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of July, 1899, an assessment (No. 14) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California.

The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of July, 1899, an assessment (No. 13) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of July, 1899, an assessment (No. 116) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on FRIDAY, the 18th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 7th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of July, 1899, an assessmeat (No. 12) of ten (10) dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 29th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOORE, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of July, 1899, an assessment (No. 9, new series) of five (5c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

Office—Room 10, 324 Pine St., San Francisco, California

THE ROESSLER & HASSLACHER CHEMICAL CO.,

100 William Street, New York.

CYANIDE

Peroxide of Sodium

Hyposulphite of Soda

Chloride of Lime

Sulphide of Iron

And other Chemicals for Mining Purposes.

The "Stop for Repairs" to Mining Machinery,



Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

LEVIATHAN CONVEYOR BELT.

It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

IT WILL OUTLIVE ANY OTHER BELTING.

MAIN BELTING COMPANY,

1225-41 Carpenter Street, Philadelphia.
55-57 Market St., Chicago. 120 Pearl St., Boston.

SEND FOR PRICE LIST AND SAMPLES.

GENERAL ELECTRIC COMPANY

Schenectady, N. Y.

Standard of the World.

EQUIPPED

The Great Electrical Transmissions

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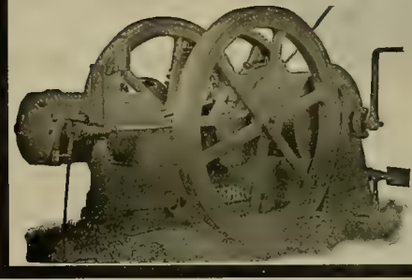
FOLSOM-SACRAMENTO (Cal.), 24 Miles,
SAN JOAQUIN-FRESNO (Cal.), 36 Miles,
WILLAMETTE-PORTLAND (Or.), 12¾ Miles.

The Power is now used for Railways, and Lighting and Operating Large Mill Plants.

Write-- SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COL., Kittredge Building. PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building.

If You Want Anything Electrical.

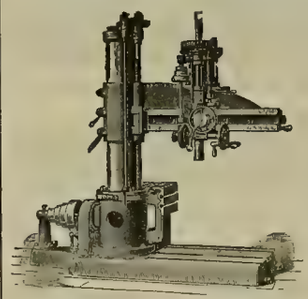
THERE IS ALWAYS TROUBLE



with a second-class Gasoline or Oil Engine or Hoist, and there is no good excuse for buying that kind when the Weber is so easy to get. Write for particulars.

WEBER GAS & GASOLINE ENGINE CO.,

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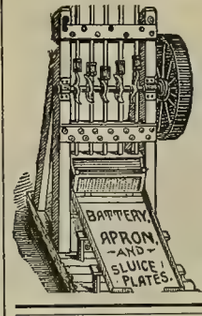
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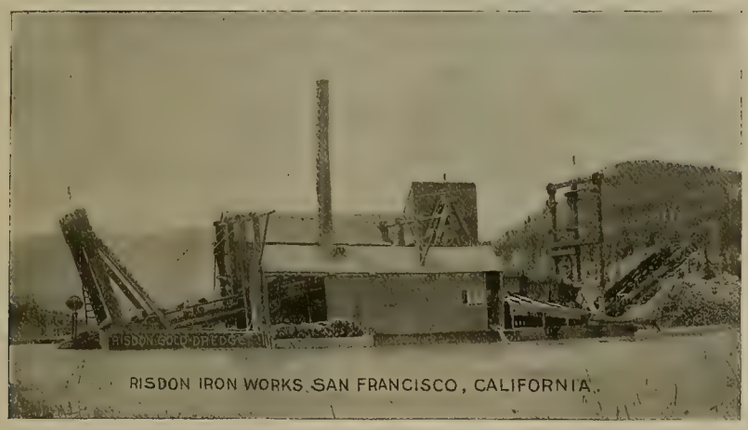
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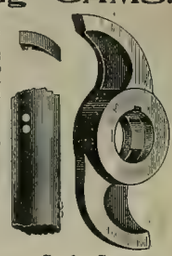
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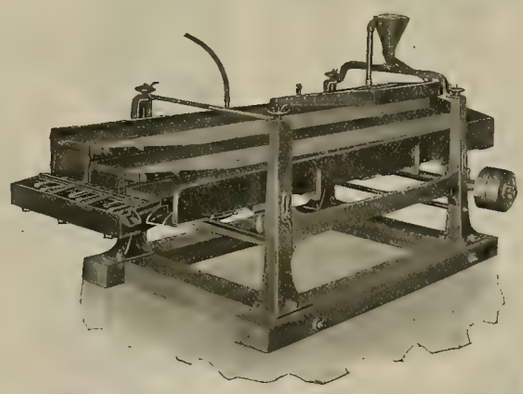
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MINING AND SCIENTIFIC PRESS.
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No. 2040.—VOLUME LXXIX. Number 7. SAN FRANCISCO, SATURDAY, AUGUST 12, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mining in British Columbia.

The head of navigation of the Columbia river in British Columbia is at Salmon Beds. Freight and supplies to the mining region are brought to this point by steamer and shipped by pack trains to the various camps. One of the accompanying engravings shows the Delphine Co.'s train leaving Salmon Beds for the mines, twenty miles distant by trail. The Delphine consists of a group of claims on the east side of the north fork of Toby creek. On these claims, according to the report of the Provincial Mineralogist, a vein of solid galena 12 to 36 inches wide has been opened in a series of cuts. This vein occurs in schist. The ore is to be packed to Salmon Beds for shipment to the smelters.

The middle fork of the Spillimachene river is reached by trail from Carbonate Landing, on the Columbia. The trail after leaving the landing passes over the summit to the north fork, below Loon lake, thence climbing over another summit into the valley of the middle fork. The distance is about thirty miles. There are numerous mines and claims along this fork, the most of them at an altitude of 6000 feet or over.

On the middle fork of Spillimachene is Bobbie Burns basin, a wild, rugged, almost treeless tract, surrounded by high, snowclad peaks and ranges. Yet into this fastness the prospector has penetrated and, finding mineral veins, has built himself a home. The principal claim lies at an altitude of 7650 feet. The country rocks are slates and schists. Cutting these rocks is a series of quartz veins 1 to 4 feet wide, which are intersected by a cross-course series of smaller veins at right angles. The veins carry sulphides of iron and lead. A concentration of mineral is usually found at the intersection of the veins.

In 1891 a 5 stamp mill, with 750-pound stamps, was packed into the basin and set up by the Bobbie Burns Co. The mill is still in good condition, in a substantial log cabin on the mountain. The ore is conveyed to the mill by wagon by a road half a mile in length. The mill is well equipped, has automatic feeder, plates, etc. It is a small concern, but serves to illustrate the energy and progressiveness of the men composing the mining communities of the north.

Near Brewer's ranch, thirteen miles south of Windemere, is a series of hot springs, the waters of which as they leave the ground have a temperature of 90° to 120° Fahr. These springs cover an area of several acres and vary in size. The largest would fill a 3-inch pipe under a 10-foot head. The water carries principally calcium carbonate and iron. Calcareous travertine is deposited about the springs.



DELPHINE PACK TRAIN LEAVING THE SALMON BEDS, B. C.



BOBBIE BURNS BASIN, MIDDLE FORK, SPILLIMACHENE, B C.



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SINCLAIR PASS THROUGH THE ROCKIES, NEAR WINDEMERE, B. C.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Delphine Pack Train Leaving the Salmon Beds, B. C.; Bobbie Burns Basin, Middle Fork, Spillimachene, B. C.; Sinclair Hot Springs, near Windemere, B. C.; Sinclair Pass Through the Rockies, near Windemere, B. C., 169. Plan Showing Method of Determining Dip of an Inclined Stratum; Plan Showing Method of Determining Dip of Oil-Yielding Stratum; Vertical Cross-Section Showing Method of Determining Position of Outcrop of Oil-Yielding Stratum, 172. Latest Mining and Metallurgical Patents, 175.

EDITORIAL.—Mining in British Columbia, 169. An Unrepealed Law; Raise in the Price of Copper May Prove Disastrous; Miscellaneous, 170.

MINING SUMMARY.—177-78-79-80.

THE MARKETS.—The Local Markets: Mining Share Market; Sales in San Francisco Stock Board, 194.

MISCELLANEOUS.—Concentrates; A Law That Has Not Been Repealed, 171. Notes on the Oil-Yielding Formations of California, 172. Boring Holes in Soft Ground; A Los Angeles Co., Cal., Mine; Some Experiences of a Working Miner, 173. Characteristic Mines of the California Gold Belt; The Extraction of Nickel from Its Ores; Of Importance to Miners, 174. Latest Mining and Metallurgical Patents; Copper Statistics; Zinc Sulphide Reduced to Metallic Zinc, 175. The Lucknow, N. S. W., Gold Field; An Occurrence of Free-Milling Gold Veins in British Columbia, 176. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recent California Dividends; Commercial Paragraphs, 180. How to Solder Aluminum; Work of the Glacier; Some Electric Traction History; Ammonia Process in Reduction of Copper Ores; To Weld Joints; Electric Plant at Sault Ste. Marie, Mich., 181.

THROUGH the years thousands of mining men have learned to look to the advertising columns of this paper for information as to where to buy mining machinery and supplies, and it is a constant custom to receive letters of inquiry as to where supplies not so advertised may be had. This week came two inquiries from Arizona from men who want to buy traction engines, two from the same Territory concerning narrow gauge cars, one from California as to "the Babcock gasoline machinery," two from California and two from Oregon inquiring where to buy telephone outfits, two from British Columbia asking for competent hydraulic miners to superintend such work there, one from Wyoming for miners' lamps and one from Montana for electric blasting apparatus.

FOR a time it looked as though the trouble between England and the Boers might be satisfactorily adjusted, but the developments of the last few days in London give the situation a war-like aspect again. Mr. Chamberlain, Secretary of State for the colonies, declares that the grievances of the English people in the Transvaal must be redressed. It is stated in press dispatches that many Uitlanders are leaving the country, going into Rhodesia, Natal and to the Cape for fear of being called upon by the Boers to take up arms in defense of the South African Republic, refusing which, they may be shot as traitors. While, undoubtedly, the reports are more sensational than the situation really warrants, there is a state of unrest, and both governments are secretly preparing for a war which may yet be averted.

A FRENCH COMPANY has recently bought a mine in Wales which had been abandoned by the original owners on the assumption that it was worked out. The new owners are reopening the property, and should they meet with financial success in the operation it will form a striking commentary on English mining methods. The miners of western England have recently made complaint that, despite the great activity in mining elsewhere, their mines failed to attract attention of outside capital. Recent experience in America and in South Africa has demonstrated the necessity of radical departures from the old time-honored methods, good enough, perhaps, in their day, but traditional practices must give place to modern requirements and ideas. Never has there been such a progressive age in mining as at present, and all that is unsuited to modern uses must go, despite the standing that long-continued use and tradition may lend it.

An Unrepealed Law.

The California Legislature intended last March to repeal the law enacted by its predecessor in March, '97, regarding the location of mining claims, etc. From a communication on the opposite page from A. H. Ricketts of San Francisco, and a perusal of the peculiar wording of the Act, it would appear that his exceptions are well taken, that by the jumble of words in the Act the Legislature passed it defeated its own purpose, and that the law of '97 is still on the statute books unrepealed.

As this is a matter of grave import to every prospector and miner in California, the MINING AND SCIENTIFIC PRESS gives it prominence. At the request of this paper, Mr. Ricketts prepared the communication on the next page. Lest it should be accounted a mistake of the State Printer that the Act appears in the shape it does in the official report of the proceedings of the last California Legislature, the MINING AND SCIENTIFIC PRESS sent to the Secretary of State at Sacramento for a certified copy of the bill with the great seal of the State affixed thereto.

This document was duly received and is herewith published:

ASSEMBLY BILL No. 140.

Passed the Assembly, March 3, A. D. 1899.

C. W. KYLE,
Chief Clerk of the Assembly.

Passed the Senate March 15, A. D. 1899.

F. J. BRANDON,
Secretary of the Senate.

This Bill was received by the Governor this 17th day of March, A. D. 1899.

W. I. FOLEY,
Private Secretary of the Governor.

[ENDORSED.]

Filed in the office of the Secretary of State the 28th day of March, A. D. 1899.

C. F. CURRY,
By J. HOESCH, Deputy. Secretary of State.

CHAPTER CXIII.

An Act to repeal "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March 27, 1897.

The people of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. An Act to repeal "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March twenty-seventh, eighteen hundred and ninety-seven, is hereby repealed.

SEC. 2. This Act shall take effect immediately.

ALDEN ANDERSON,
Speaker of the Assembly.

THOS. FLINT JR.,
President pro tem. of the Senate.

Approved March 20, A. D. 1899. HENRY T. GAGE,
Governor.

No. 300. STATE OF CALIFORNIA—DEPARTMENT OF STATE.



The Great Seal of the State of California.

I, C. F. CURRY, Secretary of State of the State of California, do hereby certify that I have carefully compared the annexed copy of Chapter CXIII Laws of 1899 with the original now on file in my office, and that the same is a correct transcript therefrom, and of the whole thereof. Also, that this authentication is in due form and by the proper officer.

WITNESS *my hand and the Great Seal of State, at office in Sacramento, California, the 7th day of August, A. D. 1899.*

C. F. CURRY,
Secretary of State.

It will be noted that while it was the evident intent of the Act to do away with the Act of March 27th, '97, it does nothing at all. This will be readily seen if the reader of the above will, in reading it, mentally leave out of Sec. 1 of the Act all that is in quotation marks; it will then read "an Act to repeal—approved March 27, 1897, is hereby repealed," which is absurd. Yet it is just what the Act says. It virtually repeals an Act that was never passed; but, by reason of its wording, lets alone the Act that it was intended to repeal. Hence, the conclusion seems incontestable that Mr. Ricketts is right, and that the California law of 1897 is still in force.

Had the word "entitled" appeared to the exclusion of the words "to repeal," as the first three words of Sec. 1, no objection, technical or otherwise, could be made, nor could any flaw be found; but in the form that it appears and which the Secretary of State certifies is correct, it is manifestly of no avail.

In making this matter public the MINING AND SCIENTIFIC PRESS has no other purpose than to protect the California miner and prospector from loss or vexatious litigation resulting from compliance with the supposed statute, this paper merely doing its duty in calling attention to the error as soon as possible. It is our advice that all requirements under the law of March 27th, '97, be followed, for when the matter is brought into the courts, the inevitable decision will be that that law is unrepealed, for, whatever the intent of the legislators, the meaning of the words used and their plain import can alone be given judicial cognizance.

IT is stated that large copper producers realize that a further raise in the price of copper may prove disastrous rather than beneficial, and that they welcome any substitute for copper which will tend to keep the price down. To how great an extent this is true is left to one's imagination. Thus far aluminum is the only metal which has replaced copper to any extent, though a more extended use of it may be anticipated. As yet many look upon the use of aluminum for the transmission of electric power as an experiment, but some large and expensive installations are being made, and when these have fully demonstrated that aluminum is a successful substitute for copper an extensive use of that metal may be anticipated. Aluminum at its present price is cheaper than copper at its present price by reason of their great difference in specific gravity. The supply of aluminum-bearing minerals is inexhaustible, and with a more extended use of the metal the cost of its production is likely to decrease. The largest copper producers of the country seem to have reached their limit of capacity, at least for a long time to come, and there does not appear to be any decided tendency on the part of the great mines to increase it. Doubtless the managers realize the possibility of a lower price, influenced largely, perhaps, by the extended substitution of aluminum wires for copper, and that a heavier output under such conditions would have a tendency to cheapen rather than raise the price of copper. Such additional output would not materially lessen the cost of production. The large producers have exhausted their reserve supply of copper. The Calumet a few years ago had 8,000 tons of the metal in store, which is now all gone into the markets, showing that they are taking advantage of what may be the highest prices to unload.

IN western Kansas some speculative individuals claimed recently to have discovered rich gold and zinc ores in a bed of bituminous shale 200 feet in thickness, which underlaid miles of Ellis and Trigo counties. The alleged discovery was given widespread notoriety and the flat prairie farms quickly rose to fabulous prices, some owners refusing to entertain negotiations at any figure. Now it develops that none excepting the inside ring are able to obtain the high-grade assays and the farmers have returned to the plow and the reaper, the brief mining boom having collapsed as quickly as it formed.

IN Colorado the smelter situation has not apparently improved. The smeltermen still demand the eight-hour day, recognition of the union, and the wages suggested by the arbitration board. The managers still claim their inability to pay this scale of wages without raising the cost of treatment of ore, and refuse to recognize the union. Members of the union have formed a guard about the entrances to the works of the American Smelting Co. for the purpose of preventing new men from applying for employment, which they have thus far apparently succeeded in doing.

A GREAT DEAL has been said of the value of technical education in mining. A finished education is desirable in any walk in life, but in no vocation is a good education more essential to the attainment of the highest success than in mining, but with this must be coupled experience. Through the medium of study, a knowledge of the experience of others is gained; but individual experience, a practical application of knowledge gained by study, is indispensable in the conduct of mining business.

Concentrates.

THE illustrated article "Cooking by Electricity," appeared in the issue of January 15, '98.

IT is stated that the copper production of the great mines of America this year will fall below that of 1898.

MINE operators of eastern Oregon are being warned by Government agents to desist from cutting timber on government lands.

RICH copper ores occur in fossil fish in the permian formation of Russia, and in some parts of the United States, notably Texas.

WHEN a vein passes from one formation into another of unlike character a change is sometimes, though not always, noticeable in the ore.

SILVER LEAD miners of British Columbia are resolving that lead smelted in Canada and refined abroad should be admitted duty free into Canada.

IN some of the old workings of California mines sticks of oak timber are found which were put in forty years ago, and are still in a fair state of preservation.

WHERE wall rocks are too soft to afford firm footing for timbers wall plates of sufficient size and thickness should be inserted between the post or stull timber and the wall.

ABOUT 9,000,000 pounds is the aggregate monthly output of copper of the Anaconda Mining Co., Anaconda, Mont. There are over 1700 men employed; 140 cars of ore are daily handled.

PERSONS who from carelessness or any other cause take mail from the postoffice that belongs to another, and who fail to return the same, are liable to a fine of $500 or one year imprisonment.

THE gold output of the Transvaal in 1897 was $58,000,000, and in 1898, $81,000,000. The strip which produces the greater portion of the gold is thirty miles in length and one to two miles wide.

LIGHTNING seldom interrupts electrical matters in California, but an electrical disturbance in the Sierra foothills last week destroyed over $6000 worth of electrical machinery at Jamestown, Tuolumne Co., Cal.

THE gold mining industry of Brazil is so heavily taxed that there is very little mining of that kind done there. Out of six properties working, but one is paying. In some instances the tax is 5% of the gross output.

TO PREVENT the pounding of water-hammering in heating pipes, a new attachment for warming systems consists of a relief valve with a spring gate inside, which allows the expansion to exhaust itself in the increased area.

ALMOST any mine of value can show specimens which run into the thousands, and in districts producing free-milling gold ores specimens may assay hundreds of thousands, but few of them ever produce a ton of ore of this particular kind.

A BED of gypsum 10 to 40 feet in thickness surrounds the Black Hills of South Dakota. It lies in the Triassic formation. It is locally used in the manufacture of plaster of paris and also of a fertilizer known as land plaster. The deposit is practicably inexhaustible.

THE term unit as applied to ores is used to indicate the amount of a certain mineral contained in the ores, as copper, iron, zinc, lead, etc. The ton weighs 2000 pounds or twenty hundredweight, and a unit is one one-hundredth of this, or twenty pounds. It is 1% of the ton.

MONAZITE has been found in the placers of Oro Fino, Idaho. This mineral is a phosphate of thorium, cerium, lanthanum, yttrium and didymium. The supply comes chiefly from Brazil and it sells for $119 per ton in Germany, where it is used in the manufacture of mantles for incandescent gas burners.

CALIFORNIA prospectors should now observe, as formerly, all details of location of the State law of 1897. It would be well for those who have located claims under the Federal law since March 20 to relocate under the State law and comply with its requirements, thus avoiding possible litigation later.

A CYANIDE leaching vat, made of wood, which had been in use four years, was recently tested as to the percentage of values absorbed. A hole was bored one-half an inch deep into the bottom, the shavings therefrom assaying $13 per ton. Thus, the absorption by wood tanks is shown not to be as great as has been claimed.

STULL TIMBERS should not be placed directly at a right angle with the hanging wall, for the reason that a very small subsidence of the hanging wall will permit the stull to fall down of its own weight. Set them a few degrees above the right angle, and when in that position any subsidence of the hanging wall will make them more firm.

FOR discharge pipe connections in mine shafts flanges fitted with gaskets are better than threaded couplings. Connection can be made or the pipes disconnected more quickly by the use of flanges. Slip joints for steam and discharge pipes are also essential to facilitate handling of the pump. By the use of 20-foot slip joints new connections need be made only at each four sets.

MAGNESITE (carbonate of magnesia), talc and asbestos are refractory substances, and each will withstand a high degree of heat. In Los Angeles Co., Cal., near Lordsburg occurs a deposit of red sandstone resembling tufa and is probably of volcanic origin. This rock, when subjected to the intense heat of an assayer's crucible furnace, shows no further sign of alteration than a slight change in color. The stone is easily worked.

WHEN a claim owner has done the assessment work required by law he should record a certificate with the county recorder setting forth the fact, and he should also post a notice on the claim to the same effect; but should he neglect to record the certificate, if he can produce responsible witnesses to prove that he had performed the assessment work the courts would undoubtedly declare his title good and the claim not open to relocation.

THE proposition to build a dam across the Mojave river, near Victor, San Bernardino county, Cal., is said by Mr. F. H. Newell, Hydrographic Engineer of the United States Geological Survey, to be one of the most feasible of any in the State and one promising excellent results. The depth to bedrock, as determined by drilling, is about 50 feet. The site is at a point where the river cuts through a ridge of granite hills. The rock is firm and admirably suited to the purpose of building a dam.

WHEN about to construct a windlass decide first to what depth you will sink with it before substituting some other machine, then calculate the diameter and length of the windlass so that the necessary amount of rope will go on the windlass with a single lay. When a rope turns back upon itself it is a source of annoyance and sometimes danger. Greater power is obtained by use of a geared windlass, but with a loss of time in lifting a given distance.

THE atmospheric pressure at the sea level is about 15 pounds to the square inch, equal to a column of water one inch square 34 feet high. Pumps do not raise water from this height owing to the fact that it is almost impossible for a mine pump to create a perfect vacuum in its chambers. Friction is also a factor. A mine pump which will raise water from a point 22 feet below its lower valve at an altitude of 2000 feet is doing good work. A very good pump in first-class condition, run slowly, will lift water higher in a quantity far below its capacity.

THE MINING AND SCIENTIFIC PRESS is bought and read every week by mine managers, superintendents, engineers, purchasing agents, foremen and wide-awake, active miners in every part of the region where metal mining is carried on. Its readers have bought mining machinery and supplies to the extent of $100,000,000 in the last ten years, and their present average annual purchases exceed $15,000,000. Its advertising pages are referred to everywhere by intending purchasers of mining machinery or supplies as a comprehensive directory for that purpose.

ON some Minnesota mining ranges iron ore of good quality is mined in open pits with steam shovels at a cost of 5 cents per ton. The ore is put into hopper cars, transported to docks and dumped into pockets at a further cost of 5 cents per ton. From the pockets, chutes, spaced to correspond with hatchways in boats of 2000 to 7000 tons capacity, load the ore at the rate of 1000 tons an hour. One boat under steam tows several others to the lower lake ports where the ore is quickly hoisted into 50-ton steel cars and sent on its way to the blast furnace, where it is made into pig iron for the cupola or puddling furnace; or it is put through the Bessemer converter or the open-hearth furnace and comes out steel of a quality superior to that of the iron which it has superseded.

THE Commissioner of the General Land Office has rendered an interesting decision in the case of the South Dakota Mining Co. vs. Jesse D. McDonald. Both parties claim the land on which is situated the entrance to what is known as the Wind Cave, which has already become noted for its wonders of crystallization of minerals. The Commissioner decides that the land is not mineral-bearing and is not subject to location as such. He also says McDonald, who located the land as a homestead, has failed to show good faith and therefore forfeits his claim. He recommends that the cave be reserved by the Government as a public resort. McDonald has made no attempt to farm the land, which is among rocky hills, but has taken in considerable money from visitors, from whom he exacted $1 each for a visit to the cave.

THE glacial drift which swept down from the northward and covered the Canadas, New England and Middle States, and extending as far westward as Minnesota, brought with it large masses of rocks, unfamiliar in the region where they are now found. In New Jersey huge blocks of granite are found resting on the red sandstone of the Triassic. In central Ohio considerable masses of pure copper have been found which undoubtedly were detached from the mass deposits of the Lake Superior region and transported on the ice sheet several hundred miles and dropped where found. The underlying rocks of the drift area have been planed down, scoured and in some places polished. Some of the harder rocks still show the markings of the glacier, and in places where excavations have been made in gravel beds and clay banks there have been found several series of striæ, indicating the changing direction of the flow from time to time, the later striations not having obliterated the earlier.

THERE is a difference between a vein and a zone. A vein, whether large or small, has clearly defined limits, whether all the material between the walls be ore or not. A zone is not necessarily sharply defined by walls, the mineral occuring along a considerable longitudinal extent in a more or less irregular manner. The masses or bunches of ore may or may not be connected. Either a vein or a zone may lie horizontally or stand vertical, or at any intermediate angle. A flat vein is not necessarily a blanket vein. By a blanket vein is meant a sheet or deposit of ore in a sedimentary formation, which is the result of replacement or impregnation. When one wall is composed of eruptive rock it is called a contact. This was the original meaning of contact vein, but it has since been miscellaneously applied to veins and deposits occuring between wall rocks of unlike character. The fact that a vein occurs at such contact does not indicate value, as there are veins of great value occuring between walls of the same formation.

A Law That Has Not Been Repealed.

The California State Mining Act of 1897 is generally supposed to have been repealed during the last session of the California Legislature. Such, in my opinion, is not the fact; but, on the contrary, that the California State mining law, unaffected by any action of the last Legislature, is still in full force and effect and that locators of mining claims should comply with all of the provisions of the Act of 1897 in order to invest themselves with title to such claims. That locations made since the 20th day of March, 1899, (which is the date of the so-called repealing Act) under the assumption that the manner of acquiring lode or placer claims was since that date entirely regulated by the United States law and the local rules, regulations and customs of miners not inconsistent with the Federal law, are subject to relocation the same as if no location thereof had ever been made. This is stated without any expression of opinion as to the California State mining law (of 1897) itself.

It appears that during the last session of the Legislature the following Act was passed, viz: An Act entitled "An Act to repeal 'An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits,'" approved March 27, 1897.

(Approved March 20, 1899.)

The People of the State of California, represented in Senate and Assembly, do enact as follows:

SECTION 1. An Act *to repeal* "An Act prescribing the manner of locating mining claims upon the public domain of the United States, recording notices of location thereof, amending defective locations, and providing for the deposit of district records with county recorders, and prescribing the effect to be given to recordation of notices of location and affidavits," approved March twenty seventh, eighteen hundred and ninety-seven *is hereby repealed.*

SEC. 2. This Act shall take effect immediately. (Stats. 1899, p. 148.)

This Act, in my opinion, is void. There is no ambiguity in its language. It purports to repeal an Act which repealed an Act commonly called the "State Mining Law," when, in fact, no such repealing Act (which is apparently sought to be repealed) ever existed. That is the Alpha and the Omega of the statute. No relief can be afforded except by further legislative action, as any departure from the clear language of this statute would be, in effect, an assumption of legislative powers by the courts.

Possibly the motive of the Legislature in passing the quoted Act was to wipe the State mining law from the statute books; but the Legislature did not say so, and Judge Wallace, in the case of Harpending v. Haight, (39 Cal., 189), has laid down the rule that the motive of the Legislature in passing a legislative Act is not a proper subject of judicial inquiry.

The language of the Act in question is explicit; it has a definite and precise meaning; there is no room for construction; it must, therefore, under the rules of the construction of statutes, be presumed to declare the intent of the Legislature, and the courts cannot go outside of it under pretext of interpretation to cure any supposed blunder of the Legislature; and it is glaringly obvious that the Legislature has blundered in this instance, in attempting to repeal a repealing Act which is yet to be passed.

It is not the province of a court to act upon conjecture, and surmising what may have been the intent of the Legislature in passing the said Act, to say: omit the words "to repeal" found in the first line of Section 1 of the statute, nor to say: insert in lieu thereof the word "entitled" after the words "an Act" on said line, which is all that would be necessary to give the statute the effect claimed for it, but which it does not possess.

Moreover, the Code of Civil Procedure of this State (Section 1858) provides that "In the construction of a statute the office of the judge is simply to ascertain and declare what is in terms or in substance contained therein, not to insert what has been omitted, or to omit what has been inserted." In other words, a court has not the power to make a new statute by supplying omissions therein. The language of the court in the case of Woodbury v. Berry (18 Ohio St., 462) is apposite. In that case it is said: "But, notwithstanding all this, *ita lex scripta est.* The language as it stands is clear, explicit and unequivocal. It leaves no room for interpretation, for nothing in the language employed is doubtful. We are satisfied, by considerations outside of the language, that the Legislature intended to enact something different from what it did enact; but it did not carry out its intentions, and we cannot take the will for the deed. It is our legitimate function to interpret legislation but not to supply its omissions." (Quoted approvingly in City of Eureka v. Diaz, 89 Cal., 469).

This doctrine is not limited to that particular case, but is found in many American and English cases. In the case of City of Eureka v. Diaz (89 Cal., 469) our Supreme Court says: "It is a cardinal rule in the construction of statutes that the intent of the Legislature should be followed, but this is subject to the imperative and paramount rule that the Court can not depart from the meaning of language, which is free from ambiguity, although the consequence would be to defeat the object of the Act." In the course of the opinion the Court quotes approvingly the language of the Supreme Court of Maryland in the case of Smith v. State (66 Md., 217) as follows: "Even when a court is convinced that the Legislature really meant and intended something not expressed by the phraseology of the Act, it will not deem itself authorized to depart from the plain meaning of language, which is free from ambiguity. As was said by Lord Denman in Green v. Wood (7 Ad. & E. N. S., 185), 'Those who used the words thought they had effected the purpose intended. But we, looking at the words as judges, are no more justified in introducing that meaning than we should be if we added any other provision. We can do no more than give such a meaning as the words authorize.'"

Therefore, no elimination of the words "to repeal" will be indulged in by the courts nor apt words be inserted to give the statute discussed here a different meaning than its language plainly imports.

The language of the Act is plain and admits of but one meaning, viz., that its purpose is to repeal an Act repealing "An Act prescribing the manner of locating mining claims, etc.," and the rule is well settled that in such an event an Act must receive that meaning, although such construction leads to results which are absurd.

Neither is the Act in question helped out by its title, because the title of an Act can never control the plain intent, as the same is expressed in the Act itself, for it is only when the meaning of the language employed in the body of the Act is doubtful that the title, taken in connection with other parts of the statute, may be resorted to for the purpose of removing ambiguity. (*In re* Boston Mining & Milling Co., 51 Cal. 624.) And as the language of the Act is free from doubt, capable of being read and understood, expressing plainly and distinctly the sense of the framers of the Act, it is only, seemingly, a question of time when the courts will declare the so-called repealing Act inoperative and the Act of March 27, 1897, to be undisturbed by its passage.

It is proper for me to add that any views of mine upon the foregoing subject which have heretofore been published were given before I had an opportunity of examining this statute, and were given upon the assumption that I was correctly informed of its repeal.

A. H. RICKETTS,
Chairman Mineral Land Committee
Cal. State Miners' Association.

San Francisco, August 10, 1899.

Notes on the Oil-Yielding Formations of California.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by W. L. WATTS, assistant in the field to the State Mineralogist.

Conditions Under Which Petroleum is Found in California.—It is not within the scope of this article to discuss the vexed question as to the origin of petroleum, for it has been ably and exhaustively treated by A. S. Cooper*, State Mineralogist, as well as by other writers. In California, petroleum is found in formations ranging from the Lower Cretaceous to the Quarternary. In different localities this mineral has accumulated in different geological horizons. The manner in which these accumulations are distributed suggests that in the first instance the accumulation was occasioned by natural distillation, although there is but little doubt that other causes have contributed to the formation of petroleum deposits. In California petroleum is found in shales, limestones, sandstones and conglomerates, and in a few instances granitic and eruptive rocks are found impregnated with this mineral; but in nearly all of the productive wells the oil is found saturating sandy strata. In this State the folding of the rocks has brought these oil-soaked strata near the surface, and the oil lines or lines along which remunerative wells can be obtained extend in length parallel to the axis of folds or to the lines of faulting. The oil lines extend in breadth only a certain distance down the limbs of the folds or down the block of tilted strata, which has been isolated by faulting. The lateral extent of the oil line is limited at its upper side by the outcrop of the oil sand, or a line of geological disturbance such as a fault, or the axis of the fold on which the oil line is situated. On its lower side it is limited by the dip of the formation, which carries the oil-yielding stratum to too great a depth for it to be profitably reached by the drill, or, where the oil sand is struck below a certain depth, it may be found that water has driven out the oil and taken its place.

Methods by Which the Strike and Dip of Oil-Yielding Strata Should be Determined.—As geologists and oil men know, the dip and the strike of the oil sand are of the greatest importance in locating the site of an oil well, and in the case of prospect wells the dip and the strike have to be ascertained from the exposed rocks.

Many people are not familiar with geological terms, therefore it is in order to describe what is meant by the dip and the strike of a stratum of rock, and to give simple methods for determining the conditions represented by these terms.

The dip of a stratum of rock is the angle which its surface, when inclined, makes with the horizon. The strike is the horizontal direction in which a stratum of rock extends, and is always at right angles to the dip. Therefore, if the direction of the dip is known the strike can be readily determined.

The direction of the dip of an inclined stratum corresponds to a line drawn along the inclined surface in the direction of its greatest inclination, and it is always at right angles to the strike.

The following is a simple method for determining the dip of exposed strata with sufficient accuracy for practical purposes:

In Fig. 13 let *P Q D C* represent the surface of an inclined stratum. It is required to determine the

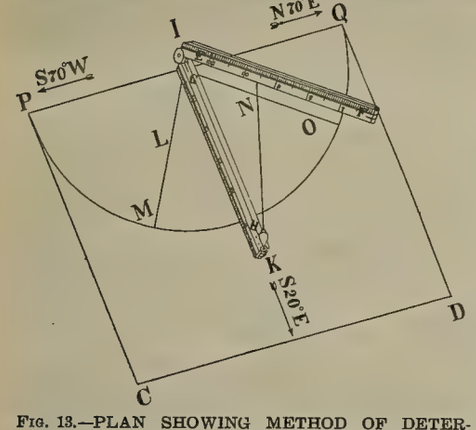


FIG. 13.—PLAN SHOWING METHOD OF DETERMINING DIP OF AN INCLINED STRATUM.

direction in which it dips, and the angle at which it is inclined.

If a plumb bob be suspended from a partly open rule, as shown in Fig. 13, and the open ends of the rule be turned in the direction of the dip until the plumb line forms one side of a triangle with the two limbs of the rule, then the lower limb *G H* is lying in the direction of the dip; for the plumb line will only complete the triangle with the limbs of the rule when its lower limb is placed on *I K*, the line of greatest inclination of stratum *P Q D C*. This can be seen by turning the rule so that limb *G H* falls on line *L M*, or *N O*, neither of which is the line of greatest inclination of the stratum. It will then be seen that while the limb *G H* is in either of these positions, or any other position except the one which coincide with line *I K*, the plumb line and the limbs of the rule will not form a triangle.

If *E F*, the upper limb of the rule, be placed in a horizontal position, and the lower limb *G H* on *I K*, the line of greatest inclination, the side of the triangle formed by the plumb line will be opposite the angle of the dip. The value of this angle may be found from the two sides of the triangle formed by a portion of the upper limb of the rule and the plumb line.

The angle of the dip may also be ascertained with approximate accuracy by carefully laying the rule, opened as explained in the preceding paragraph, on a piece of paper, drawing the angle and measuring it with a protractor.

Some rules are furnished with a clinometer scale, by which the angle formed by the open limbs of the rule is indicated.

It will be apparent to mathematicians that if the upper side of the triangle be considered a radius the plumb line will be tangent of the angle of the dip; and if the hypothenuse, *i. e.*, the lower side of the triangle, be considered as radius, the plumb line will be the line of the angle of the dip.

As previously mentioned, the strike is always at right angles to the dip. Thus in the case of stratum *P Q D C*, if the direction of the dip, as shown by line *I K*, is found to be S. 20° E., the strike will be represented by line *P Q*, at right angles to line *I K*, and the stratum will extend in a horizontal direction with a strike of S. 70° W., or N. 70° E.

Care should be taken that the surface of the stratum, the dip of which is to be ascertained, really is a bedding plane. It must also be borne in mind that the bedding planes are seldom true planes, as they are subject to many inequalities.

Therefore, if possible, the dip should be estimated at several places on the same stratum, and the average of the results taken as the dip. In estimating the dip of a stratum of rock by this method, it is well to clear off a space on the surface of the stratum, and to lay thereon a board, thus getting a better surface on which to work.

When a remunerative oil-yielding stratum has been discovered, its strike and dip should be determined by drilling three wells according to the following method:

In Fig. 14 let *A*, *B* and *C* be three wells in which the oil sand has been respectively struck at 100,

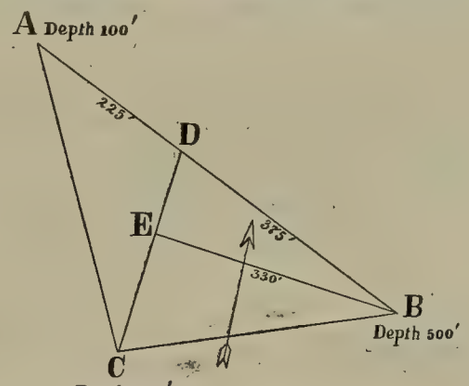


FIG. 14.—PLAN SHOWING METHOD OF DETERMINING DIP OF OIL-YIELDING STRATUM.

500 and 250 feet below any datum plane, such as a horizontal plane touching the top of well *A*. Draw *A B* and let it represent a distance of 600 feet. If a point be found between wells *A* and *B*, at which the oil sand can be struck at a depth of 250 feet below datum, a line drawn from well *C* to that point must necessarily be drawn along the strike of the formation; and if a line be drawn at right angles to the strike of the formation and towards the deepest well, that line will necessarily be drawn in the direction of the dip of the formation. Moreover, the figure contains the elements from which the angle of the dip may be calculated.

The question is at what point along the line *A B* will a well strike the oil sand at 250 feet below datum. The distance *A B* is 600 feet; the difference in the depth of wells *A* and *B* is 400 feet, therefore the grade of the surface of the oil sand between *A* and *B* is 400 feet in 600 feet, or 2 feet in 3 feet. Hence wells situated along line *A B*, and sunk to strike the stratum of oil sand, would, if measured from the datum plane, increase in depth as well *B* was approached, and the depths would be in proportion to the distance from *A* measured along *A B*.

It is required to find a point along the line *A B* at which the oil sand may be struck 250 feet below this line, or 150 feet deeper than at *A*. Since the increase in depth of wells which may be sunk from the datum plane to the oil sand along the line *A B* is at the rate of 2 feet in depth to every 3 feet of horizontal advance towards *B*, the distance from well *A* to the required point will be to the increase of depth of well at the required point as 3 to 2, or one and one-half times 150 feet, which is 225 feet. Lay off *A D*=225 feet. As point *D* is 225 feet distant from well *A*, along line *A B*, a well sunk at point *D* will strike the oil sand at a depth of 250 feet below datum. Hence a line drawn from *C* to *D* will give the direction of the strike of the oil-sand stratum.

Or the proposition may be stated thus: The grade of the stratum of oil sand between wells *A* and *B* is 400 feet, (the difference between the depths of the wells at *A* and *B*) divided by 600 feet (the distance between the two wells), which gives two-thirds of a foot in depth to 1 foot along *A B*. Dividing 150 feet (the difference of depth of wells *A* and *C*) by two-thirds of a foot, we obtain the distance 225 feet, which is the distance *A D*. Therefore, if a well were sunk at *D*, the oil sand would be struck at a depth of 250 feet. Draw the line *C D*. Now it is evident that a well sunk at any point along *C D* would strike the oil sand at a depth of 250 feet. Hence, as before stated, the line *C D* is the direction of the strike of the oil sand stratum. Moreover, any line drawn at right angles to line *C D* and in the direction of the deepest well will be drawn in the direction of the dip of the formation.

It is now required to find the angle at which the oil sand dips, and this can be found as follows: From *B* draw *B E* at right angles to *C D* (the line of strike). This line *E B* is the direction of the dip of the formation. By measurement, we find that line *E B* is 330 feet in length. If a well were sunk at point *E*, it would strike the oil sand at a depth of 250 feet below datum. Therefore, the grade along the surface of the oil sand in the direction of *E B* is 250 feet in 330 feet; and this grade represents an angle of about 37°. If the meridian be represented by the arrow in Fig. 14, then the oil sand penetrated by the wells *A*, *B* and *C* dips S. 80° E., at an angle of about 37°, and, consequently, the strike is N. 10° E.

Method for Calculating the Position of the Outcrop of Oil Sand.—When a remunerative stratum of oil sand has been struck and the angle at which it dips has been ascertained, as shown in the foregoing paragraphs, the distance from any of the wells, as *B*, to the point at which the oil sand ought to crop out at the surface of the ground, if it were on a level with the datum line, can be determined. This is done by the following method:

Let Fig. 15 represent a vertical cross-section drawn through the ground plan of Fig. 14, along line

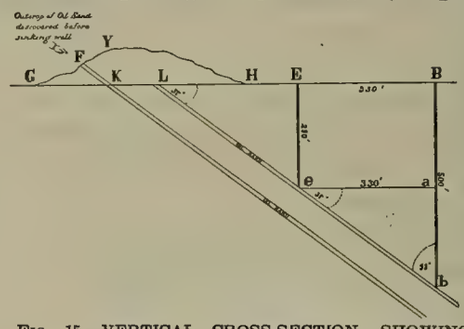


FIG. 15.—VERTICAL CROSS-SECTION SHOWING METHOD OF DETERMINING POSITION OF OUTCROP OF OIL-YIELDING STRATUM.

B E, and extended along the line of dip towards the outcrop. Let *B b* represent 500 feet, the depth of well *B*, and let *E e* represent the depth of a well, which, if sunk at *E*, would strike the oil sand at a depth of 250 feet, as explained in a preceding paragraph. It is required to find the point at which the stratum of oil sand, struck in well *B*, ought to crop out at the surface of the ground, provided the surface were on a level with the datum line and not covered with alluvium. Through points *b* and *e*, or the top of the oil sand stratum, draw *b e*, and extend it until it cuts the datum line; the point where it cuts this line is at *L*. If the distance between *B* and *L* be measured, it will be found to be about 660 feet, which is the distance between well *B* and the outcrop. If the surface of the ground sloped upward from the datum line, as indicated by the outline *H Y*, it is evident that the oil sand would crop out at a point above the datum line. This point can be found by extending line *b L* till it strikes the surface. It is obvious that if the surface of the ground sloped downward from any point, such as *H* on the datum line, the outcrop would be below the datum line.

The angle at which the oil sand dips, and the distance from well *B* to the outcrop, may be found by measurement and the simple methods already given, with sufficient accuracy for practical purposes. But, if a closer estimate is desired, it can be obtained by the following trigonometrical formulas:

From the right angled triangle *a e b* (see Fig. 15) of which *a e* = 330′ and *a b* = 250′, we have:

Cot. of angle of dip (*a e b*) = 330 ÷ 250 = 37° 8′ 48″.

From the right angled triangle *B L b*, of which *B b* = 500′ and angle *a e b* = angle *B L b* = 37° 8′ 48″, we have:

B L = 500 × cot. 37° 8′ 48″ = 660′.

That is to say, the distance from the well to the

*MINING AND SCIENTIFIC PRESS, Feb. 4, 1899.

point where the oil-sand stratum intersects the datum plane equals the depth of the well multiplied by the cotangent of the angle of the dip.

If in the first instance an outcrop of oil sand had been discovered at point *F*, and well *B* had been sunk to strike it, then it becomes important to determine whether or not the previously discovered outcrop of the oil sand is identical with the outcrop of the oil sand as determined by calculation. It has been found that the angle of the dip would cause the oil sand struck in well *B* to come to the surface at point *L* or *Y*. Therefore it is reasonable to suppose that the discovered outcrop which comes to the surface at *F* represents a stratum of oil sand underlying that penetrated by wells *A*, *B* and *C*.

If an outcrop of oil sand had been discovered at *F* and well *B* sunk, and oil-sand had been struck at 500 feet, it would naturally be supposed that the oil sand stratum discovered at point *F* had been reached. If struck a little sooner than expected, it might be accounted for on the supposition that there is some irregularity in the dip; but when three wells are sunk and the dip, calculated by the method of triangulation already explained, shows that the stratum of oil-sand struck in wells *A*, *B* and *C* ought to appear at *L* or *Y*, it is presumptive evidence that the outcrop of oil sand discovered at *F* is a stratum underlying that penetrated by the wells. When no outcrop of oil sand has been discovered, it is important to find out where the outcrop ought to be in order that some idea may be had on the ground, as to the width of that portion of the oil line which lies between the well and the outcrop.

In all these calculations everything must be reckoned with reference to a common datum, which is preferably the horizontal plane passing through the highest or lowest part of the oil field in which the calculations are made. Oil fields should be developed by this method of triangulation or some modification of it. In the development of an oil field in California it is expected that many cases will occur where the calculations will not check with the results, for the reason that there are irregularities in the formation; but taken as a whole progress by triangulation is the only safe method of procedure.

It will be evident to mathematicians that the calculations herein set forth may be made by various formulas.

From the foregoing paper it will appear that, although the element of risk is inseparable from petroleum mining, it is greatly diminished by competent and careful preliminary work, consisting of:

First—A study of the structural geology of the locality wherein operations are to be conducted.

Second—By following a systematic method of triangulation for determining the strike and dip of the oil sand, and the site of new oil wells.

When a remunerative oil line has been discovered it should be developed gradually; and in districts where there has been much geological disturbance, it is better to limit the distance between wells to about 300′.

If oil lines are discovered on both sides of an anticlinal fold, it is well to develop them simultaneously, by which means a correct idea as to the structure of the fold may be obtained.

By prospecting and developing territory on the lines mentioned in this paper, in most instances, a few wells may be so located that they demonstrate the value of the territory; whereas wells drilled without due regard to the geological conditions of the locality only demonstrate the value of the rocks they actually penetrate, and several wells may be drilled which prove the same fact over and over again, instead of the group of facts on which the value of an oil field depends.

Boring Holes in Soft Ground.

Where rock, such as granite, diorite or other massive rock, has become much decayed by weathering or by the action of underground mineral solutions, and is so soft as to give much trouble in drilling, holes may be bored far more rapidly than they can be drilled. For this purpose take an old mill auger or bit such as is ordinarily used by carpenters. If it is too short, weld on a piece of sufficient length. An inch bit is large enough for practical purposes. The bit should be split at the bottom and the ends turned out slightly (one-eighth inch) in opposite directions. The shank should be fashioned by the blacksmith into a form resembling a brace so that it may be used as a brace and bit. On the end opposite the bit a block may be fixed by boring a small hole in it the size of the iron rod. Having selected the spot for putting in the hole, the block is placed against the breast of the operator, who, with his hand, turns the bit by means of the crank-like arrangement formed by the four right-angled turns of the rod. The bits will cut more or less rapidly according to the nature of the rock, and the drillings are discharged automatically by the spiral shape of the bit. This has been found to work admirably in soft, wet ground where a hole could not be drilled, owing to the continued caving of the hole.

A Los Angeles Co., Cal., Mine.

Written for the MINING AND SCIENTIFIC PRESS.

A remarkable ore is found in a vein known as the Kelsey mine in the San Gabriel canyon in Los Angeles Co., Cal. The mine is eight miles above the village of Azusa. The ore is rich in silver and contains considerable of the native metal.

The country is almost wholly made up of metamorphic rocks, having a schistose, gneissoid, or massive structure. Both hornblende and mica occur in these rocks, the former being found frequently altered to chlorite and the latter by further alteration has in part passed into epidote.

Dykes of porphyritic rock have been intruded into the crystalline schists. In the immediate vicinity of the Kelsey vein are found intrusions of a dark green, much decomposed and shattered rock, which is probably diorite. Faults both great and small are numerous throughout the region. Within a few hundred feet of the mine is a great fault which can be readily seen. The displacement reaches several hundred feet and has resulted in bringing in contact in a horizontal plane on the opposite sides of the fault, rocks of entirely dissimilar character. On the south side of the fault the rocks consist of a series of regularly bedded micaceous sandstones, more or less schistose and having a light gray color, or where oxidized the small amount of iron present has given them a buff color. These rocks dip east at an angle of 20° to 30°. On the north side of the fault the rocks are harder, of dark gray color and contain hornblende in place of mica. They are more gneissoid or massive than schistose. The dip is less regular than the sandstones on the opposite side of the fault. In this formation are numerous large, lenticular masses of quartzose and feldspathic rock, which may possibly represent local segregation of the contained minerals. There is much more evidence of disturbance on the north than the south side of the fault. It is in the disturbed area that the Kelsey vein is found. The vein is a fissure and occupies the line of a fault plane which at first was perhaps a crack, but which has become enlarged by the movement of the rock masses upon themselves, resulting in the crushing and grinding of the rocks and the formation of a convenient channel for the passage of mineral waters and excellent conditions for the deposition of minerals from the mineral waters, and this is what has evidently occurred.

The vein consists chiefly of heavy spar (baryta), with carbonate of lime (calcite) and some quartz. The associated minerals are cobalt bloom (erythrite), a hydrous cobalt arsenate; nickel arsenate (annabergite); carbonate of copper (malachite); silicate of copper (chrysocolla); iron oxide and black oxide of manganese. The silver occurs native and as glance (argentite) and possibly to a limited extent as chloride, and in various combinations with sulphur, cobalt and arsenic. Galena occurs sparingly in small, disseminated crystals.

A clay selvage usually separates the vein from the walls, this feature being particularly noticeable on the footwall side. In places a soft, clayey gouge constitutes the entire vein filling. In width the crevice varies from a small seam to more than 4 feet.

The rocks enclosing the vein differ in various parts of the mine; a much decomposed rock containing iron in the form of carbonate occurs frequently. The dyke of dark, basic rock resembling diorite, previously referred to, is exposed at numerous places throughout the workings, often in contact with the vein or close to it. A more or less schistose to massive chloritic rock is also found, which may represent a phase of the dyke rock.

Since its formation the vein has been subjected to torsion and displacement. A nearly vertical fissure crossing the strike of the vein at right angles has displaced the rocks on the south side of the fault and resulted in giving the vein a curving strike.

Most of the ore extracted from the workings has been of high grade, usually running over $200 per ton and small lots sometimes running into thousands. At one time the late Dr. Endlich made some very interesting experiments with the rich cobalt and nickel ores. The ore taken for these experiments contained 7% to 15% cobalt, 2% to 3% nickel and from 1000 to 1400 ounces silver per ton. The ore was crushed through a 20-mesh sieve, mixed with sufficient litharge to produce an 8% charge, and enough borax added to take up the gangue (heavy spar, quartz, calcite, magnesia and iron). Carbonate of soda and flour were added to the charge. When the percentage of arsenic in the ore was sufficiently high to form speiss none was added, otherwise metallic arsenic was mixed in some sulphides in the ore, and reduced sulphur from the heavy spar was utilized to produce mattes. The mixture was melted in large black lead crucibles, the slag poured off and the metallic product allowed to cool. The bars obtained were composed of lead, silver, cobalt, nickel, arsenic and sulphur, principally, the lead being in the form of sulphide, the cobalt and nickel in the form of arsenides. The bars contained from 4500 to 7000 ounces silver per ton. The slag contained a trace of silver and averaged about 0.75% cobalt which, when desired, could be reworked by arsenizing and the cobalt obtained in the resulting speiss. S.

Some Experiences of a Working Miner,

NUMBER XXVIII.

Written for the MINING AND SCIENTIFIC PRESS.

Several men were earnestly engaged in conversation in L—— A—— one day, and as the controversy did not appear to be of a private nature, I approached, knowing most of them, and listened. One of the party, an elderly gentleman, was telling, with much detail and emphasis, of the wonderful wealth discovered some years previous by a party of prospectors in N—— M—— or A——, near the line. Several nuggets were picked up on the surface, he said, weighing $20 to $80, and they had a large amount of small nuggets and fine dust. The mines had been discovered through the agency of a friendly Indian for whom A——, the leader of the prospecting party, had done a favor—saved his life, I believe. As every one in the West knows, the proper thing for an Indian to do who feels that he owes his life to the man who saved him, is to show him a rich gold mine, and this grateful Indian was no exception. A—— and his party had been conducted to the gold field, and, though they knew they were going on a mining trip, strangely failed to provide themselves with the necessary mining paraphernalia; but this made little difference to the success of the expedition. They worked vigorously, packed dirt down the hill several hundred feet to a stream and washed the earth in a frying pan. Notwithstanding these crude methods, they soon accumulated half a bushel of gold, and had not made a good start. One day one of the men left camp for something and went several miles along the mountain. Returning toward evening and nearing camp, he thought it unusually still and decided to investigate. He cautiously approached a spur on the hillside, on the farther side of which was the camp. Reaching this, he looked around a projecting boulder and was horrified to see the cabin a mass of smouldering ruins; his companions were lying about on the ground with arrows sticking in them until they resembled pincushions. The lone survivor remained in concealment until nightfall, and then going to a certain tree where he had buried an $80 nugget, made his way out of the country and eventually to L—— A——, where he sold the nugget.

The little party listened to this recital with marked interest, and when the gentleman had finished, one of them asked:

"Can this place be found again?"

"It can," was the reply; "but there is only one man who knows the locality."

"And who is he—where can he be found?" was asked.

The first speaker looked knowingly, and smilingly said:

"He can be found when wanted."

"Suppose we organize a party," said another speaker, "and go out to these lost mines. What would it cost?"

"It will cost," said the first speaker, "$2000, and every man furnish his own outfit."

These men actually commenced to talk "business." In a few days a party was organized and a friend of mine was a member of it. He, however, intended to make arrangements with an Indian whom he knew to surreptitiously leave the outfit when the party had reached the mines and telegraph to me; I was to have a large party ready to move at once into the Indian country and take possession of all the territory not already located. A day or two before the time appointed for leaving, the leading spirits of the expedition disappeared, and my friend informed me that they had left without notice, evidently intending to go ahead of the others. All hope of finding where they had gone was lost, and a score of anxious men felt that they had been dealt with unfairly. Several weeks passed, and one day a member of the party that had left was seen on the streets. The following day the others put in an appearance. When questioned, they were at first reticent; but finally they were unanimous in condemning the man who first told the stories of the great wealth of the lost A—— placers.

One would scarcely think that a score or more of men would be so easily taken in; "but distant fields seem green," and this lost placer in the heart of a hostile Indian country was too much for them, and some members of the party were so anxious to corral the whole field that they even did not treat their associates honorably. Like most lost-mine fables, it turned out to have no foundation in fact whatever.

* * *

The B—— H—— mines were much talked of, and eventually attracted the attention of capital. A company took the property, expended a large amount of money, had plans for a large mill drawn and were about to order the machinery, when, for some reason, an experienced mine manager was sent to make an examination. He reported value but insufficient development, and finally recommended a small mill for experimental purposes. This was built; but it was with difficulty that sufficient water was obtained to supply the small mill. Not much was ever said about this enterprise, for the reason, probably, that the large mill was not built. Still, the property has great prospective value, if sufficient water can

be obtained. This simply is another illustration of the way investors will plunge into extravagant purchases of machinery, etc., without first investigating the surroundings. A mill alone would be of little use if no water were available to work the ore.

Characteristic Mines of the California Gold Belt.

NUMBER X.

Written for the MINING AND SCIENTIFIC PRESS.

As stated in a previous paper, the central gold belt in Calaveras county spreads out in the neighborhood of Angels to a width of about three miles, extending from the Star of India on the west to the Birney ranch on the east. At the latter place the diabase and diorite rocks, and the amphibolite schists due to their alteration, are in contact with rocks of a different character and represented by types of diorite and other hornblendic rocks unlike any occurring in the area to the westward.

As the amphibolite schists are important in this section, being intimately associated with the gold-bearing veins and being in places gold bearing, a more detailed description should be given of them. F. L. Ransom, of the United States Geological Survey, thus describes these rocks: "The characteristic mineral of these schists is a green fibrous hornblende, but quartz, in the form of a fine mosaic of interlocking grains, plagioclase, feldspar, chlorite, epidote, biotite, white mica and calcite are all abundant constituents in varying proportions. Occasionally the augite and plagioclase of the original rock occur. These amphibolite schists were evidently derived from the various forms of more or less basic igneous rocks."

In several counties of the gold belt the writer of these articles has collected series of rock specimens which show perfectly and conclusively the transition of massive diorite and diabase over to amphibolite schist.

The Birney mine is one of the most easterly of those which may properly be included in the central belt, though other veins occur in the hornblendic rocks referred to in the area lying to the eastward, and not far distant the rocks of the older Calaveras formation are found. The Birney mine is situated on a low hill one and one-half miles northeast of Angels. The rock is a granular diabase of almost normal type, but altering to amphibolite schist near the veins, of which there are a dozen or more within a distance of 200 feet. Most of these veins are gold-bearing, and in depth simple veins have developed characteristics similar to some of the mines near Angels, viz., a splitting up of the vein with increasing width of quartz, a silicification of the amphibolite schist and the occurrence of auriferous pyrite throughout. Sufficient development work has not been accomplished to determine whether the several veins found on the surface will bear any relation to each other in depth or not.

Not far from this mine in a grano-diorite area, lying to the eastward, the granitic rock is found to be gold-bearing and contains large cubes of auriferous pyrite. The occurrence is of geological interest only. In the area between the Birney ranch and the large mines at Angels are several gold-bearing veins upon which a limited amount of prospecting has been done. West of Angels are numerous claims in which are veins and zones of gold-bearing rock. One of the notable features of the zones or mineral veins in this locality is that the schistose rock as well as the quartz is auriferous. When this occurs it may always be observed that, no matter how completely the original rock has been altered structurally by the compression and shearing to which it has been subjected, it is always more or less silicious.

In the Smith's Flat region, or that section lying west of the Madison-Gold Cliff vein and extending to the Star of India, the veins all bear a certain similarity, occurring as lenses or masses of quartz in splintery, schistose or slaty diabase, more or less altered to chloritic schist. Reticulated systems of small veins are also numerous. There are three zones or belts of mines—the Star of India group on the west, the Blair Con., Eclipse and Gold Hill on the central zone and the Smyth on the east.

One of the most prominent is the Gold Hill mine of the central zone, of what may be termed the western half of the gold belt. In this mine two pay zones have been developed in the amphibolite schist. The rock mass is much decayed at and near the surface and heavily mineralized with iron oxides. The zones are 10 to 30 feet in width and about 30 feet apart. The upper portion of the zone has been extensively exploited by the open-cut system and shallow workings, both shoots being worked by a single excavation. The facility with which ore could be mined here, and the large capacity of the mill—six tons to the stamp daily—made it an inexpensive proposition to operate.

Since writing a former paper of this series, in which the statement is made that the dolmitic material, with mariposite, is not seen in Calaveras county north of Carson hill, the writer has received information to the effect that this material is found in the mines of the Brown-Smyth-Ryland group of Smith's Flat. When these mines were visited formerly the dolmitic rock was not observed, as it was covered with detritus and overgrown with thick brush. This material is an important feature of the mines of the central belt in southern Calaveras county and in Tuolumne and Mariposa counties, but nowhere is it particularly indicative of value excepting at the Rawhide mine in Tuolumne county, where it was found phenomenally rich at one place. Gold occurs, however, in the dolmitic rock occasionally, as previously stated, but not abundantly, with the exception of the single instance noted.

W. H. S.

The Extraction of Nickel From Its Ores.*

By PROF. ROBERTS-AUSTEN.

The Mond process marked an entirely new departure in metallurgical practice and in the principles which had hitherto guided it. It depended on the remarkable property possessed by nickel of forming a volatile compound with carbon monoxide, from which metallic nickel might be released if the gaseous compound was heated to 180° C. The methods hitherto employed for extracting the metal from its ores involved concentrating the nickel either as a sulphide (matte or regulus), or as arsenide (speiss), followed by either dry or wet treatment; and the metal to be refined, mainly with a veiw to separate it from associated carbon. In 1889, Dr. Ludwig Mond, in collaboration with Dr. Carl Langer, had been engaged upon a metod for eliminating the carbon monoxide from gases containing hydrogen. They had been guided by the observation that finely divided nickel removed carbon from carbon monoxide at a temperature of 350° C., converting it into carbon dioxide, whereas the dissociation of carbon monoxide by heat alone, according to Victor Meyer and Carl Langer, remained incomplete at the high temperature of 1690° C. The experiments were carried out in conjunction with Dr. Friedrich Quincke; finely divided nickel, formed by reducing nickel oxide at 350° C. by hydrogen, being treated with pure carbon monoxide in a glass tube at varying temperatures. The gas escaping from the apparatus was ignited, and while the tube containing the nickel was cooling, the flame became luminous, and increased in luminosity as the temperature sank below 100° C. Metallic spots were deposited on a cold plate of porcelain held in this luminous flame, and on heating the tube through which the gas was escaping a metallic mirror was obtained, while the luminosity of the flame disappeared. These metallic deposits were found to be pure nickel. Nickel-carbonyl was then isolated in a liquid state, and it was possible to produce it with facility in any desired quantity. It could be readily distilled without decomposition, but on being heated to 150° C., the vapor was completely dissociated, pure carbon monoxide being obtained and the nickel being deposited in a dense metallic film upon the sides of the vessel. No other metals which were submitted to investigation showed indications of combining directly with carbon monoxide except iron. The discovery that in a mixture of metals only nickel and iron would form volatile compounds with carbon monoxide, and that they could, therefore, be separated from other metals, induced Dr. Mond to arrange experiments with ores containing nickel, cobalt, iron, and copper —such as "kupfernickel" and "pyrrhotite." The experiments afforded such promising results that apparatus of considerable size, though still within the limits of the resources of a laboratory, was set up, and in it several pounds of ore could be treated with carbon monoxide. The principal nickel ores which were metallurgically treated contained the nickel in combination with arsenic and sulphur, besides other metals and gangue. These ores had first to be submitted to calcination, in order that the nickel might be present in the form of oxide, and to drive off, as far as practicable, the arsenic, sulphur, and other volatile bodies. The resulting oxide of nickel was treated with reducing gases, such as water gas or producer gas, in order to convert the oxide of nickel into finely-divided metallic nickel, and the material containing it was cooled to about 50° C., and was treated with carbon monoxide. In 1892 an experimental plant on a large scale had been erected at Smethwick, near Birmingham. The process began with "Bessemerized" matte; it ended with the market product, commercial nickel. The Bessemerized matte proceeded to the first operation of dead roasting, after which the matte contained 35% of nickel, 42% of copper, and about 2% of iron. It then passed to the second operation for the extraction of part of the copper (about two-fifths) by sulphuric acid, the copper being sold as crystallized sulphate of copper. The residue from this process contained about 51% of nickel, and it passed to the third operation for reducing the nickel. Incidentally, the remaining copper was reduced to the metallic state, care being taken to avoid reducing the iron. This was effected in a tower provided with shelves, over which mechanical rabbles passed, the reducing agent being the hydrogen contained in water gas. The temperature did not exceed 300° C., and should be kept lower when much iron was present. From this tower the ore was conveyed continuously to the fourth operation of volatilization, in which part of the nickel was taken off by carbon monoxide and formed the compound nickel-carbonyl. The formation of this volatile compound was effected in a tower, but the temperature was much lower, and did not exceed 100° C. From the volatilizer, the ore was returned to the reducer, and it continued to circulate between the reducing and the volatilizing stages for a period between seven days and fifteen days, until about 60% of the amount of nickel had been removed as nickel-carbonyl. The residue from this operation, amounting to about one-third of the original calcined matte, and not differing much from it in composition, was returned to the first operation and naturally followed the same course as before. The nickel-carbonyl produced in the fourth operation passed to a decomposer, which consisted either of a tower or a horizontal retort heated to a temperature of 180° C., so as to decompose the nickel-carbonyl and release the nickel in the metallic form, either on thin sheets of iron, or preferably, on granules of ordinary commercial nickel. Carbon monoxide was in turn also released, and was returned to the volatilizer for taking up a fresh charge of nickel. When the operation was in progress, the gaseous carbon monoxide and the partially reduced oxide of nickel and copper continuously revolved in two separate circuits, which joined and crossed each other in the volatilizer. The commercial product contained 99.8% of nickel. The author proceeded to a description of the working as he saw it in full operation in Smethwick. The plant had been working for some time, and nickel had already been extracted from different kinds of matte. The results were satisfactory, and pointed to the conclusion that the process was well able to compete with any other process in use for the production of metallic nickel. The process would always occupy a prominent position in chemical history, and there appeared to be no reason why it should not play an important part in metallurgical practice. Its application in Canada to the great nickeliferous district of Sudbury would probably contribute to the development of the resources of the Dominion.

*Condensed from a paper read before the Institution of Civil Engineers.

Of Importance to Miners.

Superintendents of Government forest reserves in all the Western States and Territories where mining is carried on have received the following instructions from the Commissioner of the General Land Office, as to the cutting of timber on Government forest reserves:

"Referring to the provisions of the Act of June 4, 1897, for the free use of timber, as regulated by paragraph 21, page 12 of rules and regulations governing forest reserves, you are advised as follows:

"Any person authorized by the said Act to secure forestry reserve timber for his own individual needs may procure it through a sawmill operator or other person acting as his agent direct; but however procurred, whether by his own hands or an agent direct, he should first confer or communicate with you directly, or through the nearest forestry officer, designating the location, amount and value of the timber proposed to be cut, the place where and the purpose for which the said timber will be used; stating what sawmill or other agent, if any, will be employed to do the cutting, removing and sawing, and pledging that no more shall be cut from the reservation than he needs for use on his own land or claim, and that none shall be sold, disposed of nor used on any other but his own land or claim; and guaranteeing to remove and safely dispose of all tops, brush and refuse cutting, beyond danger of fire therefrom.

"The bona fide settler and miner, each acting in his individual capacity, is not precluded from taking his timber to the sawmill; nor is the sawmill proprietor precluded from receiving or sawing or otherwise handling the timber for that settler or miner; provided the sum charged therefore is exclusive of any charge of the timber itself, and is no more than a reasonable sum to cover time and labor expended and all legitimate expenses incurred in sawing or handling it. The charge cannot be paid with any part of the timber, or with any other timber taken from any public lands.

"The stumpage valuation is the value of the timber in the standing tree, and it is determined by the locality and size of the timber, the commercial use for which such timber is sought, the demand therefor, etc.

"The said provisions for the free use of timber contemplates individual use only. Therefore mining corporations, lumber companies and any organization engaged in extensive business enterprises requiring vast amounts of timber, are not entitled to any of the benefits thereof.

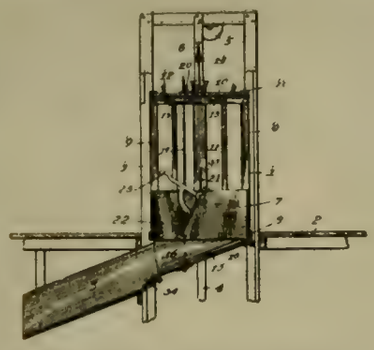
"Residents of towns and villages within or near a forest reservation, having railroad facilities and other convenient access to sawmills and lumber yards where lumber and fuel can be procured by purchase, are not entitled to the benefits of the provision of the law for the free use of timber."

Latest Mining and Metallurgical Patents.

Patents Issued Aug. 1, 1899.

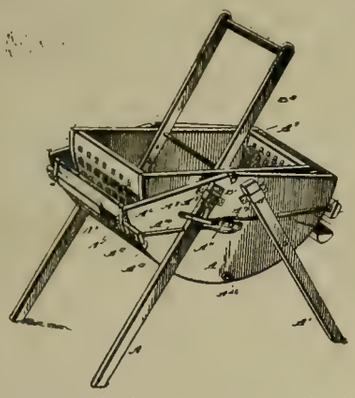
Specially Reported for the MINING AND SCIENTIFIC PRESS.

HOISTING CAGE FOR MINES.—No. 629,854; J. W. Hall, Coffeen, Ill.



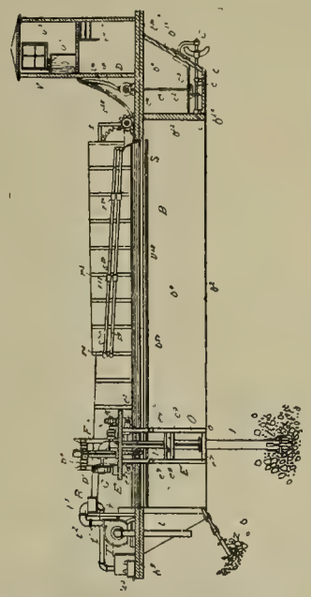
A hoisting cage for mines, constructed with a rectangular receptacle, a door hinged to close the entire lower end of the receptacle, which door is held closed by the weight of the cage, a door hinged to one end of the first mentioned door and closing half of the receptacle, and a vertically arranged partition in receptacle, the lower edge of which engages the edge of the second-mentioned door. Means whereby partition is swung laterally to disengage the edge of the second door, a framework in which the cage operates, and means whereby cage is held at a desired point in framework.

ORE WASHER.—No. 629,947; E. J. Beverstock, Washington, D. C.



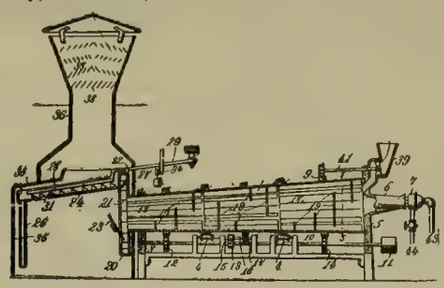
A machine of the class described, a pivotally suspended basket having a curved screening bottom in a combination with a stationary tank having an imperforate bottom of similar curvature, and having an open top and curved bottom with exterior transverse splasher bars thereon; the load carried by the basket is supported below its center of motion in combination with a tank having a similarly curved imperforate bottom.

SUBMARINE MINING AND ORE SEPARATING APPARATUS.—No. 629,910; E. C. Nichols, Topeka, Kans.



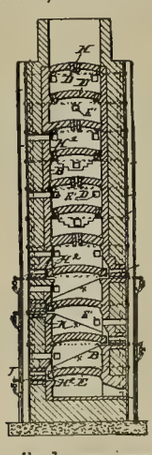
A submarine mining apparatus, a frame, a motor upon frame and a stationary material conveying hollow shaft supported within frame, a suction and force pump connected with shaft, shaft also having a separate telescopic portion, rotating power devices connected with the motor and telescopic portion of shaft, an elevating apparatus upon frame, also connected with the telescopic portion of shaft, and separate power reversing mechanism upon frame connected with shaft, elevating apparatus, and also connected with motor. A water carriage and a frame upon carriage, a suction and forcing apparatus and a conductor connected with the induction opening to apparatus and also with shaft, a motor upon water carriage, and a rotary shaft having a worm upon the frame carrying hollow shaft, a power conveyer connected with the shaft motor and the telescopic end portion of hollow shaft, and a collar upon telescopic portion of shaft engaging with worm, and means for reversing the action of motor. An oscillating frame, and a shaft with which frame is connected, suitably supported upon platform, and a hollow shaft adapted to be extended to the bed of the river, supported within frame, a suction and forcing apparatus upon platform, and a pipe having flexible joint connected with the induction opening to suction and forcing apparatus, and also with hollow shaft, and a frame upon platform, and a worm upon frame, and a curved rack upon oscillating frame.

ROTARY CYLINDER DRIER.—No. 630,059; C. M. Kemp, Baltimore, Md.



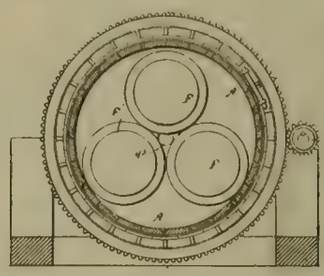
In a drier, a plurality of horizontal cylinder sections, mounted end to end to form a continuous cylinder, and means for rotating different sections in different directions. The combination with a drying cylinder having an open discharge end, of a drying table arranged at one end of cylinder so as to be heated by the exhaust heat from the latter, means for conveying the material onto the table after it has passed through the cylinder and a series of discharge tubes at the lower end of the table. A conveyer wheel secured to the end of the cylinder and serving to convey the material onto the drying table as it is discharged from the cylinder. A rake movable over the face of table and means operated by the cylinder for moving rake over the table. A cover plate at the rear of table and extending partly over the top thereof and a stack rising up from the table to convey away the exhaust heat from the drier. The drying cylinder having a series of longitudinal blades on the interior thereof, and a plurality of transverse deflector plates arranged in spiral order around the interior of the cylinder, plates being separated one from the other. A series of transverse slats located in the stack and arranged to arrest the flow of fine particles from the stack and to precipitate particles back upon the table.

ORE ROASTING AND CALCINING FURNACE.—No. 630,108; G. A. Richard, Mount Morgan, Queensland.



The herein described ore roasting and calcining device, comprising a vertically elongated structure, a furnace at the bottom thereof and horizontal partitions therein provided with openings at alternately opposite ends, some of partitions being provided with openings at the sides, and some of partitions being provided with vertical openings therethrough along the longitudinal center thereof. The structure provided with fireproof lining, horizontal partitions therein provided with openings at alternately opposite ends, the partitions being arched and some of them provided with openings in the top of the arches, and the others with openings at the sides of the arches, and injectors arranged at the side openings for directing jets of steam or air through openings into the chambers beneath the partitions in proximity to the openings at the sides of the partitions.

PULVERIZER.—No. 630,125; J. H. Steele, Butte, Mont.



A pulverizer, comprising a revolvable drum provided with inlet and outlet openings at opposite ends, and sets of plain disk-like crushing rollers in the drum, each set consisting of three rollers in peripheral contact with each other, and the sets of rollers being arranged side by side throughout the length of the drum with the two lowermost rollers of each set in contact with the drum, the spaces between the rollers of the several sets being in longitudinal alignment with each other and into which spaces the material is fed from inlet opening.

PROCESS OF EXTRACTING GOLD AND SILVER.—No. 629,905; John J. Hood, London, Eng.

A precipitant consisting of an alloy of about one hundred parts of zinc, five parts of antimony and twenty parts of mercury. The process of extracting the gold, silver and mercury from solutions, by bringing the solutions into contact with an alloy of zinc, antimony and mercury, from time to time distilling off mercury from the alloy, and finally recovering the gold and silver from it.

Copper Statistics.

The following table gives the semi-annual statistics of copper compiled by the New York Metal Exchange:

Supplies for the six months ending June 30, 1899:

	Tons.
Domestic production, as per producers' returns	124,487
Foreign net importation	13,908
Total supplies	138,395

Deliveries for the six months ending June 30, 1899:

	Tons.
Exports of domestic to Europe	51,723
Exports of domestic to British North America	220
Exports of domestic to Mexico	50

Contents of sulphate of copper exported:

	Tons.
7640 tons at 25%.	1,910
Total exports	53,903
Estimated deliveries for home consumption	72,000
Total deliveries	125,903

The domestic production shows an increase of exactly 4000 tons, as compared with the same period of 1898, but compared with the last half of 1898 the increase amounts to 10,702 tons.

The importation of foreign is the largest on record, exceeding even the total for the whole year of 1898 by 1000 tons. Of the 13,908 tons imported, about 7100 tons came from Europe, being mostly of Australian and Japanese origin.

Exports to Europe show a decrease of 13,611 tons, as compared with the same period of 1898, and of 14,180 tons if compared with the last six months of 1898.

The contents of sulphate exported show an increase of 820 tons as compared with the same period of 1898.

Deliveries for home consumption were extremely heavy during the second quarter of the year. For the six months the increase over the same period of 1898 amounts to 18,000 tons, and if compared with the second half of 1898 the increase shows 12,000 tons.

The surplus in supplies over deliveries amounted to 12,942 tons, the greater part of which went into newly established refineries.

The above figures are in long tons of 2240 pounds.

By a newly invented process, zinc sulphide is reduced to metallic zinc by first roasting the ore to convert the zinc into an oxide, converting the resulting sulphurous acid into sulphuric acid, causing the latter to act upon a chloride as cupric chloride or perchloride of iron, thereby extracting a portion of the lead removing such solution, roasting the mineral thus partly freed from lead, and then reacting thereon with hydrochloric acid gas in presence of water or a chloride solution, whereby lead and silver are first extracted from the crude ores and subsequently a final solution obtained containing the zinc in the form of chloride.

The Lucknow, N. S. W., Gold Field,*

By A. R. Canning, A. I. M. M.

Mineralogy.—The minerals found on this field are not numerous, but are interesting. They may be separated into two classes—payable and non-payable. Under the former are free gold, auriferous arsenical pyrites and antimony carrying gold. Under the latter are found magnetic pyrites (pyrrhotite), iron pyrites, zinc blende, and more rarely galena, stibnite, kersemite and cobalt bloom.

Free gold occurs in exceedingly rich patches in the calcite. When in this form it is most often dendritic in structure, but is also found tabular or threaded through the stone. Where the rock is less rich the gold differs but little from the ordinary reef gold, although usually met with in calcite. It is seldom found very massive, a 1 dwt. piece being considered large. Pieces of stone several pounds in weight have been and are still being found, yielding up to 40% bullion. Such stone on being treated with acid gives an excellent illustration of how the gold exists in the rock, for, the matrix being dissolved, the moss-like form of the gold is apparent. Rich stones of this class are not by any means regarded as office specimens, for they are not infrequent, and are treated with other ore going from fifty ounces and upwards. The output of the mine depends largely upon this special class of ore.

Up to four years ago, while oxidized zones were still met with, large cavities or vugs were found in the larger quartz veins. In these there existed a quantity of brown matter, sometimes of an earthy, sometimes of a spongy nature, and this carried as high as 50% of gold. By washing and squeezing the valuable contents were easily extracted. It was mainly to the finding of such pockets that the phenomenal returns of that time were attributable. There were 16,345 ounces in March and 16,965 ounces in April, 1895—at that time a record yield. Unfortunately, no specimens of this so-called brown vein have been kept. The value of the bullion is £3 10s an ounce.

Arsenical Pyrites.—This mineral is the most important, and, since the oxidized zone has been passed through, more gold exists in this pyrites than occurs in a free state. Arsenical pyrites is found both in radiating and massive form, though the latter by a play of light very often shows a divergent structure. These forms usually have from one-fourth to one inch radius, but portions of considerably larger bodies have been found.

Careful analysis to detect the presence of antimony sulphide, and so account for this radiating form, have failed to show that mineral. The arsenical pyrites assays very high in gold, the clean mineral in which no gold can be seen yielding 100 to 800 ounces per ton; and from other examples in which gold can be seen coating the faces, sticking out from or otherwise closely associated with the mispickel, assay results of 1500 to 3000 ounces to the ton have been obtained from lumps of considerable size.

Blocks of solid mispickel weighing from two to five tons have been found during the past three years, which, taken intact, would assay 250 ounces of bullion to the ton, and in some instances might have given better results but for the presence of pyrrhotite. For some time it was considered that the arsenical pyrites, in which the radiating structure was displayed, was richer than the more massive, but it is not so. Not the least interesting of the specimens shown is a fine-grained arsenical pyrites occurring in a clean, pearly lustered calcite in which the cleavage is well determined. Such stone, although not carrying more than 25% to 30% of mineral, assays from forty to fifty ounces of bullion per ton. A distinctly different class is found in a dense, fine-grained massive stone having an almost rectangular cleavage, but otherwise uninteresting in appearance. A portion of this stone assayed 321 ounces bullion.

Antimony.—This is more erratic in its occurrence than the other minerals, and, besides being auriferous, it almost invariably betokens the vicinity of rich arsenical pyrites. The value of the antimony lies entirely in the gold contents, and this varies somewhat. There may be said to be two classes of this mineral; the one is hard and untarnished and grouped in heavy well-defined crystals with striated faces. These crystals are found shot about in calcite. This form of antimony is not rich in gold. The other class shows a dense crystalline mass, the mineral being found in splashes or bunches. It does not appear to carry any quartz or calcite matrix. It is much softer than the first-mentioned, and, certain faces being tarnished black, it is evidently accompanied by stibnite. This class of mineral carries considerable gold, but varies with the locality in which it is found. It assays not less than 6 dwts. and more than 10 dwts. per unit of antimony. Bullion won from the antimony ores is good—far better than that obtained either in a free state or in combination with the arsenical pyrites. As has been remarked, antimony is a good indicator, and several valuable bunches of high-grade ore have been found by paying attention to a few specks or a tiny seam of antimony.

Non-payable Minerals.—Magnetic pyrites is the most prominent and the most unsatisfactory feature of the mine. Pyrrhotite occurs in zones in the veins, and either entirely replaces the auriferous mispickel or is so intimately associated with it as to almost smother it, bringing the value of the lode down till it verges on the unpayable. The magnetic pyrites seldom occurs massive, it being more often spotted about or displaying a reticulate form. Splendid pay bodies have gradually given place to this unwelcome mineral, which lives both in the quartz and in the calcite. Not unfrequently, after 50 or 100 feet of worthless pyrrohite, the arsenical pyrites reasserts itself. Where the magnetic pyrites is strong, great uncertainty exists as to whether certain blocks of ground will repay extraction and treatment. Frequently each sample contradicts the previous one. Carefully taken daily samples from a drive advancing along a strong lode, highly mineralized with pyrrhotite, gave the following sequence: 6 dwts., nil, 22 dwts., nil, nil, 3 dwts., nil, 12 dwts., nil, trace—results that hardly tend to elucidate matters. Where a strong calcite lode carrying pyrrhotite is found, it has to be subjected to very extensive prospecting in order to show whether parts of it may not prove payable. The pyrrhotite carries no nickel.

Iron pyrites and also zinc blende are found chiefly in the quartz reefs and apart from the gold-bearing calcite. This, however, is not a hard and fast rule, and free gold has been found on the field in conjunction with these minerals.

*Condensed from a paper read before the Institution of Mining and Metallurgy.

An Occurrence of Free-Milling Gold Veins in British Columbia.*

By Wm. Hamilton Merritt, F. G. S.

The free-milling gold ores have not as yet been developed to the same extent as the smelting ores in British Columbia. Indeed, it might very correctly be said that (excepting, possibly, the Poorman, near Nelson), until comparatively recently the Cariboo at Camp McKinney was the only mine that had been constantly at work for some years back on a free-milling gold ore of sufficiently high grade to yield its owners handsome dividends.

Somewhat similar conditions prevail about twenty-five miles from Camp McKinney in a locality known as the Fairview Camp, and while it cannot be said that developments up to the present have demonstrated ore shoots as extensive, and perhaps as high grade, as on the Cariboo, yet there is high-grade ore, there are strong and permanent veins, and I think I may very properly take a portion of this camp as a type of the occurrence of free-milling gold veins in British Columbia.

Intrusive granite appears to be the rock most intimately connected with the free-milling gold ores in the southern part of the province—that is to say, perhaps not of necessity as forming the walls of the veins, but, as in Nova Scotia, occurring in the immediate vicinity.

Here in one part of the camp in question an immense mass of intrusive granite forms the major part of a mountain. This is bounded on the northeast by a schistose quartzite (microscopic examination, referred to later, would allow it to be classified as a mica schist).

The schistosity of this rock is parallel to the edge of the granite. A couple of strong quartz veins occur in the schists running with them. The veins have been opened at various places along a length of a couple of miles and are found to follow in a general way, and sometimes to be quite close to, the edge of the granite.

Here and there protrusions of the granite mass have caused disturbances and have thrown the veins, in well defined faults, to the northeast. Where the faulting occurs the schist is also much twisted.

The veins above alluded to vary from 2½ to 12 and 15 feet in thickness, and so far as their width and permanency go they are everything that can be desired. The mineralization is similar to that of the Camp McKinney veins, consisting of varying proportions of iron pyrites, galena, zinc blende and gold.

A number of mill runs showed that the free-milling value was some five times that of the value of the concentrates obtained per ton of ore milled; but at the same time a considerable larger value, per ton of ore milled, escaped in the tailings caught by the Frue vanners; indeed, the loss in the tailings in some trials was nearly half the value of the bullion caught in the battery and on the plates.

In higher grade ore the tailings sometimes ran to $4 and $5 a ton.

The loss in the tailings is probably carried over by slimed concentrates. This is a matter that will bear careful watching in the development of the Fairview and Camp McKinney camps, and it would be no matter of surprise to me were it found that all the tailings run away from the Cariboo mill would bear treatment. Cyanide tests have given an extraction of 90% gold and 75% silver of both concentrates and tailings, the samples tested being from above mentioned test runs.

When running on a pay grade of ore the yield of concentrates is about 2% and their average value is about $70 a ton. They have been generally shipped to smelters.

As is usually the case elsewhere, the rich places appear to occur as shoots, and in the claim about 100 feet was quarried along the outcrop, yielding good results, from a width of over 12 feet in places.

I understand that the part of the vein which paid on the surface is being opened in depth.

It should be mentioned that while most of the veins have been developed in the schistose rock, yet there are cases where veins have been opened in the granite. In one of the latter instances ore was obtained which yielded upwards of $30 a ton in the mill, but it was reported that this vein was very irregular and all the pay ore mined out.

The geological features of the portion of the camp above alluded to is the more immediate object of these notes. It might appear that there were at least two series of upheavals—the first may have caused the fissures in which the veins were deposited, and the second, accompanied by constant great pressure, has produced the faults in the veins and also the schistosity parallel to the strike of the vein and at right angles to the evident thrust from the mountain of granite.

This is another example of the so-called "bedded vein" structure, but in this case they are as typical fissure veins as it is possible to imagine.

This is shown much more distinctly in another strong vein farther to the east. Here the vein occurs in a darker schist; but, on microscopic examination, its wall rock shows identical features to the wall rocks of the main system of veins beside the great granite mass. In this latter case, however, it is clearly shown in the rock section (described later on) that the original bedding has been disturbed by pressure and that the present bedding has been set up at some 50° from the original bedding, the present bedding being parallel to the vein.

An example such as this is of value to offset the too often indulged in deprecation of a vein where the bedding is parallel to it, and for which reason it is sometimes held that it is not a fissure vein, though indeed the bedding or schistosity may have been formed subsequently to the original fissure.

The following are the descriptions of the granite and schistose quartzite (or mica schist):

Biotite Granite.—Rock light in color, of medium grain and somewhat porphyritic, owing to the biotite being, as phenocrysts, scattered rather sparsely. The section shows granitic quartz with the usual inclusions; orthoclase rather fresh looking; plagioclase which is much altered and shows much secondary mica in small flakes all through it. The plagioclase is in excess of the orthoclase and the two are predominant in the rock. No accessory constituents are to be noticed in the section.

Muscovite Granite.—Resembles the above closely in color and general structure, but it is finer grained and is without porphyritic crystals of mica. The specimen was taken from the same intrusion as the above, but nearer the edge, where it has cooled more rapidly. The rock is more altered than the one just described. The microscope shows much muscovite, most of which seems to be derived from the feldspar. The little flakes show very high polarization colors; granitic quartz in normal proportion; feldspar present in large quantity, part of it seems to be orthoclase and part probably plagioclase, but very much altered, the muscovite being all around and through it. Some small scattered grains of ferric oxide, in the center of which pyrite is visible where decomposition has not yet oxidized the whole mass.

Mica Schist (*Schistose Quartzite*).—The specimen represents the general character of the formation in which the veins occur along the edge of the large granitic mass. The rock is a very fine and rather evenly grained mica schist. The quartz grains are rather irregular in size, but in a general way they are very minute. There is an abundance of both biotite and muscovite, the two kinds intimately mixed and forming pretty, continuous strings. Both are in fairly well defined crystals, the former in small, oblong prisms and the latter in long needles. Scattered quite profusely through the section are irregular pieces of pyrite, considerably decomposed, and with their longer axes also usually following the direction of schistosity.

Mica Schist.—This specimen represents the rock in which the vein to the east occurs. The constituents of this rock are identical with those of the last described, and they have probably both been formed together, but this rock is less evenly grained, as it shows evidence of having had another bedding previously, and the present bedding is naturally, therefore, not so perfect. The rock is stained dark with iron oxide and microscopically has the appearance of a fine-grained gneiss. It is seen to be made up of dark layers alternating somewhat roughly with lighter and thinner layers.

This section shows by the direction and arrangement of its mica constituents that there has been a previous bedding of the schist inclined to the present bedding at an angle of about 50°. The original schistosity may then have been parallel to that of the previously deposited specimen of mica schist, and the present bedding subsequently formed by heat and pressure at an angle.

*Condensed from Transactions Canadian Mining Institute.

Mining Summary.

ALASKA.

Reports received by the director of the Mint at Washington, D. C., show that so far this season the amount of gold received at Seattle from the Alaskan gold fields aggregates $4,900,000, of which $4,018,262 arrived during July. The amount so far received at San Francisco is approximately $2,700,000. These amounts, however, do not represent the entire output of the fields.

Juneau *Truth*: A new placer strike is reported on a creek flowing into Lake Bennett. Six miles of the creek is already staked and there is a rush to the new diggings. Mr. Morse of Skagway, who owns a quartz claim below the new diggings, saw coarse gold taken from one of the claims.

ARIZONA.

(Special Correspondence).—Stanley Butte and Mount Turnbull mining districts are on the San Carlos strip, on the west side of the Gila river, which was formerly part of the Indian reservation. The strip is from five to ten miles wide by forty-five miles long. It was thrown open for location as mineral land Nov. 19th, '98.

It had been known for years that a coal belt ran through the strip, from which, years ago, coal was mined and hauled by wagon to Globe and Phœnix. When the strip was thrown open the lands were formally located. It had been known that gold, silver, copper and lead existed here, but settlers were prohibited from developing the leads. A large portion of the district is mineralized, the predominating mineral being copper ore, which assays from 5% to 50% and carries gold from $2 to $100 per ton; silver from 5 to 50 ounces, and some lead. Some weeks ago it was reported that a body of wolframite had been found. Samples sent for analysis gave conflicting returns. In one instance returns showed tungsten to the value of $300 per ton; in the others no tungsten was found, but the samples contained gold and silver and a large percentage of specular and magnetic iron.

The formation of the district is lime, porphyry, quartzite and slate, and the veins are mostly contacts. No great depth has been reached in any place. Prospect holes 10 to 60 feet in depth abound.

Wood and water are here in sufficient quantities for present needs, and, in the future, timber in unlimited quantities can be obtained from the sawmills in the Graham mountains, while the Gila river, eight miles distant, will furnish water.

From Stanley Butte, which has an altitude of 11,000 feet, there diverge several ravines known as Kelly gulch, Squaw creek, Garden gulch, Deer creek, Hawk canyon, and others, on the sides of which are the various prospects.

W. J. Parks, who is interested in various parts of the district, owns interests in forty-two claims.

The Copper Belle group, owned by Jones & Porter; the Longfellow, owned by Bull, Whipple et al.; the Nevada, owned by Foster, Cunningham et al.; the Old Man and Palo Alto, owned by Allison Bros.; and the Black Diamond, owned by Dempsey & Williams, are among the important prospects.

The Lone Pine group, under bond for $22,500, is being developed under the management of John Belser, who is working three shifts.

The Gold Crack and Cabinet, owned by Cunningham, Knowles et al., has a shaft down 70 feet and has made two shipments of ore, the first netting $61 and the other $57 per ton. The Friend, owned by Warren & Blake, has made one shipment of sixteen tons, netting $150 per ton, and has another of a like amount ready for shipment. The Capt. Jack and Jump-Off-Joe, owned by W. C. Warren, is where the supposed tungsten was found.

The Grand Reef is owned and operated by John W. Mackay, and consists of a group of ten claims in Aravaipa canyon, at the foot of the Santa Teresa spur of the Graham mountains. This property was purchased by Mr. Mackay, December, '96, and has been operated continually since under the management of J. W. Payne. A depth of 700 feet has been reached and 3000 feet of levels have been run. It is stated that over $200,000 has been expended upon the property. Water is piped from wells three miles distant, and power drills used. Fifty men are employed at $3 to $4 per day. There are a dozen buildings connected with the property.

San Carlos Strip, Ariz., July 29th, '99.

(Special Correspondence).—Mining in Chloride district is active, made so by a number of rich strikes in old and, to some extent, abandoned mines, a number of which have been reopened within three months. Those that have been recently developed have in every instance become ore producers. The ore is found where work stopped years ago. It is proven that below water level the best ore is found. The ore in a number of instances is very rich in native and ruby silver, which is usually accompanied by gold, copper and lead.

The Tennessee mine has 12 feet of ore in its 375-foot shaft, chiefly lead carbonate, with streaks of wire and ruby silver through it. Recent rains have increased the water supply and the concentrator is now run most of the time. Within the past two weeks ore on the dump has been lessened and the concentrates shipped to Pueblo and Denver, Colo.

The Elkhart mine is also in ore and the concentrator is kept busy. The shaft is down 400 feet, with much crosscutting and drifting at this depth in ore. This and the Tennessee are on the same vein, separated by the Schuylkill mine. The ores in these mines are of the same character and value. The Elkhart is working a greater number of miners than ever before, and many improvements have been projected by Dr. T. B. Comstock, the Mgr.

Cleeland Bros. & Cochran of Philadelphia, owners of the Merrimac mine, have been here, and, after an inspection, decided to erect a concentrating plant. In the meantime, J. M. Russell is having preliminary work done at the mine, which has a quantity of high-grade ore on the dump.

Colin Timmons, Mgr. Payroll mine, has a large body of lead carbonates in that property. This is a branch from the Tennessee lead, being a few hundred yards southeast of the latter. It is of considerable size. This ore is being shipped, the mine having no concentrating plant, and no custom work is done in the district.

The Mollie Gibson mine, which was recently equipped with a steam hoisting plant, remains idle. Several men are working under the direction of Mr. Grant, the foreman, but the ore body is not being touched. The owners made the purchase last spring, and all are Montana men. E. J. Carter is Gen. Mgr.

The northern terminal of the Arizona & Utah R. R. is now near here.

Chloride, Ariz., Aug. 9th, '99.

Tucson reports that 100 men are at work in the Helvetia copper camp and that large smelters will be erected.

Pres. Coram of the Cochiti G. M. Co. has issued a circular outlining the developments at the mine to date. He says the company has a shoot of ore which is opened to 600 feet in depth, 450 feet in length and 60 feet in width—a block containing 1,500,000 tons. As soon as the mine is equipped to treat 10,000 tons per month it is thought it will be upon a dividend paying basis.

The village of White Hills, in Mojave county, was nearly washed away by a flood on the 3rd inst. Several cabins and other buildings were destroyed or damaged.

Kingman *Miner*: C. E. Sherman has opened a good body of ore in the Katie mine, at Mineral Park. The ore body was found in a drift run from the tunnel level and within a few feet of where leasers left off. It is 4 feet in width and all pay. A streak on the wall 20 inches wide gives a high value in silver. The mine has been idle for years.

Arizona *Republican*: A favorable report comes from Fool's Gulch. At the Planet-Saturn the 10-stamp mill has been started and five stamps are running. There is a scarcity of water, hardly enough for the five stamps. A portion of the water is pumped back to be reused. It is proposed to sink a new well of large diameter. The ore has been tested and proven satisfactory. The ore bins are full and enough rock is out to feed a 10-stamp mill three months.——R. McNary of Copper Basin is driving a tunnel in good ore. Six weeks ago twenty tons of this ore was worked at the Last Chance mill and turned out gold valued at $1056.54, while the concentrates carried $200 per ton.

Journal-Miner: The Empire M. Co. keeps its 10-stamp mill running day and night on Lynx creek, near Prescott. It is shipping a carload of concentrates every third day.

Journal-Miner: It is reported from Mayer that a strike has been made by the Standard Copper Co. Years ago a shaft was sunk 100 feet in a saddle of Copper mountain, and ore cut by the shaft extended from 42 feet below the surface to the 100-foot level, where the ore was 14 feet wide. It is a black sulphide of iron. Working tests of average sample lots returned from $20 to $26 gold per ton and several ounces of silver. The shaft was continued to a depth of 150 feet, being 550 feet lower than the apex of Copper mountain, and drifts were run in three directions to catch the ore body, but without success. Recently the old shaft was cleaned out and prospecting at a lower level recommenced. A mass of lime 40 feet wide was cut and in this 41 feet from the shaft Mr. Stoddard has struck the body of ore. The drift is in solid ore, which contains four times the copper values of the ore above, the black sulphide of iron being replaced by yellow sulphide of copper.

Kingman *Miner*: G. Klempf and W. Bohne have opened a body of ore on the old Mint claim at Layne Springs that runs 110 ounces silver and 2 ounces gold to the ton. This claim had long been abandoned.——Capt. Polhamus, with the new river steamer, is hauling two mills for the Arizona & New England M. Co. from Needles to the landings forty miles above. On the Nevada side of the river a 20-stamp mill will be erected and on the Arizona side ten stamps will be added to the ten stamps already in position, the two mines owned and operated by the company keeping the mills running.——A representative of the Standard Oil Co. has been examining mines of the Klondike district, in which that corporation is interested. The claims in which they have recently acquired an interest are large bodies of gold-bearing lime carbonate, in which shafts will be sunk.

CALIFORNIA.

Amador.

Sutter Creek *Record*: Supt. A. L. Gross has let a contract for sinking 200 feet in the Centennial shaft.——Development work is in progress at the Pocahontas mine and fourteen men are employed.——At the Bay State mine, four miles north of Plymouth, thirty men are employed and development is in progress. The property is owned in Stockton.——S. K. Thornton has a good prospect in the quartz claim he bonded on the Easton ranch.——The mills working on the old Pacific dump, which were closed recently, are running again.

Jackson *Republican*: Fifty men are employed at the Zeila mine and prospecting is carried on simultaneously with the regular work of the mine. The mill has recently been crushing ore from the Central Eureka. The Zeila mine has been working continuously for a quarter of a century.——At the Amador Queen No. 2, south of Jackson, drifting at the 500 level is in progress.——It is reported that work at the Amelia mine, adjoining the Argonaut, is to be resumed.——It is said that a mill will be put up at the Oneida mine next year.——Another rich body of ore has been found in the Central Eureka mine near Sutter Creek.——Devlin & Marsh, owners of the Klondike mine, have organized with a capitalization of $150,000 to work this mine.

Calaveras.

At the Petticoat mine, near Railroad Flat, a station has been cut at the 550 level; sinking to 650 feet and drifting on the 550 level are in progress.

At the Poorman mine, near Glencoe, the work of sinking from the 250 to the 350 level has been completed and a level is being run to tap the pay chute, which is 500 feet from the shaft.

J. Dixon and J. H. Lewis have discovered a large deposit of rich gravel in the Gunter mine at Washington ranch at a depth of 26 feet. The discovery is on the west end of the mine, where several shafts were sunk forty years ago, varying from 40 to 100 feet in depth, discovering a pot hole or depression in the ancient channel containing little gold on the bedrock, in consequence of which the diggings were abandoned. Dixon & Lewis found no gold on bedrock, but found a stratum of gravel above it 5 to 7 feet thick, which will yield $5 to $7 per ton.

Calaveras *Chronicle*: At the Vorlander mine near Middle Bar everything is running in good order. The new hoist is completed, the pipe laid and water turned on. The work of sinking the shaft will be continued. The lead has widened from 16 inches at 30 feet to 3 feet at the depth of 40 feet. The ore resembles that of the Gwin mine. C. M. Burleson of Mokelumne Hill is Supt.——J. D. Kline and J. A. Sterling are working on the Kline ranch, near West Point, sinking a shaft which is down 40 feet. They have taken out three tons of free-milling ore which will pay $40 per ton.——It is reported that the Farington G. M. Co. intends to sink the shaft on the Lone Star mine, near West Point, 500 feet and also to commence work on the Woodhouse mine, on the Middle Fork of the Mokelumne below Sandy gulch.

Amador *Ledger*: A bond held by J. F. Hamby, on the White Swan quartz mine, northeast of the Gwin, has been transferred to P. Deidesheimer and some Eastern capitalists. The mine is the property of A. J. Sargent.——G. Gates and S. H. Lucas, who are operating the Baltimore mine at Big Bar, are running the mill continuously on ore, which runs $6 per ton in free gold. There is little value in the sulphurets.

Angels *Echo*: Preparations are making at the Angels mine, at Angels, owned by J. V. Coleman, to begin operations. A new gallows frame, 50 feet in height, has been erected, and the concrete foundation for the engine and electrical motor is completed.——The boiler and other machinery recently delivered at the Harris mine, one mile south of Angels, is being placed in position. F. Dunlap is in charge.——It is reported that the Smadaeke mine, at Smith's Flat, will again start up.——C. Tryon has completed his contract to sink 200 feet of the shaft on the Bald Hill mine, at Albany Flat.——The addition to the Lightner mill is nearly completed and soon forty stamps will be dropping.——Recent discoveries in the Demarest mine, on the Copperopolis road, south of San Andreas, are very encouraging. The ledge is 10 feet in width.——Work continues on the Pioneer mine, in Smith's Flat. This is the property of the United Labor G. M. Co. The ore body is said to be 60 feet in width.

Jackson *Dispatch*: The Thorpe mine, near Fourth Crossing, has been shut down, it is reported, for an indefinite period.——D. Gutman has bonded the Ford Brothers' interest in the Ford mine at San Andreas for sixty days and a forfeit of $1000 has been deposited.

Angels *Echo*: The Utica Mining Company is having the ground south of the Stickle mill graded, on which a building will be erected for a large air compressor.——Sinking at the Gwin mine continues and the shaft has reached a depth of over 1600 feet. Last week all the rock taken out in sinking was run through the mill without sorting and it milled $5 a ton. As the shaft is 8 feet wide and the vein 2 feet, but a quarter of the rock milled was ore. A crosscut will be run west to the new vein at the 1200 level, and east below 1600 feet; crosscuts at each level to the main vein will intersect the new vein.

El Dorado.

Placerville *Democrat*: The Placerville Slate Quarry, one mile north of Placerville, operated by Col. Cummings & Son, has made its first shipment of slate. A carload of 47 squares were consigned to Keswick. The slate will be used in roofing the new buildings going up in that camp. J. W. Guthrie and W. S. Desborough of Sacramento recently visited the Pacific Gravel mine, in the Fair Play district. The object of their trip was stated to be to arrange for building a mill, with facilities for working the gravel in their claim. The mine is located on what is known as "Coyote Ridge Channel," and contains 60 acres.——The adjoining mine on the east containing 80 acres, known as the Umatilla, has been worked since February, when it was bonded for three months and afterward purchased by its present owners. Tunnels aggregating 1000 feet near the lines which divide it from the Pacific mine have shown the same gravel in both mines.——In the Pacific, besides the main tunnel 268 feet, there are crosscuts and drifts aggregating 419 feet, through which a body of gravel 30 by 90 feet, has been worked out. For milling purposes, water from a ditch 150 feet above the main tunnel and timber near at hand can be had at nominal cost.——The Blue Bird, near Soapweed, an early day producer, is to be worked under a lease, to a company composed of F. Morey, H. G. Sexton, A. Pierroz, H. Borden, W. Yeoman, E. Meier, H. Niedecker and W. McGarth, who have started operations.——A 2-stamp mill for testing purposes is to be erected by A. Demetre on his quartz claim above Georgetown. He has heretofore worked his ore in a hand mortar.

Georgetown *Gazette*: The 75-foot mark in the tunnel at the LeBoeuf-Weske mine was reached the first of the week.——The McKeeney mine, one mile north of Greenwood, will be ready to work when the mill is completed.——The steam pump for the Little Gem, near Volcanoville, is being taken to the mine.

Placerville *Nugget*: The Eureka Slate Co. has bought the Strahle slate quarry near Placerville. The company is capitalized for $500,000. A plant of new machinery will be put in at the quarry at Chili Bar. When the plant is installed 125 men will be employed.

Placerville *Republican*: There is considerable activity in mining in the vicinity of Kelsey, most of it being development work.——At Red Hill the Jermyn Bros. of Scranton, Pa., are driving a tunnel to crosscut the ledge. It is in 550 feet.——Hayward & Lane are sinking a shaft on the mine recently bonded by them. E. A. Davis is in charge. It will be called the St. Clair mine.——Callaghan Bros. have been at work a year with the cyanide process on the tailings from the mill on the St. Lawrence mine. They bought the tailings of A. Mierson, owner of the St. Lawrence.

Placerville *Nugget*: Fifty tons of rock from the Little Gem mine near Volcanoville is to be crushed at the Esperanza mill near Garden Valley. A new steam hoist and pump have been recently installed at this property and the work of sinking is progressing. Some high-grade ore has been taken out of the shaft.——H. Summers of Rescue reports that the Kepp Bros. have struck it rich at their pocket claim on Webber creek above the Boulder mine.

Kern.

Dennis Searles recently went to the Searles Borax Works to make a shipment of fifty tons.

De Reimer Bros. recently took to Los Angeles a $500 bar from the Merced mine, near Randsburg.

Randsburg *Miner*: The Annex mine is owned by Montgomery & Maginnes. At 130 feet a large body of good ore was struck some time ago. They have 100 tons on the dump which they will send to the mill. The vein is 3 to 5 feet wide.——In the Yellow Aster a new vein has been struck in the Hercules level, 900 feet below the point where the ledge reaches the surface. It is 60 feet in width, the same as in the Rand level. A small vein on one side is rich, showing coarse gold. The whole ledge is milled without sorting and yields $12 to $20 per ton. Two-thirds of the men employed in the mine are doing development work. Work was begun Tuesday on the foundation of the new hoisting plant. This will consist of a gasoline engine of 130 H. P., made by the Union Gas Engine Co. of San Francisco, and an auxiliary engine of 15 H. P. The new hoist is expected to be in place in a short time. The high price of fuel is one of the largest items of expense in working the Yellow Aster mines. Notwithstanding this the cost of mining and milling has been reduced to $3.12 per ton.

Los Angeles.

A gold-bearing gravel channel occurs on Mount San Antonio in Los Angeles county at an altitude of more than 8000 feet. The gulches tributary to the channel have been worked each summer, it is said, successfully for years.

Nevada.

Nevada City *Herald*: Rich ore has been found in the Reward mine, near Nevada City. The rock is rich in free gold and galena, and came from the bottom of the shaft, at a depth of 770 feet. The Reward is owned by a company consisting of R. C. Walrath, George Stone, ex-Postmaster Backus of San Francisco and others. The mine has so far paid over twenty dividends. The ledge averages ten inches in thickness.

Nevada City *Herald*: The Union Hill Consolidated M. Co. has incorporated: T. Mein, E. C. Creller, F. G. Beatty, S. Granger and J. H. Mooser. They will operate the Union Hill and other properties in Nevada county.——At the Pine Hill quartz mine in Wolf district, near Auburn, they have recently struck rich ore.

Orange.

Santa Ana *Standard*: The reports of the discovery of rich gold-bearing deposits in Lucas canyon, thirty-five miles southeast of Santa Ana, are said to be greatly overdrawn. Parties who have inspected the claims located there say that gold may be found in the canyon, but, owing to a scarcity of water, the work of development has been slow and results have been somewhat discouraging.

Placer.

The forty-four men at the Pioneer have progressed 1967 feet in the No. 4 tunnel south. Two hundred feet more will reach a point under the old workings, at which it is proposed to work upward with a view to reaching the region abandoned by the former management. The new tunnel is 600 feet below the level of the old workings.

Colfax *Sentinel*: Gillet & Taylor have completed their wing dam in the American river, near Colfax. The dam extends into the river and down stream below Rice's bridge 650 feet. They have commenced to move gravel.

Auburn *Argus*: Work on the Jupiter, at Iowa Hill, continues. The incline following the rim rock is well advanced. A preliminary or first cleanup was sent down recently. Eleven ounces of coarse gold was the result.

Riverside.

It is reported that the Santa Rosa rancho, on the mesa back of Temecula, has been sold to an English capitalist for $225,000. There are known to be mineral deposits and veins in that section but no mining is in progress.

Dry placer miners are working in the Virginia Dale country, using machines. The gulches on the south side of the range should contain placer gold. Several years ago, coarse gold to the amount of $1200 was taken from a claim called the Schillerman, from shallow surface workings. This gulch has never been

worked for placer. Other gulches near the old Rene camp on the south side should also be gold bearing, as the veins there are gold-bearing.

San Diego.

Los Angeles *Times*: The lepidolite deposits owned by N. G. Douglas are near Pala. A New York firm took a bond on the mines one year ago for $160,000, paying $10,000 down. This bond expires August 5th, and it is not known whether the bond will be taken up. The New York firm has done a good deal of work on the mines. One tunnel shows the ledge 40 feet wide at a depth of 50 feet. The cost of mining it is low. Several shipments have been made to New York. The cost of hauling it from the mine to the railroad at Temecula, Riverside county, is $4 a ton, at which place Mr. Douglas was paid $40 a ton for it, the New York parties paying freight on it from that point to New York. An analysis of some of the lepidolite from the Pala deposits showed that it contained 10% of lithia and 60% to 70% potash, the lithia being worth $700 per ton. Twenty-five men are employed.

Santa Barbara.

A lease from John Barrick and wife to J. C. Cody, J. C. French and H. S. Nelson to a small strip of land, containing three-fourths of an acre, lying south of and adjoining Miramar, for the purpose of boring for oil, has been recorded. The parties leasing the land will commence erecting derricks and boring for oil.

Shasta.

A report is current in Redding that the Mountain Copper Co. has struck a new ore body in depth in the Iron Mountain mine by prospecting with diamond drills. It is stated that the new strike lies 300 feet below the present workings. The Iron Mountain Co. has rewarded the men who worked so faithfully at the time of the fire several months ago and saved the smelter from destruction.

At the Oro Fino mine, recently bought by Behrens & Levisay, a rich body of high-grade sulphurets, accompanied by free gold quartz, is reported.

Shasta *Courier*: The Iler brothers, who own mines on Spring creek a few miles north of the town of Shasta, have sold their interest to W. G. Ducey of San Francisco, as the representative of Eastern men.

Redding *Free Press*: W. R. Beall, who has a bond on the Bullychoop mining property in western Shasta, is having the mine cleaned out.

Sierra.

Sierra Valley *Record*: H. and J. Goering, who are mining near Haskell's Peak, after a run of a month, were compelled to shut down on account of the short water. During that time they cleaned up $2000. The gold runs over $19 to the ounce. This fall they will run 150 feet of tunnel to tap the channel. They have been working on the rim.

Downieville *Messenger*: Last week another rich body of ore was struck in York & Sons' mine in Slug canyon.

Nevada City *Transcript*: Captain Nihell and his men are making good headway with the new 20-stamp mill at the Alaska mine of Pike City. They have removed the old machinery that passed through the fire a few years ago and find that a portion can be used. Thirty-one men are working on the claim besides the builders, and the developments are satisfactory.

Nevada City *Herald*: It is reported that a rich strike was made a few days ago in Harper's mine, at Forest City.

Siskiyou.

Yreka *News*: Jillson, Roberts & Co. continue paying dividends. Miner & LeFlesh of the Badger State M. Co. put in $15,000 before realizing a dollar. Monday they struck the ledge in the lower tunnel.——Doney Bros. have two good prospects, one of which they have developed. It shows 4 feet of ore at 100 feet, some of it worth $50 per ton.——J. L. Boyle has a 4-foot ledge of $10 rock, which was found in searching for a rich stringer lost two weeks ago. Before losing the stringer he took out twenty-four tons of ore, twelve tons of which was milled in the Ashland mill by J. Kinney and C. Lindsey, the brick weighing $824.75. Two tons milled by F. Hegler returned $140. Ten tons sent to the Mountain Copper Co. at Keswick netted $60 per ton.——The Union Copper Co., near Low Divide, shipped ten tons of copper ore from their mine last week, which netted them $255.70.——The New York Copper Co., at Youngs valley, have employed thirty men.——A new discovery has been made at the headwaters of Elliott and Joe creeks by L. F. and A. Cooper and W. Malone of Crescent City. They report that the vein has a width of 25 feet, and assays show copper and gold.——Hendricks & Thompson, owners of the claim bearing their name, twenty-five miles northwest of Klamathon, report the shaft down 150 feet, the vein 8 feet wide and carrying excellent values.

Yreka *Journal*: The Sheba mine at Patterson creek is to have air compressors to work drills on the lower level, where the ledge is firmer. The upper works seemed to be in a succession of ledges, loose in places. The mill is running day and night.——The Wheeler M. Co., working at the Nehrbass place on Greenhorn, adjoining the Blue Gravel mine, is near bedrock and has had to cut through boulders and handle a large amount of water. The two pumps in use are kept running constantly and raise water enough to more than supply Yreka.——The Greenhorn Blue Gravel mine is working a smaller force, owing to a failing water supply.

Trinity.

Weaverville *Journal*: R. A. Skinner has struck a ledge of rock in the Yellowstone mine, owned by him, in East Fork mining district. He has been running for the ledge for some time. The mine was formerly owned by W. T. Coleman and was a good bullion producer in the past.——This week the sale of the group of mines in the Arkansas Dam mining district, above Junction City, owned by T. F. & C. E. Bergin & J. C. O'Neil, was made to the Maple Creek M. Co. of San Francisco for $35,000.——In the New River country J. Frank is prospecting for D. M. Burns and M. Gunst of San Francisco.——The roasting plant at Harrison gulch is nearly completed.——At the Chloride-Bailey mine, near Junction City, they are working twenty men. At the Globe, over the hill, men are at work.——At the Red Hill placer property, under Supt. Goodyear, they are preparing for a cleanup. Thirty-six men are working.

Redding *Democrat*: The Boulder mine is on the west slope of the divide between Sacramento river and the east fork of Trinity river, and 5 miles from the Altoona quicksilver mine. Three years ago G. L. Carr bought the property and has expended several thousand dollars in development. He has run 1500 feet of tunnel trying to find the vein from which came large quartz boulders rich in free gold. Eastern men have been interested and G. C. Carson, M. E., will superintend future work.

Tuolumne.

Sonora *Independent*: United Star Quartz G. M. Co., Stent; capital stock $250,000; T. F. Gormley, A. W. Gilfillan, Quartz Mountain; F. Simen, Sonora; J. P. Mangante, Jamestown; D. Russell, Stent.——Esperanza G. M. Co., San Francisco; capital stock, $200,000; W. A. Clark, Berkeley; S. Salomon, R. Stevenson, San Francisco; J. Y. Miller, East Oakland; F. Enzensperger, Sonora.——Temescal G. M. Co., San Francisco; capital stock $1,000,000; C. B. Tilley, J. E. Stock, J. F. Holling, H. W. Gray, San Francisco; F. McPherson, Sonora.——Mountain Spring M. Co., San Francisco; capital stock, $100,000; H. L. Eastman, Alameda; E. J. Ensign, J. H. Duncan, W. W. De Lano, F. M. De Lano, San Francisco.——Black Oak South Extension M. Co., San Francisco; capital stock, $100,000; W. E. Miles, R. S. Moore, Oakland; D. J. Staples, J. Mason, San Francisco; J. J. Mason, Berkeley.

COLORADO.

The Colorado Fuel & Iron Co. of Pueblo has a contract for a six months' supply of coke for the smelter of the Copper King of Arizona, at Barrett, Ariz.

The Denver Smeltermen's Union has voted almost unanimously to continue its strike until the American Smelting & Refining Co. shall agree to pay the wages awarded by the State Board of Arbitration. The two smelters in Pueblo and two in Denver owned by the association are closed.

The Denver Smelting & Mining Co. was incorporated on the 9th inst., with a capital stock of $1,000,000.

BOULDER COUNTY.

L. H. Denison, Supt. of the Slide mine, at Gold Hill, who leased and bonded the Nugget mine at Rowena, is taking out $600 to $1000 per day. The ore is a decomposed iron, easily worked, and the greater percentage of the values is caught on the plates. The ore carries $40 in gold, and with a few men from fifteen to twenty-five tons is broken down daily.

The Inter Ocean, located in the town of Sunshine, is working steadily with eighteen men and shipping sixty tons per month of high-grade ore, some of which runs six ounces. The shaft is down 300 feet on a 6-foot vein of tellurium ore, with a pay streak 1 foot in width. The rich ore occurs in thin streaks through the mass. The ore is treated as it comes, averaging $80 per ton. Sinking on the ore body has been resumed.

The White Crow mine, near Sunshine, is making preparations to resume operations. The shaft is down 500 feet on a vein 5 feet wide, with a pay streak of 6 inches that will run seven to eight ounces.

The American Star is the mine that was jumped by E. H. De Vore a year and a half ago, who claimed that the assessment work for 1897 had not been done and that the buildings were on Government ground. The ore is silver and rich. A body of ore has been opened in the property averaging 4 feet in width. The shaft is 260 feet from the tunnel level and 350 feet from the surface; it is in ore all the way. Until recently twenty men have been employed, but the former owners of the property have been enjoined by Mr. De Vore from taking out any ore, pending the litigation, and the mine is closed.

The Cold Spring M. & T. Co., at Gold Hill, is driving a crosscut tunnel to cut eleven claims, owned by the company, and make a connection with the shaft, located half a mile northeast from the town. It is in 460 feet, and is to be equipped with a compressor, the foundation for which has already been built. The Cold Spring Co. is composed of Jerseyville, Ind., men, who have been fortunate in a lease on the Mary McKinney, at Cripple Creek. A tunnel was a necessity, for the company, upon the completion of the tunnel, will construct a mill.

CHAFFEE COUNTY.

Victor *Record*: Within less than a mile of Buena Vista, on Free Gold hill, there has been made a strike of gold ore. The Single Standard G. M. & M. Co. started a new shaft recently on a showing that assayed $4.50 at the surface, but on reaching a depth of 200 feet they encountered a body of sulphide ore which runs $150 in gold to the ton. The strike was made on what is known as the Hendricks claim of the Cleveland group of three claims.

CLEAR CREEK COUNTY.

Denver *Republican*: C. Barron reports new gold discoveries on Chicago creek and says that he has one of the rich veins. There are a great number of prospectors in that locality. Many veins and porphyry dykes pass through near the north and south branches of Chicago creek. It is this part of the district which has received the name of Ozone. J. F. Bridges reports finding rich gold-bearing float. He says the veins are wide and rich in free gold. Where some of the richest float is found the slide is many feet deep and the veins are found by trenching. It is reported that phonolite and tellurium have been found. The belt is two miles wide and discoveries have been made along it a distance of five miles.

(Special Correspondence).—The property known as the Tuller & Riley group, south of town, has been sold to an Eastern company, who take charge of it to-day. It was sold for $50,000, part of which has been paid. The first car of ore has been shipped by the old owners, who reserved the ore on the dump, and this first shipment of 9¾ tons netted them a little over $3000. The purchasers expect to sink a shaft as rapidly as possible and drive a tunnel that will tap it at 150 feet, to determine the values of the quartzite dyke in which the vein lies. The high-grade ore is in a vein of white quartz and is 8 to 18 inches thick; it has been opened 3000 feet. Along it at different places and at every opening free gold is visible. The ore has a small amount of iron associated with it, with some copper, a little lead and a good deal of tellurium. This narrow vein lies in a large reef of a changed quartzite, 200 feet wide, and which cuts the dark schist at nearly right angles. It is hard on the surface, but a few feet down it is soft and slightly stained with iron oxide. It disintegrates soon after exposure to the air, leaving a fine granulated mass of crystals. The dyke is interlaced with narrow, ribbon-like veins of white quartz. The gold is sometimes found in the pure quartzite. They have good water power 300 yards down the hill, where a tunnel and mill site can be had.

The concentration mill for the Keystone mine, near Crested Butte, owned by Smith, Bartholemew & Miller, is about ready to make a trial run, and ore is now being hauled from the mine to the mill, which is to be run by water power from a Pelton wheel hired from the Crested Butte Light & Power Co. The mill will have a daily capacity of about fifteen to twenty tons, owing somewhat to the number of hours run. The ores are a low-grade lead and silver, with some copper and a little gold. It will run about three to six tons to one. The finished product will be worth from $15 to $20 per ton net. Great things are hoped for the mill, as there is a good deal of similar ore near there. If the present mill is found satisfactory, a new one will be built next spring at the mine, with a greatly enlarged capacity, which it is hoped the present operations will bear out.

At the Standard mine the shaft is down 75 feet. It is one of the claims owned by the Underhill M. Co., in which Gov. Adams & Bro. own the controlling interest.

The work of placing machinery on the Tom Boy is being rushed and sinking will be commenced. It is the intention of the company to put it down to 400 or 500 feet before drifting is done. The vein is wide and is soft, yellow carbonate on the surface, which at 20 feet has grown hard and shows a fine-grained, pink quartz. The vein is 30 feet wide and lies between schist walls. The surface values show $13 per ton across 8 feet, as far as it has been cut. There is another vein of the same nature, a third of a mile south, that parallels it. It has schist on one wall and coarse porphyry on the hanging wall. This mine is on the Grand Central group, owned by Bartholemew and others.

Work on the Du Boise tunnel is going along and also on the vein at the surface called the Pride of Denver. A recent mill run from the vein gave returns of $10 per ton free gold.

J. McCormick has made a strike in his property at Tin Cup of manganese, almost solid ore, but shows plenty of free gold.

C. Johnson of Denver is securing property at Tin Cup for a company.

The last of the Union Park machinery has been hauled to the ground. The machinery for a steam stamp mill has been taken to the same vicinity by another company.

At the Bull Domingo, on Italian mountain, a great deal of high-grade lead ore is being taken out, which will have to be packed out. The management finds trouble in securing a sufficient number of animals.

At the Gunnison mine the shaft is being sunk and no other work is going on.

At the Good Hope a contract has been let to sink the shaft another 100 feet, which will give it a total depth of 400 feet. The shaft is in the best ore found in the mine, which will run $5 per ton.

At the Humboldt, on the west, it is reported that the ownership of the mine has passed into the hands of the principal owners of the Venable Co. and is now operated by the latter company. The Humboldt Co. have a bond on the claim by that name and the new management assumes the bond.

The Vulcan mine is again sending out regular shipments, the strike trouble having been settled. It is under a new Supt. and things are going along smoothly.

Gunnison, Aug. 5th, '99.

GUNNISON COUNTY.

(Special Correspondence).—In Crystal district a number of new prospects have been opened this season. The Fargo, owned by the Crystal River M. Co., has a vein which carries copper with lead and silver. In 6 feet the pay streak has widened from 14 inches to 36 inches. A pack train is hauling this ore to the Marble smelter. The Black Queen ore taken out last fall after the road closed has also been packed down.

The Carbonate, on Crystal mountain, is making steady shipments to the smelter.

The Copper King, above the Lead King mine, has ore out that will run 10% to 80% copper, with silver.

The Mineral Point M. Co., has let another contract on the Laura.

The Attix properties in Paradise Gulch have several tons of ore for shipment.

The concentrator at Scofield, under the management of Cramer & Co., is equipped with three tables and is nearly completed.

The Bent, on Mineral Point, has an ore chute opened 185 feet and its further extent is not known. It carries copper, gold, silver and lead.

The North Pole in Crystal Basin is producing carbonate of copper which will be hauled to the railroad.

Crystal, Aug. 8th, '99.

HINSDALE COUNTY.

Lake City *Times*: Mgr. Farrell of the Lellie has let a contract for 50 feet more on the long tunnel to Senter & Hardy.——The Silver Lake, Iowa and Sunnyside mines in San Juan county are resuming operations and men are said to be scarce.——Returns for the last carload shipment from the Big Horn mine received by J. S. Hough ran 175 ounces to the ton in silver.——Hill & Griffiths, leasers of the Wyoming mine on Copper mountain, have reduced the force on the mine, not being able to get their ore treated by the smelters.——W. Morehead, owner and operator of the John A. Logan property, above Capitol City, reports that he will have a carload of lead ore to ship from there in a short time.——Some time ago the Contention vein was cut in the Argus tunnel and work is being done on the vein. They lack 80 feet of being under the ore shoot from which high-grade ore was taken in the upper workings.

LAKE COUNTY.

One of the most important strikes in the Twin Lakes section has been made on the Rhoff group, owned by McDonald & Dewar. The vein is 6 feet wide, with a 2-foot pay streak. A 55-pound sample gave an average value of $55 gold and 6% copper. High-grade ore has been found in the breast of the 240-foot tunnel on the Ruby, an adjoining property.

In the Lecompton shaft of the Nisi Prius group on Rod hill, Leadville, a 3-foot vein has been cut which carries seventy-eight ounces silver, 18% lead and .04 of an ounce gold per ton.

The Leadville Home M. Co. is shipping iron from the Penrose and will soon start shipments from the Coronado.

A shipment of thirty tons has been made from the new discovery in the Lillian mine, on Printer Boy Hill, near Leadville, running 30% copper, seven ounces silver and $4 in gold.

Leadville *Reporter*: Another mill will soon be running in Leadville which will have a capacity of 75 tons per day. It is the cyanide mill in California gulch. The mill was built by the Ibex company some time ago for the purpose to work its low-grade ores, but did not prove satisfactory. The company has been storing ores of a grade of less value than they have been shipping with the intention of milling it, and in the last two years have piled up a large amount of it.

TELLER COUNTY.

Returns to the Jack Pot mine of Cripple Creek from the last four shipments sent from the Creston lease were 5.34 ounces, 3.55 ounces, 9.9 ounces and 4.6 ounces. These four shipments, after freight and mill charges were deducted, netted $10,700. In the bottom of the winze, below the 400-foot level, there are 2½ feet of ore that runs $30 to $40 per ton.

J. Winchester, lessee of the Doctor mine at Victor, has made claim to a large portion of the rich Jack Pot ground, alleging that the Jack Pot vein apexes in the Doctor ground. The workings of the two mines are now separated by only a few feet of unbroken ground.

Simmons & Mick the 1st of August commenced work on the Flat Top on Copper mountain. The claim adjoins the Fluorine.

Victor *Record*: It has been decided to equip the Union mine with air drills, the air to be obtained from the Smith-Moffat plant at Goldfield. These drills will aid in the development of the find made in the Orpha May claim recently.——Gold Hill will add to its list of shippers the Happy Day claim of the Alamo M. Co. Silas Parker, the lessee, is erecting an ore house. Drifting at a depth of 80 feet, 20 inches of mineral has been found which assays as high as $1200 to the ton. The entire 20 inches will ship $50 to the ton.——Since the Matoa G. M. Co. commenced operations on its own account, twenty to thirty tons of ore weekly have been marketed, averaging two ounces to the ton. One hundred tons or more are broken in the mine. The property is being developed and prospected. Contractors are working on a 220-foot sinking contract which will put the shaft down to 810 feet.——The Whipp and Glenn lease on the Lansing, of the Pinnacle Co., is shipping a carload of ore daily. Inside of thirty days the mine will be producing from fifty to seventy-five tons every twenty-four hours. The workings are full of ore and in the stope between the second and third levels the miners are breaking 9 feet of ore. In the south drift from the bottom level the breast shows 4 feet of ore and the walls carry values for some distance back. The ore broken in this drift assays $40 to $340 a ton.——Melber & Geraghty, leasing on the Mitchell of the same company, have ten to twelve tons of ore out.——The Lloyd lease, on Pinnacle ground, is also reported to be in ore, a vein having been cut at a depth of 45 feet, carrying values of one ounce to the ton.

Victor *Record*: At a depth of 85 feet in the new shaft being sunk by lessees on the J. I. C., on Battle mountain, one of the largest ore bodies in camp has been encountered. It has been crosscut for 13 feet, with but one wall in sight. The values range between $8 and $15 to the ton. The J. I. C. is owned by the Republic Company.

Victor *Record*: Walker & McGovney, leasing on the joint shaft of the Specimen, have sent out a shipment of ten tons of screenings, which will run twenty to thirty ounces to the ton, and fifteen tons of coarse rock, estimated at ten-ounce ore. These lessees have opened in the fifth and sixth levels, at depths of 250 and 300 feet respectively, the rich lead first uncovered in the 200 level. A crosscut is being driven in the third level. The vein lies 80 feet south of the shaft and is new to the property. The rich seam is 1 to 4 inches in

width.——The Annie, on Gold hill, has been leased by the owners, Tutt & Penrose, to H. L. Brown, F. Cole and W. H. H. Hamilton, for one year, with an option of six months extension; royalties graded. The property is developed by a shaft 140 feet deep and has produced considerable ore.

Denver *Republican*: A strike has been made on the Monument, on Battle mountain, at Victor. The block under lease to Parcells, Limbach & Welch is in good ore. At a depth of 40 feet the lessees have a body of sylvanite ore, a streak in which runs as high as fifty ounces to the ton. Parcells & Co. have leased on this ground for two years, dating July 1, paying a royalty of 30%. They commenced by prospecting the surface, and succeeded in opening a promising vein in three surface trenches. The vein varied in width from 6 to 18 inches, and assays from one to twenty ounces were had. A shipment of six and a half tons was settled for at 127 ounces to the ton. The lessees have been sinking a shaft east of the vein. At a depth of 40 feet a crosscut was started which struck the ore found at the surface. The lessees also have a lease on a block of the adjoining Dillon claim. This lease is for one year, and the same royalty is to be paid. The rich find has been found on this ground as well.——It is reported that the lessees of the Burns of the Acacia Co. have broken into richer ore. Curll & McGill, the lessees, opened up 3 feet of smelting-grade ore in a winze sunk from the 500 level. Several shipments were made and further development resulted in finding rich mineral. One ton is estimated to return $1 to the pound.——The gross value of the output of the Jack Pot mine, on Raven hill, for July is estimated at $80,000. Returns gave from 76-100 ounces to 8.56 ounces to the ton. High grade is being saved.——The Doctor mine, on Raven hill, owned by Cone & Robinson of Canyon City, has been leased to J. Winchester of Denver, who has in turn subleased the ground to other parties.

IDAHO.

Reports from the Badger Creek gold district, near Boise City, vary as usual in such cases. The original discovery, the Copper Queen claim, has been developed to show 10 feet of ore. High assays have been secured, but the average value is from $25 to $50 a ton.

The De Lamar mines of Idaho, during the first eight years' management of the new company, produced 292,591 tons of ore, which yielded $6,323,000, of which $4,850,000 was paid out in dividends, being 117½% of the original capital invested and leaving $170,000 in the reserve fund. The expenses of operation for the same period were $3,970,000.

Spokesman *Review*: A peculiar vein has been found in the Black Jack mine in the Hump country. From information that has come to Dr. Miller of the Idaho University, this vein has a banded structure, having 16 inches of quartz and 16 inches of porphyry, in alternating bands. The quartz carries no values and where the porphyry joins the quartz, the porphyry, on either side, carries iron pyrites from the width of one to one and a half inches, which streak carries $40 to $1600 to the ton in gold. Between these streaks the porphyry is also barren. What the miners call porphyry in this mine is pronounced by Dr. Miller to be a serpentine carrying iron pyrites.—— Since snow has disappeared from Buffalo and active development begun the camp has been improving. All trails into the Hump are bad and travel slow. There is much fallen timber, and the trails are badly defined and in many places dangerous. There are two towns; Buffalo is at the Big Buffalo mine. The other town, where the postoffice is, has been located two miles from the mine.——Owing to litigation the Big Buffalo, which was bonded to the De Lamar company, has reverted to the owners. It is said Mr. Huntley, for Capt. De Lamar, sampled the Big Buffalo lead across the surface cropping and obtained an assay of $19.78; 63 assays averaged $15 in gold. Three samples of the Oro Fino, one of the claims of the group, showed an average of $196.——The San Francisco at Buffalo is under bond for $85,000 to an English corporation.——The St. Louis, which is under bond to Norman & Cameron for $20,000, has been given up and a new bond was taken upon the claim by W. H. and F. E. Young of Spokane for $85,000, on which $5000 was paid. The lead on the St. Louis has been recently crosscut in six places, showing an average width of 20 feet. The ore is yellow decomposed quartz.——On the Fortune, the property of the Norman & Cameron syndicate, work is in progress. The company is erecting buildings. A cut has been run showing the vein 7 feet wide, with an average value of $20 per ton in gold. The croppings show 20 to 30 feet wide.——The Monte Cristo has been crosscut in several places, showing a vein 6 feet in width. The El Dorado adjoins the Monte Cristo. A tunnel is being run on the line between the two claims to cut the lead 200 feet deep.——Work is to be started by C. Sweeny and W. B. Heyburn of Spokane on a tunnel to be run into Buffalo Hump mountain, which will crosscut all the leads.

Idaho *World*: The shaft on the Wolverine mine at Banner has caved and five pumps, three cages, tools and iron pipe are in the wreck, besides other valuables, worth in the aggregate $5000. The shaft was covered with heavy plank at the 200 level. Whether the cave has gone below that level is not known.

MICHIGAN.

The annual meeting of the Calumet & Hecla Copper Co. will be held on the 16th inst. President Agassiz says: "During the past year we produced mineral equal to 43,879 tons of copper; product in fine copper was 44,450 tons. For the previous year our refined copper product was 45,194 tons. The price of copper has varied from 12 cents to 18⅛ cents per pound. It is now 18⅛ cents. During the past fiscal year there have been paid three dividends of $10 each and one of $40, including $30 from surplus cash. In this connection it may be interesting to compare the work we were doing in 1874 with the amount of work performed in 1899. Twenty-five years ago we were hoisting 800 tons a day from an average depth of 800 feet along the slope of our shafts, equal to 400,000 tons raised 1 foot high. The average per day in April, 1899, was 5206 tons raised 3800 feet along the slope, equivalent to 12,302,250 tons raised 1 foot high, or thirty times as much work done in 1899 as in 1874. In 1874 we employed 1616 men. In 1899 we employed 4706 men. The comparative cost of this work was as 30 is to 9."

The lode below the forty-sixth level, No. 12 shaft, South Hecla branch of the Calumet & Hecla mine, shows the richest copper ground ever opened in the mine. Much of the rock is shipped direct to the smelter, being too rich for stamping, ranging from 50% to 80% pure metal.

In No. 5 Calumet and in Tamarack Jr. branch of the Osceola Con. considerable ground giving 20% copper has been mined the past three years.

The first rock from the Arcadian mine has been sent to the stamp mill. New machinery at the mine and mill runs smoothly.

The second drill exploration located Trimountain lode, this time at a depth of 100 feet on incline of vein. Fourteen feet of cores were taken out and some show as good copper as that secured at Copper range, on which Trimountain lode is also opened on the west.

The Mesnard shaft on Quincy property is unwatered and is being straightened and enlarged to the bottom, a depth of 180 feet.

The Kearsarge lode has been located on the Eagle Harbor property.

MISSOURI.

In the Missouri zinc field none of the mines are down below 200 feet and the ore goes down to a depth of 1000 feet. The Crossman Drilling Co.'s charts show the best ore between 300 and 400 feet. In this region the ore underlies an area twenty-five by forty miles, and ore is found at various depths. One double compartment shaft and five other shafts are being sunk on the Chitwood properties, owned by the United Zinc & Lead Co., and a new 100-ton mill is under contract to be built. The company is operating by the royalty system of mining, as this has been found the best way of working the properties.

The New York Zinc Co., with a capital of $700,000, has been organized under the laws of Delaware to acquire a large zinc property in the Missouri-Kansas zinc and lead district that produced the past twelve months 44,377,630 pounds of zinc ore and 1,147,200 pounds of lead ore that was sold for $229,151.

MONTANA.

The Anaconda Copper M. Co. has acquired a quarter interest in the Parnell mine from T. Driscoll for $15,000. The Parnell is being operated by the Montana Ore Purchasing Co. It is said to be showing up well. It is directly north of the Mountain View.

J. A. Murray has transferred to P. T. Dudley of New York three-eighths interest in the Blackfoot for $15,000. S. F. King also conveys to Dudley one-eighth interest in the Blackfoot.

It is reported that the Amalgamated Copper Company has bought the Speculator mine at Butte, which has a capacity of 300 tons of ore a day.

A mining company under the name of the Smoke House Copper M. Co. has been organized for the purpose of tunneling under the city of Butte for copper ore. The organization of the company was brought about through a settlement of litigation which has been going on for years, involving the Smoke House, Destroying Angel and Copper Bottom mining claims, which cover the principal parts of the city of Butte. J. A. Murray, the banker, and other capitalists are at the head of the company.

Salt Lake *Tribune*: T. W. Buzzo, general superintendent of the Alice Mining company's property at Walkerville, reports the mill working on custom as well as company ores. During the year he has opened up new ground.——There is more activity among the silver producing mines of the Butte district than at any time since 1893. Many of the properties are being operated under lease, and many of the lessees are making money. A number of rich strikes of silver ore have been reported recently. On the Volunteer addition, a few days ago, a property owner was digging a well, and at a short distance from the surface uncovered a rich ledge of silver ore, upon which work has already been started.——It is said the Silver King will resume work again. The owners claim they are 50 feet inside their side lines, and the same distance from the Plymouth lode claim. A survey of the ground in dispute is being made.

Loomis *Prospector*: The Bull Frog group, under the management of Del Hart, which recently began work, has 10 men, and the water is nearly out of the 120-foot shaft. The shaft is to be sunk to 500 feet and drifts run at every 100 feet. A steam hoist will be put in.

NEVADA.

Pumping operations at the C. & C. shaft, Comstock lode, continue successfully but slowly. The rise and fall of the water mentioned in the superintendent's report is probably due to the fact that the elevator takes water from the shaft faster than it comes into it from distant workings. Atmospheric pressure in some of the abandoned stopes may have some influence on it, causing the water to seek its level spasmodically. The following telegram was sent on to San Francisco:

VIRGINIA, Nev., Aug. 10, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 24 feet below the 1050-foot level station, having risen and fallen during the last twenty-four hours, while the elevator has worked regularly and continuously. G. McM. Ross.

Reno *Journal*: After several years of unsuccessful experimenting, the bed of tailings at the old English mill is worked satisfactorily by the process known as chloridizing, or roasting with sulphur and salt, after which they are run through the amalgamating vats. Nine tons of tailings are being roasted per day, with salt and pulverized iron sulphurets obtained near Washoe City. Six men are employed on the roasting furnace, working three shifts. A charge of 750 pounds is drawn from the furnace every hour. The roasted tailings are transferred to the amalgamating vat, which takes 2800 pounds at a charge, and runs four charges per day. Two men are working on the pans, each working twelve hours a shift. The tailings assay fourteen ounces of silver and from $4 to $6 per ton in gold. Of this it is estimated that from $8 to $12 per ton is saved. Amalgam weighing from 120 to 160 pounds is retorted every other day.

Salt Lake *Tribune*: It is reported that large outcrops of copper-bearing material have been discovered east of the Cortez district and fourteen miles east of the Eureka & Palisade railroad. From the same source it is learned that at a camp fifty miles south of Battle Mountain on the Battle Mountain & Austin railroad, in Ravenwood district, several locations have been made that show from 14% to 28% copper, $6 to $20 in gold and about 80 ounces silver. This last find is not far from Old Jersey district, that produced thousands of tons of high-grade lead ore in former days.

OREGON.

(Special Correspondence).—The Virtue Consolidated mines include the original Virtue and the Collateral groups, which lie in a body eight miles east of Baker City. The Virtue grounds are developed by an 800-foot shaft, sunk close to the vein, and from which extensive drifting has been done on the vein at the 350, 470, 500, 600, 700 and 800-foot levels. The Collateral has five tunnels on the vein, which are from 70 to 100 feet apart, vertically. The two groups are on different ledges, the ores from which, however, are similar. In the Virtue the vein is from 2 to 6 feet in width, and that on the Collateral is from 1 foot to 4 feet. The ores are free milling and are run through a 20-stamp mill on the ground. A pumping plant of good capacity has to be operated to keep the mine clear of water. The company owning this group also own the Cumberland at Silver City, Idaho. The Con. Virginia, near the Virtue, is equipped with machinery, but is idle, due partly to an excess of water, it is said.

The Flagstaff mine, situate four miles west of the Virtue, belongs to a London company and is under the management of N. E. Imhouse, with W. O. Reynolds as superintendent. It is developed by an inclined shaft 728 feet deep, which follows the dip of the vein. There are six levels at 100-foot intervals, aggregating 1500 feet of drifting. The ledge has a width of from 3 to 8 feet between walls, carrying a pay streak of ore from 13 to 18 inches wide. A blind lead was recently struck. The values in the mine run from $8 to $25 per ton, as shown by treatment in the 10-stamp mill on the property. Twenty tons per day are milled. WASCOTT.

Baker City, Or., Aug. 1st, '99.

SOUTH DAKOTA.

Deadwood *Mining Review*: The Esmeralda mine and mill in Blacktail gulch have been leased and bonded to a Boston syndicate, which will erect a cyanide plant with which to treat the conglomerate. The Esmeralda is owned by E. Faust & Son and there is a large amount of ore that will average $8 a ton gold. Blacktail gulch is two miles in length. R. M. Maloney has demonstrated that the low-grade cement ore is amenable to the cyanide process and a large number of companies are starting up old mines to be worked in this way. The ore is conglomerate, the values being contained in the softer cementing material.——The Adams Express Co. is figuring on erecting a cyanide plant at the Boley mine.——B. C. Cook, who owns a part interest in the Omega mine at Terraville, is making arrangements to put in a cyanide plant in connection with a 10-stamp mill at the mouth of Deadwood gulch.

UTAH.

Before a subcommittee of the Industrial Commission at Salt Lake last week Supt. Terhune of the Hanauer Smelting Works was questioned generally on the mining industry of the State. He thought the industry was in a prosperous condition, and much advanced over conditions 20 years ago. He spoke favorably of the eight-hour law. He said that there were no labor unions in the State, and that the men seemed to be satisfied with their conditions. Referring to trusts, he said he did not favor any conditions that destroyed competition. A. Hanauer, manager of the Hanauer smelter, did not approve of the eight-hour law being applied to smelters, but said that the law was all right so far as it applied to mines. He thought a ten-hour day was preferable for smelters. He believed there was more profit in mining silver at present, with silver at 60 cents per ounce, than when silver was 90 cents per ounce, owing to the reduced cost of supplies. He did not believe the smelter combine would work any injury to the mining industry.

Salt Lake *Tribune*: In La Reine of Tintic a strike has been made of copper glance, malachite and azurite, with a black sulphuret of silver, in the upraise from the main workings off the tunnel level.——Assays from the auriferous chute in the properties of the Eagle M. Co. at Mercur show 498 ounces in silver and 6.5% copper.——Lewisohn Bros., who last season bought the Copper Mountain group in Box Elder county, will erect a smelter. G. K. Fischer, who designed the plans for the Highland Boy smelter, is engaged on plans for the proposed one. J. P. Channing, the representative of Lewisohn Bros., will have charge of construction. According to the plans, the new smelter will be equipped with but one stack at the start, although provision will be made for an enlargement.——At the Centennial Eureka a new strike in the winze below the 600-foot level is reported and everything indicates that the chute of high-grade ore which was opened up this season is as continuous as that from which the previous millions were taken.——At the Highland Boy smelter preparations are being made for another shipment of copper, gold and silver bullion. Two hundred thousand pounds are stacked up in the bullion room. Changes in the third furnace are being made and the output will be increased in a few days.——At the Big Indian group in the La Sal region it is understood an examination is being conducted by the Messrs. Rogers of Colorado.——The discovery of a gold field near Marysvale in Piute county is reported. L. Bartholomew and associates, who discovered the district, have staked forty claims.——In the La Sal region in Grand county there are 300 men scattered over the country and improvements are being made. In Miner's basin, Mill creek, Beaver basin, Geyser and Middle mountains and Sylvanite basin claims are being worked with good results.

WASHINGTON.

H. Hewitt, Jr., has bought twenty-six mining claims near Index for $30,000 and will develop them.

In Republic camp, on the Vulcan, west of the Merrimac one-fourth of a mile, the ledge is showing up 5 feet of quartz that averages $5 per ton in gold. It is said a Seattle syndicate will develop it.

The Gold Ledge, at Republic, has been shut down on account of water. No more work will be done until after a steam hoist and pumping plant have been installed.

J. Ross, one of the contractors on the Copper Mountain tunnel, reports an average of 3 feet per day being made in the tunnel. The high-grade ore encountered a few weeks since continues. The ore carries galena, silver and gold.

The new tunnel on the North Star is in 180 feet. Two ledges have been cut, one 150 feet from the mouth and the other at the face of tunnel. They are each 5 feet in width. The last is being drifted north and south.

At a recent meeting of the directors of the Surprise M. & M. Co., in Cedar canyon, it was decided to continue the shaft 100 feet, and a contract was awarded S. H. Webb, formerly superintendent of the Elephant in the same camp.

Spokesman-Review: A strike has been made in the Deer Trail No. 2 mine, in Cedar canyon. The vein has been drifted upon for 45 feet. The ore has widened to 3 feet. Two samples returned $15.31 lead and $119.10 silver, and $125 silver, $1.13 lead. This strike is 200 feet from any of the older workings on the claim. Ore is being stoped in all parts of the mine.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence).—The first discovery of gold in the Kamloops, or Coal Hill mining camp, was made June 6th, '96, and since then 500 claims have been staked, 200 of which have been partly developed. The Copper King, Iron Mask, Iron Cap, Lucky Strike, Pothook and Mammette Lake have each shipped several carloads of ore to the smelters at Everett, Swansea, Trail and Nelson. The ore shipped averaged 18% copper and $5 to $12 in gold to the ton. While the principal ore bodies are copper-gold, there are several good showings of free-milling gold. Two weeks ago a rich strike of free-milling gold was made by J. Dillon at Jacko Lake, six miles south of this city. The claim was named the Last Rose of Summer. The vein at the surface is 14 inches wide, which, at a depth of 10 feet, had widened to 22 inches. Four assays gave values of $16, $9, $111 and $258 to the ton. This property has been bonded, through Messrs. Robinson, Redman and Outhett, in Cannington, Ontario. The Noonday is also showing values in free-milling gold. The shaft is down over 100 feet, and at the 90-foot level is a 100-foot drift running easterly. The Pothook, the best developed mine in the camp, has shut down part of its works to install its new machinery. The new plant consists of a 50 H. P. hoisting engine, fan and six compressed air drills. The shaft on the Pothook is down 357 feet and the drifts will aggregate 1100 feet. The ore averages 8% copper and $4 gold and there is now a large amount of ore in sight. A Glasgow syndicate owns the Pothook. The Python is working ten men under the superintendency of W. F. Wood. This mine is owned by Montreal capitalists. The company proposes erecting a concentrator this fall. A 1000-foot wire tramway is being built from the mine to the site of the proposed concentrator. Messrs. Rand, Flack & Co. of Vancouver have offered $100,000 for the Copper King, which was refused. A quarter interest in the five claims owned by the Coal Hill Copper Mines Co. has been sold to the Paris Mining & Exploration Co. of Paris, France. The owners of the War Eagle at Rossland have had their agent here looking over the Mammette Lake properties. The Iron Mask, owned by N. C. Wallace and Armstrong & Cook of Toronto, is idle. The Dawson has been bonded to Moncton & Colhoun. It will be worked. L. Boillott of Paris, France, is here purchasing properties for the Paris Mining & Exploration Co.

Kamloops, B. C., Aug. 2nd, '99.

NEW ZEALAND.

During the month of April the New Zealand Crown mines at Karangshake crushed and treated 2681 tons of quartz for a return of bullion valued at £6007. The best previous return was for the month of July, 1898, when 2500 tons were crushed for a return of £5891. Compared with the last return, that just to hand shows an increase of £355, although the quantity of ore was fifty tons less. The yield of £6007 gives an average of £2 4s 9d per

ton. The total value of the bullion from the New Zealand Crown mines amounts to £212,268.——During the month of April the Talisman company's mill ran twenty-two days, and treated 788 tons of ore, which yielded £3338 9s 3d, or at the rate of £4 4s 9d per ton. The return is under that of the previous month, when 900 tons of ore returned £3609, but a higher average per ton has been realized this month.——The Komata Reefs Co. crushed and treated 340 tons of ore during April for a yield of £650.

SOUTH AFRICA.

Johannesburg *Mining Journal*: There is a noteworthy reduction in the number of native miners deserting from their contracts. The time-expired still refuse to re-engage, and the number of natives coming forward from the sources of supply is insignificant.——The pioneer borehole has reached a depth of 800 feet. The sinking engine designed to hoist from the 2000 level is erected and the shaft down 130 feet. The Cinderella is popular with the natives. No premium has been paid to secure labor, but more than sufficient boys have sought employment of their own accord.——At the Simmer & Jack Proprietary Mines development continues to improve and the forty stamps going up will crush ore of as good grade as is now being milled. The mines of the Consolidated Gold Fields group have felt the slackness of native labor very little. The Simmer has been especially fortunate in this respect. The new forty stamps will be ready by October or November. The cyanide plant has to be enlarged proportionately.——At the Robinson Deep the native compound is being enlarged and improved for the purpose of making the mine more attractive to native miners. This detail of policy is very essential in deep level mines which have reached the producing stage.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING AUGUST 1, 1899.

629,975.—VESSEL-LOADING PLATFORM—C. R. Allen, S. F.
630,164.—CIGAR BAND CUTTER—S. J. Ballard, Los Angeles, Cal.
630,187.—FRUIT EVAPORATOR—B. Cunningham, Liberty, Or.
630,198.—BICYCLE GEAR—A. Doyle, Seattle, Wash.
630,231.—COPY HOLDER—L. Hudgin, Lochiel, Ariz.
630,306.—EQUALIZER—C. R. Murray, S. F.
630,002.—AIR BRAKE SIGNAL—Nethercott & Hersch, Alameda, Cal.
630,097.—BOX PLATE FOR LOOMS—J. H. Northrup, Tustin, Cal.
629,813.—MATCHER HEAD—W. W. Philbrick, Seattle, Wash.
629,814.—MATCHER HEAD—W. W. Philbrick, Seattle, Wash.
630,006.—WAVE POWER—J. Rogowski, S. F.
31,312.—DESIGN—O. H. Greene, Chico, Cal.
31,296.—DESIGN—W. A. Russell, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AIR BRAKE SIGNAL.—J. H. Nethercott & J. W. Hersch, Alameda, Cal. No. 630,002. Dated August 1, 1899. This invention relates to improvements in air brake devices. It consists essentially of a chamber containing a whistle or signal controlling valve and interposed between the engineer's valve and the main auxiliary reservoir, with which one end of the chamber is connected, a connection is made between the other end in the train brake pipe whereby a reduction of pressure in the brake valve from any point in the train will operate the valve and actuate the signal without the use of a supplemental signal pipe. In conjunction with this is employed a lock or stop device actuated by the discharge from the engineer's valve so that the signal actuating valve is prevented from moving and the signal from being operated.

PORTABLE VESSEL-LOADING PLATFORM.—Charles R. Allen, San Francisco, Cal. No. 629,975. Dated August 1, 1899. This invention relates to a device which is designed for the loading of vessels from wharves, and is particularly adapted to discharge from wagons directly upon the vessel's deck or into the hold. It consists of a platform, means whereby it is supported above the level of the wharf, an inclined driveway, a means by which it can be detachably connected with the platform, an extension of the platform which is adapted to be projected beyond its edges and over and beyond the edge of the wharf, so that a load can be driven upon the platform, then moved out upon this extension and discharged directly upon the deck or into the hold of the vessel.

WAVE POWER WATER MOVING APPARATUS.—John Rogowski, San Francisco, Cal. No. 630,006. Dated August 1, 1899. This invention relates to a device and apparatus which is especially designed to furnish a supply of water through the action of waves upon a seacoast. It consists of a reservoir or chamber, a pipe leading into the upper portion thereof having a funnel-shaped mouth or opening toward the sea, a pipe leading from the lower portion of the reservoir or chamber, a check valve in the first-named pipe, a valve or gate in advance of said check valve, a discharge pipe connected with the second pipe and a valve controlling the admission of water into said pipe.

Industrial Notes.

—A railroad is projected from Las Vegas to Taos, N. M.

—Wallace, Idaho, will put in a $15,000 sewer system.

—The Utah & Pacific Railroad is completed to Stateline, Nevada.

—The U. P. R. R. has secured control of the new Wyoming Southern Railway.

—The Union Light & Power Co., Salt Lake, Utah, will issue $3,000,000 4% bonds.

—The Santa Fe Railroad pays Japanese laborers $1.10 per day, and is increasing the number of such employes.

—As in California and elsewhere, so in Colorado. Denver reports a scarcity of labor and consequent delay in filling contracts.

—The Burlington Railway Co. will build the road into Keystone, South Dakota, from Hill City, the work to commence immediately.

—It is said the Pittsburg Reduction Co., manufacturers of aluminum, is about to invest $3,000,000 at Shawinigan Falls, Quebec, for the production of aluminum.

—The water power at Winchester, near Roseburg, Or., has been sold to J. S. Johnson of Atlanta, Ga., who intends to utilize the power for manufacturing purposes.

—It is stated in New York that all of the stock of the American Smelting & Refining Co. not heretofore sold, has passed into the hands of the Standard Oil magnates, and the latter have a controlling interest.

—The Boston & Maine railroad, in order to successfully compete with electric roads, it is said, will adopt coke as fuel and sprinkle the roadbed with crude petroleum, thus doing away to a great extent with the smoke and dust incident to steam road travel.

—It is stated that a consolidation of the mica-producing interests of the world is being effected. The Consolidated Mica Co. was formed in June last, and has since succeeded in securing a large number of the heaviest producing mica mines in New Hampshire, the South and Canada. The Consolidated Mica Co. will have a capital of $5,000,000. Its directorate will consist of the leading mica men of the United States and Canada.

—Proposals are to be opened at Pretoria for the construction of two railroads in the Transvaal, South Africa—one from Belfast to Lydenburg, connecting with lines to Pretoria, and one from Pretoria to Rustenburg. The first opening will be too late for American bidders, but the latter will be Oct. 12th. The tenders must be written in Dutch, and in the latter case they must be addressed: "Tender Voor Den Buow Der Spoorweglyn-Belfast-Lydenburg."

—The Yuba County, Cal., Electric Power Co. is expending $600,000 in improvements, dams and reservoirs are being built, sawmills constructed and flumes laid. It is the intention to put in a plant supplying 15,000 H. P. The Nevada County Co. has contracted for 3000 H. P., and 5000 H. P. has been sold to the Folsom Electric Co. Reservoirs have been built in Sierra county, and water will be carried through a mile flume with a capacity of 10,000 inches and piped to the power house, twelve miles below Camptonville, under 940 feet pressure. The foundations for the wheels at the plant will take 7000 barrels of cement. About 500 men are now employed.

—M. Landauer, en route from the Pacific coast to New York, has been in China four years, representing a Parisian syndicate, for which he has secured coal, quicksilver and other mineral concessions in China valued at $100,000,000. He says there are rich mines of cinnabar in Kweechow province and along the Yang-tse-Kiang are copper mines and coal deposits, which he has secured the privilege of developing. Landauer says Europeans and Americans are beginnng to have a realization of China's mineral resources. These have been neglected by the Chinese for 3000 years, because Confucius taught that the tilling of the soil was the safest foundation of any State's prosperity. In consequence the mandarins have not permitted the common people to engage in mining. Now that the opening of China has commenced, Chinese mines will be opened with modern machinery.

—The production of iron ore for 1898 aggregated 19,278,369 long tons, 1,760,323 tons, or 10%, in excess of the previous maximum of 17,518,046 long tons, produced in 1897. This is also a greater amount than has been mined by any other country in one year, being over 1,250,000 tons above the total recorded for Great Britain in 1880, when 18,026,049 long tons were mined. The ores of the British Isles also average lower percentages of metal than those of this country, and therefore represent a smaller pig metal product. The variety of iron ores produced includes red hematite, the output of which was 83% of the total, and brown hematite, which was 10.3% of the aggregate product. Magnetite and carbonate ores make up the remaining 6.7%. The total output in long tons of all varieties by States was: Michigan, 7,346,846; Minnesota, 5,963,509; Alabama, 2,401,748; Pennsylvania, 773,082; Tennessee, 593,227; Virginia, 557,713; Wisconsin, 509,645; Colorado, 318,480; New Jersey, 275,438; New York, 179,951; Georgia and North Carolina, 160,083; Montana, Nevada, New Mexico, Utah and Wyoming, 55,969; Missouri, 50,000; Ohio, 43,868; Kentucky, 12,913; Connecticut and Massachusetts, 20,251; Texas, 9705; Maryland, 5941.

—In appearance tatki, a product of the oil wells of Baku, is a dark, viscous fluid, not more inflammable than vegetable oil and less so than coal. As a steam producer it has no rival, and the demand for this purpose is constantly on the increase. Nothing else is burned on the railways in central Asia, the Caucasus and southern Russia, on the Black sea, Caspian and river steamers, and in the innumerable industrial works which are springing into existence on the Azov littoral. On the railways which employ this substitute for coal locomotive tenders carry a sheet-iron astatki tank, filled by pumping. The result is an intensely white, roaring flame, and in pulverizers of the latest type the value of astatki as compared with coal as a steam raiser is as 2½ to 1. The former sells at Baku at $2.50 per ton, and when the pipe line connecting that place with Batoum is complete astatki will be delivered at the steamer's side at $4.

—The United States Consul to Venezuela, discussing the mineral deposits of Venezuela, says: "Its mineral deposits are exhaustless, and include everything from iron in abundance to gold and diamonds. The district south of Orinoco will probably become the great gold-producing region of the world. Already an American company is operating with dredgers in the tributaries of the great river, and has met with success. Placer mining is also carried on by individuals, who seem to thrive at it. On the Imatac, a small tributary, 75 miles from the Orinoco's mouth, are vast deposits of iron, controlled by an American syndicate, at the head of which is J. E. Searles. The hidden wealth in this region, according to competent engineers, is almost beyond estimation, and there is no doubt that it will be fully exploited, as the company is abundantly able to carry out its schemes. The crying need is a railroad from some point on the river to mines in the interior. I am confident that American capital could find no better field for investment. Mining is expensive now simply because supplies reach the camps only by pack trains, and the journey is tedious and laborious. The Government of Venezuela would undoubtedly subsidize a railroad company whose promoters could produce proper evidence of good faith."

Commercial Paragraphs.

WALLACE & HART have opened an assay office at Baker City, Oregon.

C. DUCOMMUN & CO., of Los Angeles, Cal., who handle a complete line of assayers and laboratory supplies, are of the opinion that the long credits demanded by Mexican houses preclude extensive business with that country in their lines. This matter will doubtless gradually adjust itself, by concessions being made on both sides.

ONE of the highest pressure pipe lines in California has just been completed by the Lacy Mfg. Co. of Los Angeles, for the Mt. Whitney Power Co., on the Kaweah river. The line has a fall of over 1300 feet and develops 1800 H. P. Owing to the character of the country the engineering difficulties were unusually exacting.

A. A. BAILEY of Los Angeles, Cal., the first man there to manufacture spiral packing for the jobbing trade, handles a large proportion of the Southwest trade in packings and engineer's supplies. He manufactures expansion and sectional packing, gaskets, lubricating oil, boiler compound and babbit metal, and carries the "Reliable" oil feeder pump.

THE contract to supply the smelter, sampling works and roasters of the Val Verde, Arizona, Copper Co. has been awarded to the Colorado Iron Works Co., of Denver, Colo., represented by S. W. Traylor, and a payment of $22,000 has been made on account by the company's manager. The smelter will be of the latest improved style. Mr. J. W. Evans, general manager and superintendent Colorado Iron Works Co., is now on the site, overseeing the construction of the work.

ON the 7th inst., in San Francisco, the annual meeting of the stockholders of the Risdon Iron & Locomotive Works was held and the following directors elected for the ensuing year: Captain W. H. Taylor, William Alvord, R. S. Moore, A. Dalton Harrison, Augustus Taylor, F. G. Drum and L. R. Mead. Mr. F. G. Drum takes the place of Lloyd Tevis, deceased. The following officers were elected: W. H. Taylor, president; R. S. Moore, vice-president and superintendent; L. R. Mead, secretary.

IN a recent interview with a MINING AND SCIENTIFIC PRESS representative, Mr. Scheller, of the Union Hardware & Metal Co., Los Angeles, Cal., stated that while their business had increased some 30% so far this year, he does not feel that this indicates 30% increase in the development of the mining propositions of the Southwest, it being largely dependent on the increase in selling prices and the extensive water developments. He states that the increase in cost of materials is not likely to encourage building of new cyanide plants, in which labor is but a small item. Mr. Scheller feels that the west coast Mexican trade, which should be tributary to southern California, can be made so only by the establishment of a regular and efficient coastwise steamer line. It would doubtless surprise many well informed readers to learn that their normal stock of iron is 15,000 tons, owing largely to the large sizes of merchant bar made necessary to meet the drilling requirements of the Southwest.

MR. C. B. BOOTHE, of C. B. Boothe & Co., Los Angeles, Cal., in an interview with our special correspondent, states that during the last two or three months the lack of water and extreme heat have tended to lessen the work on the mining properties of southern California and Arizona. In anticipation of this condition his house had made arrangements for devoting their particular attention to water development. This work has consisted very largely in the "assisting" of artesian wells. The methods employed are practical and economical and the result of long experiment by Mr. Boothe. They have been peculiarly successful, in most cases restoring the original flow and not infrequently increasing it considerably. Mr. Boothe states that they have devoted their chief energies during the past two years to the installing of pumping plants of high efficiency and economy. Such a plant as this is the one at present being constructed for the Val Verde Water Co., in the Perris, Cal., district. This deep-well pumping plant consists of a Sioux-Corliss high-pressure triplex pump. This is one of the most unique plants recently installed, the water being lifted 300 feet through more than a mile of pipe. They expect to effect great economy in operating it. This firm has the agency for the Stilwell-Bierce & Smith-Vaile Co. of Dayton, Ohio, whose general line of deep-pumping machinery is universally known.

Personal.

PROF. HIRSCHING of Good Springs, Nev., is in San Francisco.

EDWIN BLEWETT has returned to Baker City, Or., from British Columbia.

CAPT. C. H. THOMPSON of Spokane was in Baker City, Or., on the 1st inst.

CHAS. H. FISHER of the Risdon Iron Works is in the Baker City, Or., district.

HARRY ELLIS, a California mining engineer, has located in Salt Lake City, Utah.

J. N. WALKER is the new Supt. of the Government assay office at Everett, Wash.

FRANKLIN RIFFLE is the present manager of the Wolff & Zwicker Iron Works, Portland, Or.

J. H. CONRAD, owner of mines at Norris, Montana, and Bingham, Utah, is in San Francisco.

UNITED STATES Engineers are surveying for a proposed dam on the Mojave river, near Victor, Cal.

SETH HOSKINS has been appointed chief engineer for the Colorado Fuel & Iron Co., Pueblo, Colo.

D. E. BIGELOW, representative of the Union Iron Works, recently visited Baker City, Sumpter and Huntington, Or.

W. E. RITTER, president California Academy of Sciences, has returned to San Francisco from a scientific trip to Alaska.

J. W. WATT has gone from Mercur, Utah, to take charge of the assaying department of the S. M. & M. Co., Silverton, Colo.

I. C. STODDARD, Pres. Stoddard Copper Co., of Arizona, says he is going to buy $100,000 worth of machinery for that property.

G. E. PRICE, M. E., Helena, Mont., representative of Fraser & Chalmers, has gone to Los Angeles, Cal., accompanied by his family.

J. H. NEFF, president California State Miners' Association, and Lieutenant-Governor of California, is removing from Colfax to San Francisco.

H. B. BENNISON of San Francisco was in the Baker City, Or., region last week. He and associates are operating the Badger mine on the John Day river.

WARNER MILLER, ex-Governor of New York, is at Auburn, Placer Co., Cal. He, with other Eastern capitalists, is interested in the Pine Hill mine, near Auburn.

JOHN LAMBERT, Pres. American Steel & Wire Co., has gone to Paris to arrange for the exhibit of the American Steel & Wire Co. at the exposition next year.

THOS. NEILSON, till recently assistant at the Keswick, Cal., works, goes to superintend operations at the property of the Neilson M. & S. Co., Redrock, Arizona.

BLEWETT & SON, who opened and now own an interest in the Van Anda copper mine on Texada Island, B. C., are developing the Van Anda gold mine near Sumpter, Oregon.

J. O. NORBOM of the Union Iron Works, San Francisco, is at Greenwood, B. C., with Paul Johnson, in connection with the projected building there of an up-to-date smelter.

W. J. ADAMS has returned to California from Lutaya bay, Alaska, where he had been superintending the inception of a placer mining enterprise. His temporary address is 224 Sansome St., San Francisco.

COL. S. H. LUCAS, of Mokelumne Hill, Cal., is in San Francisco. At his Calaveras county mine he is daily crushing thirty tons free-milling ore, the total cost of mining and milling of which is less than $1 per ton.

A. H. TEN BROECK, Mgr. Gold Bug mine, El Dorado, Cal., has resigned and is succeeded by W. E. Thorne, whom Mr. T. has had placed in charge while he will visit New York State to secure capital for further development.

CHAS. BUTTERS and Thos. Good are credited by the Salt Lake, Utah, *Tribune* with a probable consummation of a plan to consolidate the principal cyanide process companies with the MacArthur-Forrest Co., with the idea of affording better opportunity to the customer with no increase in the cost.

A. H. WICKHAM, who for two years past has been Supt. of the cyanide works at the Camas No. 2 mine, Idaho, has gone to Glenwood Springs, Colo., to take charge of works there. H. R. Case, who has been Mr. Wickham's assistant, succeeds to the superintendency of the works at the Camas No. 2.

F. H. NEWELL, United States Geological Survey, Washington, D. C., is in San Francisco. He has charge of the U. S. work looking to the conservation of water throughout the west half of America, and, after extended research in Colorado, Utah and Arizona, is now going through California en route to Idaho and Montana.

Recently Declared Mining Dividends.

Empire State, Idaho, M. Co., monthly dividend of 2%; payable Aug. 15.

Gwin Mine Development Co., California, dividend No. 9, 5 cents per share, $5000; Aug. 8. Total to date, $81,500.

How to Solder Aluminum.

A circular issued by the Pittsburg Reduction Co. concerning aluminum soldering says:

The soldering of aluminum has always been a difficult problem, and the problem has not been, up to the present time, completely solved.

The difficulties in soldering aluminum arise from the high heat conductivity of aluminum, and the fact that none of the ordinary soldering salts, or any easily obtainable soldering salt, will clean the surface of aluminum.

On account of the high heat conductivity of aluminum the heat from a soldering iron is conveyed away from the iron and from the solder so rapidly that the solder does not become sufficiently liquid to flow rapidly. This can be overcome to a large extent by taking steps to counterbalance the spreading of the heat. If the aluminum pieces to be soldered are small and thin, then, naturally, the difficulty is not so great as when the aluminum pieces are heavy and absorb a large amount of heat. In this latter case the soldering iron should be kept at a higher heat than is usual, and the aluminum pieces should, if possible, have been warmed beforehand.

Whereas aluminum is properly spoken of as a non-oxidizing metal, nevertheless the surface is covered with a very thin film of oxide, which prevents the solder from amalgamating with the aluminum. The most natural and simple way to remove this coating is to scrape it off with emery cloth or a file. If this is not possible, then it can be done by dipping the edge to be joined in a solution composed of about 1 part hydrofluoric acid, 10 parts nitric acid, 50 parts water; or in a solution, first, of caustic soda, and then strong sulphuric acid.

Many manufacturers, after some attempts with indifferent results, are now soldering aluminum with considerable success. Experience seems to be a very important factor in the successful accomplishment of the soldering of aluminum. A workman who, perhaps, is experienced in the soldering of other metals will meet with considerable difficulty in the soldering of aluminum, but these difficulties become less, and in time practically vanish as the experience of the workman increases.

The Pittsburg Reduction Co. do not, however, recommend soldering if any other means of making a joint can be employed. Several joints in aluminum, even when well made, are not as strong as soldered joints in other metals, and, on account of the galvanic action between the solder and the aluminum, the joint will gradually disintegrate, especially if by exposure to water or by other means the conditions are particularly favorable for galvanic action. In dry places, however, a soldered joint will apparently last an indefinite time. Samples of soldered joints submitted to the Pittsburg Reduction Co. a number of years ago, and which have been kept in the office, are quite as good now as when first sent.

In view of the high heat conductivity of aluminum, it follows that a solder which will melt at as low a temperature as possible should be used. There are a number of solders on the market having this characteristic, or one can easily be made to suit the occasion. Nearly all aluminum solders contain a small portion of phosphor tin.

Work of the Glacier.

Rivers work openly where people dwell, and so does the rain and the sea thundering on all the shores of the world; and the universal ocean air, though unseen, speaks aloud in a thousand voices, and explains its modes of working and its power. But glaciers, back in their cold solitudes, work apart from men, exerting their tremendous energies in silence and darkness. Coming in vapor from the sea, flying invisible on the wind, descending in snow, changing to ice, white, spirit-like they brood, outspread over the predestined landscapes, working on unwearied through immeasurable ages until in the fullness of time the mountains and valleys are brought forth, channels furrowed for the rivers, basins made for meadows and lakes and soil beds spread for the forests and fields that man and beast may be fed. Then, vanishing like clouds, they melt into streams and go singing back home to the sea.—John Muir.

Some Electric Traction History.

All of the earlier inventors used motors of too small power for the work they had to do. When this lesson was learned, there came the difficulty of designing motors of sufficient capacity, and, at the same time, small enough to get into the space available for them under the floor of the car and between the car axles. In order to make the motors small enough to get into this space and to decrease their cost and weight, it was necessary to run them at high speed, and gear down to a lower speed at the car axle.

Various devices were used to accomplish this, such as belts, cables, cranks and connecting rods, bevel gears and others; but spur gears were finally found to be the most serviceable. Sprague hoped to use a single reduction with a pinion on the armature shaft and a large gear on the axle, but was finally forced to give up this idea because none of the manufacturing companies were, at this date, able to design a motor to run at the speed required for single reduction which would be small enough to get into the space at his disposal. He was forced, therefore, to put in an intermediate gear, into which the armature shaft pinion meshed, and which, in turn, meshed into the axle gear.

Sprague first suggested making the car truck a separate structure from the car body and proportioning this structure to bear the heavy strains brought to bear upon it by the motor. He also centered the motor frame upon the car axle by means of a sleeve cast upon the motor frame and lined with a brass bushing within which the car axle could turn. This eliminated a great difficulty by keeping the centers of the gears at a constant distance from each other. It also enabled him to suspend the free end of the motor frame on springs, since that end could then have a certain amount of play up and down about the car axle as a center without causing the gears to get out of mesh. The destructive pounding of the motor on the truck and on the rails was thus obviated.

While this lessened the sledge-hammer blows of the car wheels on the rails, the rails in use with the old horse cars were not heavy enough to stand the pounding that still remained, and the result was that the cars were soon running over a series of ridges like the waves of the sea, caused by the sinking of the rails between the cross-ties, and the rail joints were battered out of shape until the bumping recalled the corduroy roads of earlier days.

The motors themselves were a never-ending source of trouble, both because they were not of sufficient power and because they were not well enough protected from dust and water. There were many other minor defects as well. The heavy loads brought on motors of small power were continually resulting in blow-outs, and the necessity of running the motors below the floor of the car and very near the ground made every mudpuddle between the tracks a source of anxiety, since the commutator and the windings of the motor were not protected or incased so as to keep the water out.—Thorburn Reid, in the Electric Railway Number of Cassier's Magazine.

WHAT is claimed to be the largest block of marble ever quarried was recently taken out of the Marble Hill quarry, near Marrietta, Ga. This block is 27 feet 2 inches long, 4 feet 4 inches thick and 4 feet 3 inches wide. It contains 500 cubic feet and weighs about 100,000 pounds. It was recently shipped from Marble Hill to Providence, R. I. It was carried on a special car, which was built for carrying large guns. The company claims that this block exceeds in weight by nearly 40,000 pounds any heretofore quarried in this country.

Ammonia Process in Reduction of Copper Ores.

At Good Springs, Lincoln Co. Nev., Prof. H. Hirsching, formerly of the Salt Lake, Utah, Mining Academy, has recently installed an innovation in the way of an extensive plant for the treatment of copper ores by a process invented and patented by himself. The plant has a crushing capacity of 100 tons daily and a leaching capacity of thirty-five tons.

The plant was constructed by the Risdon Iron Works of San Francisco, Cal., and consists of a crusher, two sets of rolls, trommels, elevators, conveyors, etc. The motive power comprises a 100 H. P. boiler and a 60 H. P. engine. The leaching plant is arranged on a series of terraces and comprises thirty-six vats. The solutions pass from top to bottom by gravity, and, when the copper has been extracted, the solution is pumped back to the storage tanks for reuse without having deteriorated.

The ore, which is chiefly oxide and carbonate of copper in a silicious gangue, averages 14% copper. It is crushed dry through a fine screen and subjected to leaching by what is called by Prof. Hirsching his ammonia process. In two hours the copper is dissolved and subsequently recovered as a finely pulverulent black oxide of copper, in which form it is marketed; but as the market for this material is limited, a portion will be melted into bars and sold as metallic copper. The secret of the process is not made public, as the various operations are not fully protected by patents. The ammonia is said to be recovered with practically no loss or deterioration.

The ore deposits of the region occur at contact of eruptive rocks with an underlying crystalline formation. The ores contain gold and a small amount of silver in addition to the copper contents.

Prof. Hirsching says that he intends to employ the cyanide process in the treatment of the tailings, the objectionable copper having been removed.

An important feature claimed for this process is that it will treat sulphide copper ores at a cost considerably below that of smelting, which, if true, will constitute it an important factor in the reduction of copper ores generally.

To Weld Joints.

The City & Suburban Railway Co. of Oakland, Cal., has been preparing to weld the rails in their tracks with a cast iron joint fused to and becoming a part of the rail, thus acting as a bond for conducting the current and avoiding all trouble from low joints which cause wear and tear on cars, brakes and motors.

A sand blast apparatus, mounted on a dray, passes over the road first and clears the ends of the rails as far back from the joint as is necessary, making them as clean and bright as a silver dollar. The blast is supplied from a reservoir fed by air compressors run by a motor connected with the trolley wire. When the rails are cleaned and the sockets attached over the joints the cupola comes along and completes the welding of the rails.

The sand blast is a simple but effective and rapid operation, and, after once well started, can be worked at slight expense to the company.

The welding machine which follows this and completes the work is a portable cupola, or melting furnace. This one has a diameter of 30 inches by 8 feet in length. It swings upright in chains in the front of a car built for the purpose, the bottom reaching close to the roadbed between the tracks. The molten metal is drawn directly from the bottom of the cupola, on either side, as may be required for the joint.

The cupola is lined throughout with fire brick, with sheet asbestos between the brick and stack, and every precaution is taken to protect it from the intense heat necessary to convert the pig iron and scrap wheels into a liquid mass for use. An upper platform is built on the car, which enables the operator to look down the chimney and see how the cooking is going on.

The cupola having been properly charged with coke, pig iron, etc., carefully weighed in, the fire is started and the air blast from a rotary blower turned on, and this blower is driven by a motor on the car, attached to the trolley wire. The weld consists of a cast-iron socket or cup, in two pieces, bolted to the rail in place of the fish plates. This cup is narrow at either end, but swells at the middle to 6 or 8 inches at the center, according to the size of the rail operated upon. This swell in the cups extends beneath as well as on each side of the joint. A little hot metal is poured in several of these to heat up the ends of the rails, and is followed by another ladle and the cup filled up. This first warming up prevents a "chill" on the casting and allows it to fuse with the rails, cups and connecting bolts, making a perfectly solid joint, amalgamating the rails with the joint, so completely that no other bond is required for free passage of the current. It requires twelve men properly to operate the cupola and move the work along in proper shape. It is hot stuff they are dealing with, and there will not be much loafing around the job while the iron is hot. They will be able to melt 150 joints in twelve hours, when the work is once fairly under way. This work will be done at night, as it can, of course, be done more rapidly and better when there are no cars running to interfere.—Oakland Enquirer.

Electric Plant at Sault Ste. Marie, Mich.

The Michigan Lake Superior Power Co. has projected and is now constructing at Sault Ste. Marie, Mich., the works required for the development of power from the falls of the St. Mary's river at that point and the waters of Lake Superior.

The difference in the mean elevation between the water surface above and below the falls is about 19 feet, and the mean discharge over the outflow section at the falls about 70,000 cubic feet per second. The extent of this development is planned to be such that 40,000 H. P. of electrical energy will be realized, the available effective head being accepted at 16 feet and the volume of water required at 31,250 feet per second. The works now being constructed for this development consist of the intake, the canal, the forebay and the power house, all of which are designed, as to dimensions, to conform to the hydraulic conditions required by the general result to be secured.

The basis from which the hydraulic conditions have been evolved is the realization of 40,000 H. P. of electrical energy, to be available at any point within three miles from the power house for manufacturing purposes. The origin of this energy is to be from single-phase, low-voltage electric generators, coupled directly to the horizontal shafts of turbines, which latter are conditioned to develop 45,243 mechanical H. P., thus providing for the losses entailed during the converting, transforming, transmitting and retransmitting of energy; or 45,243 H. P., converted with 7% loss, will net 42,077 low-voltage electrical H. P., which, transformed with 1% loss, will net 41,655 high-voltage electrical H. P., which, transmitted with 3% loss, will net 40,405 high-voltage electrical H. P., which, retransformed with 1% loss, will net 40,000 effective electrical H. P.

The turbines are to develop a mean efficiency of 80% for a range of three-fourths to full gate opening, and the development of 45,243 mechanical H. P. on the shaft, therefore, requires a gross hydraulic power of 56,554 H. P. —Electrical Review.

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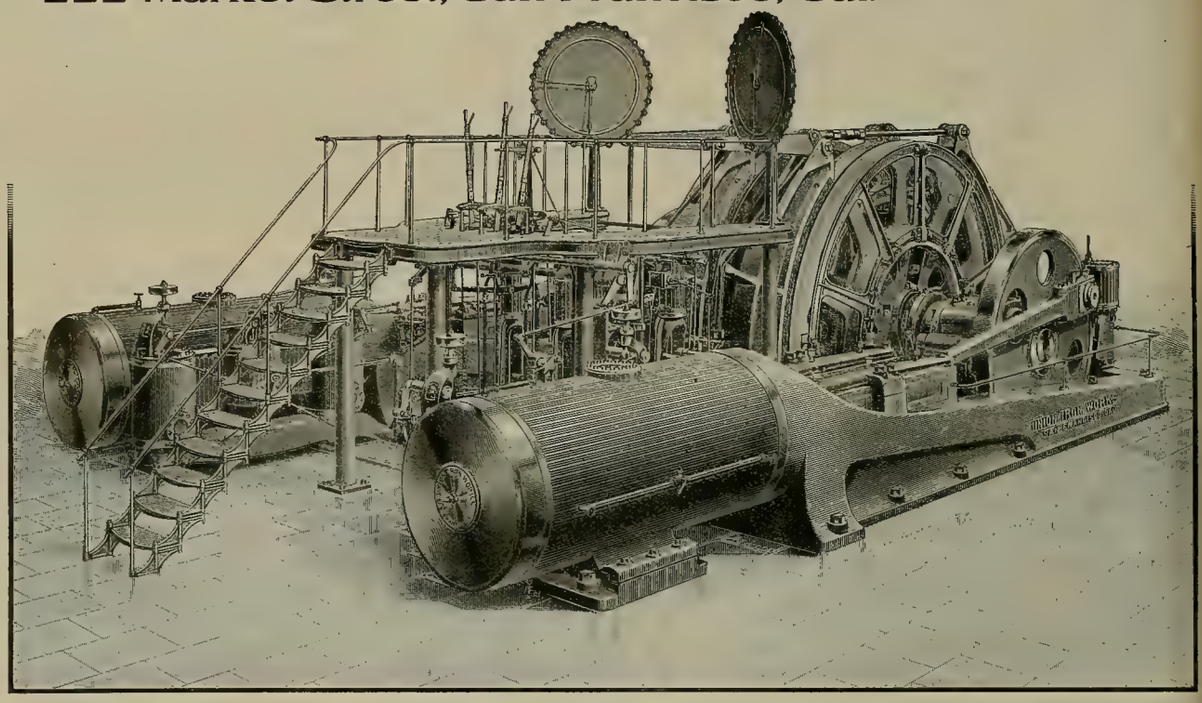
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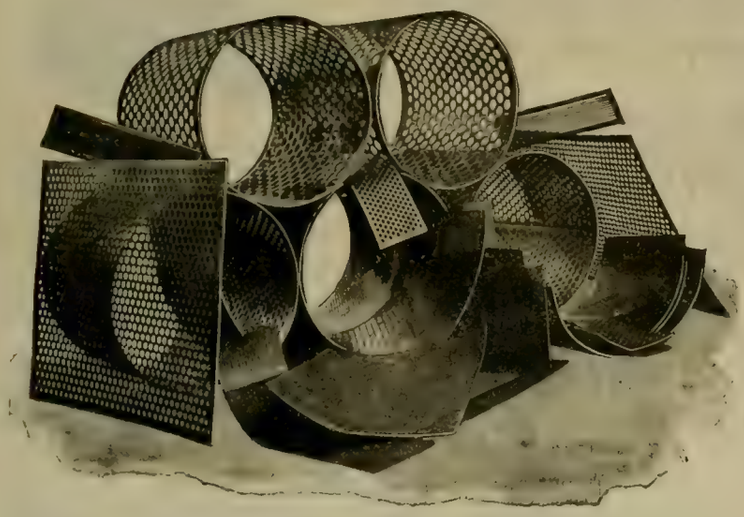
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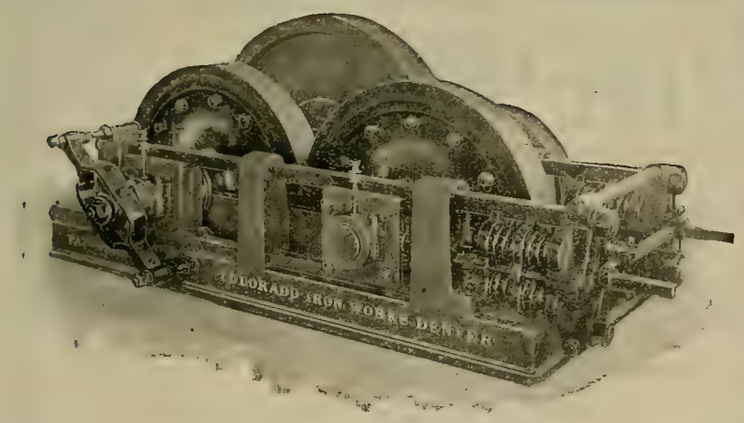
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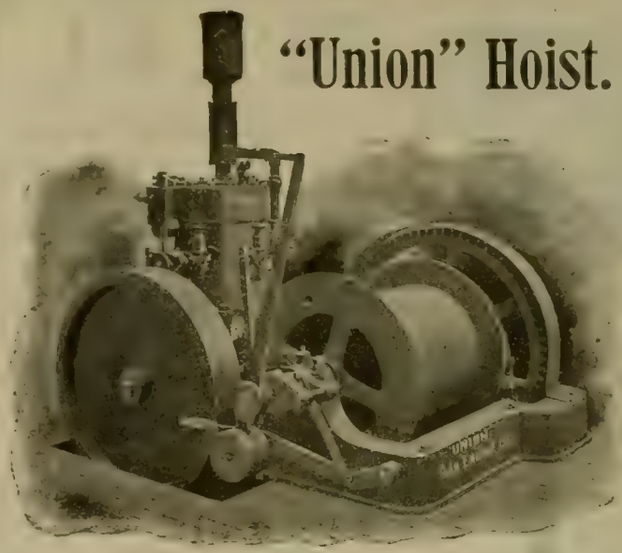
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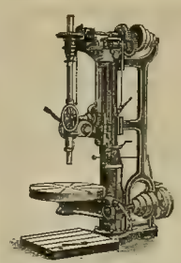
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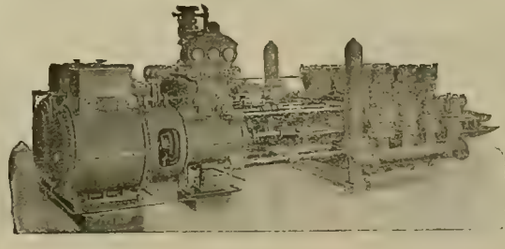
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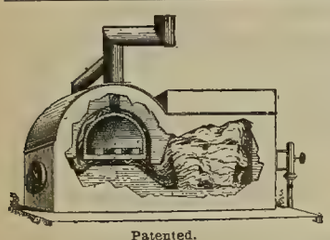

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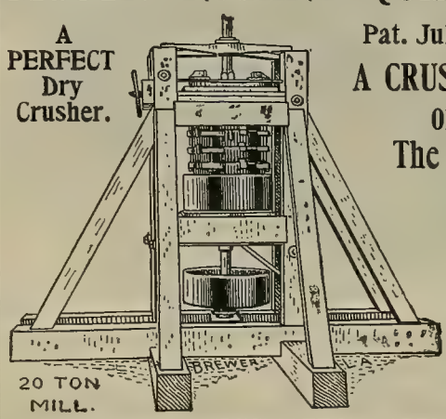
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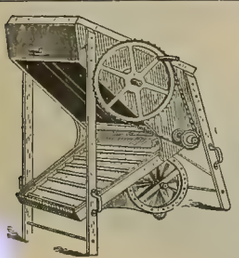
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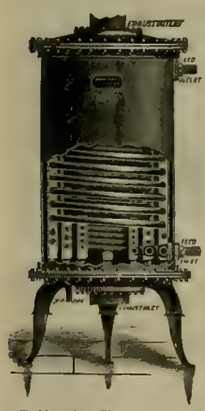
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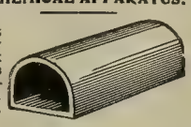
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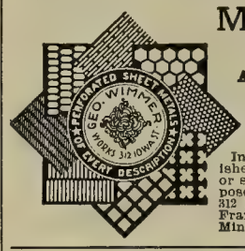


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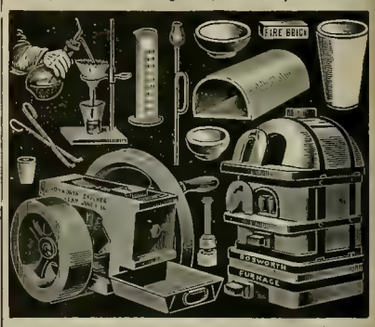
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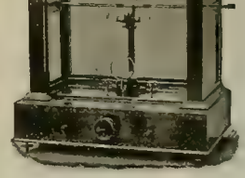
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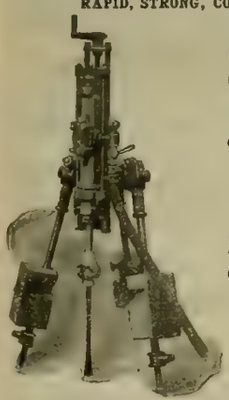
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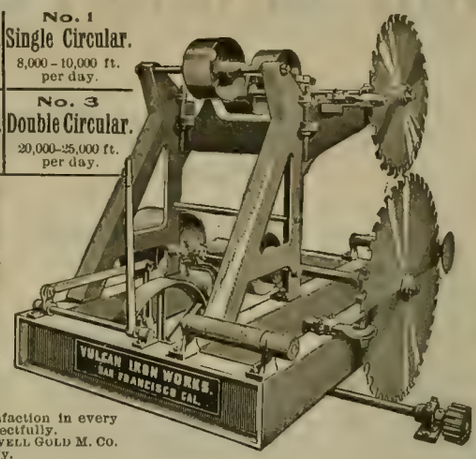
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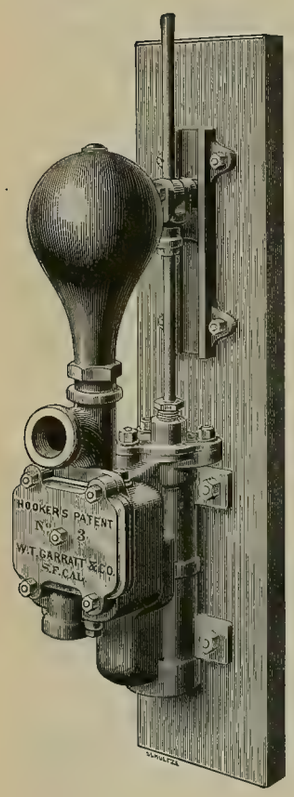
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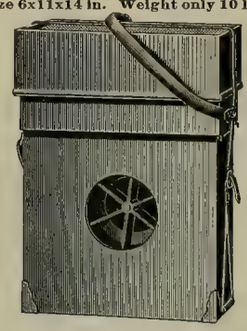
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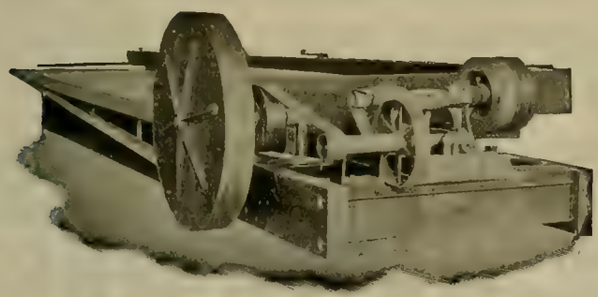
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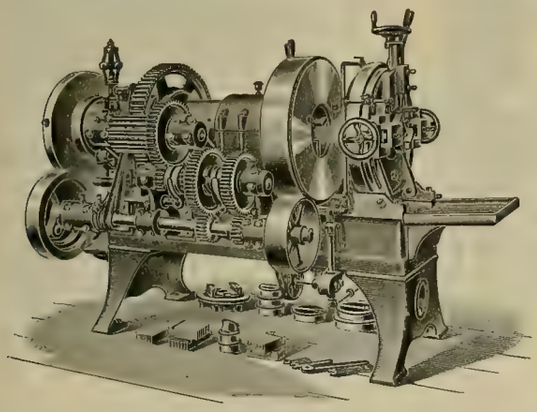
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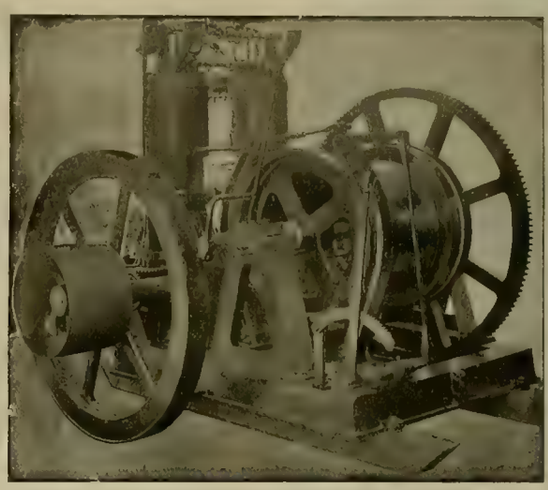
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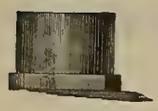
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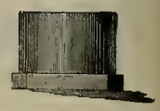


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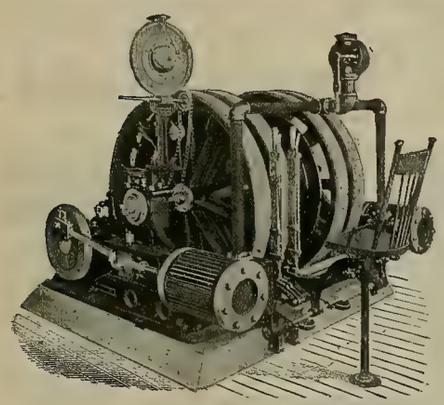


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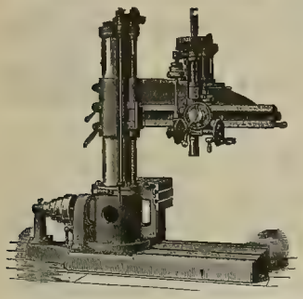
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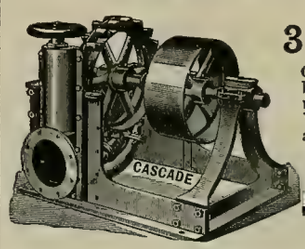
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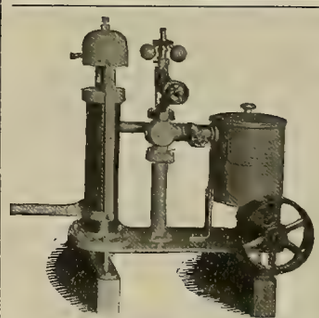
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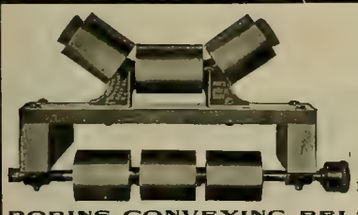
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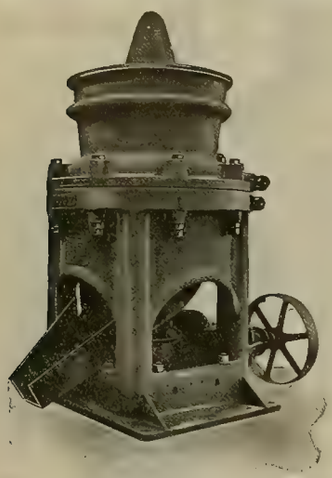
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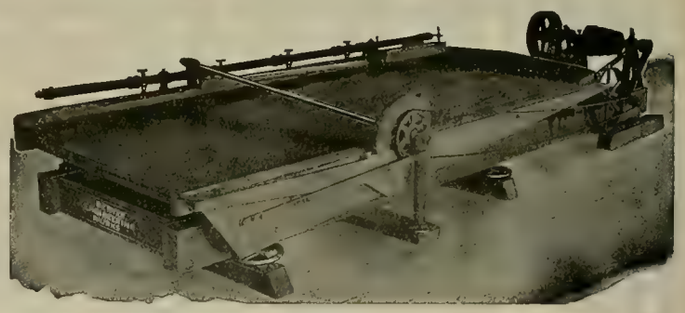
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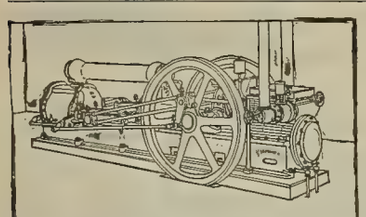
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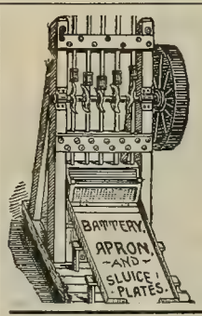
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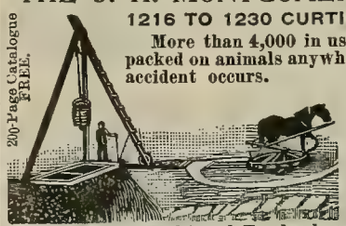
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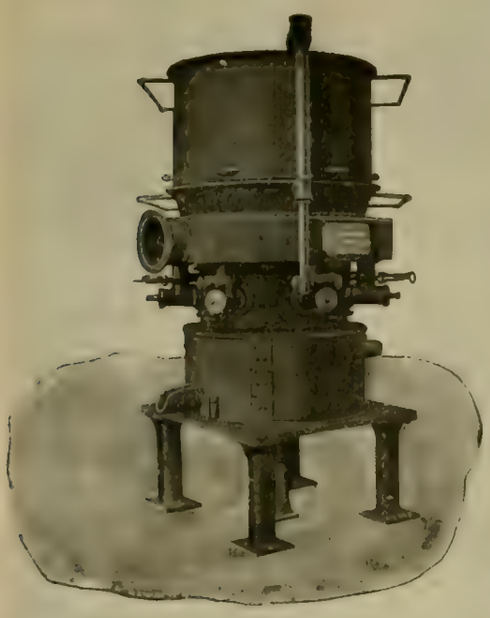
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THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

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If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



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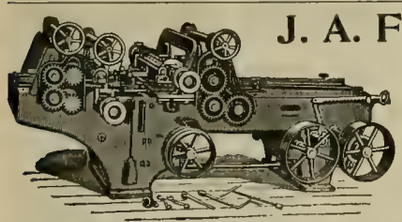
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Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes.

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For keeping your iron and wood work in perfect condition. Nothing else "just as good." Circulars cheerfully furnished.

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DESIGNERS AND BUILDERS OF
DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,
MACHINERY FOR PLACER MINING.
SOUTH MILWAUKEE, WISCONSIN.



FOWLER'S AIR SPACE and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums.
G. C. Fowler, 656-58 Howard St., S. F.

Market Reports.

SAN FRANCISCO, Aug. 10, 1899.

SILVER.—London, 27¾d; New York, 60½; San Francisco, 60¼; Mexican Dollars, 49@ @50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.55 bid, $4.60 asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake strong at $18.50; brokers' price, $18.75. Local—Mill copper plates, 23½c.

Copper remains unchanged, the demand being steady. Brokers' price advanced ¼c.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

Iron ore that was formerly delivered at Cleveland, Ohio, for $2.50 and $3 per ton now brings $5, and pig iron, that formerly brought $8, has of late been selling at $21 and $22 per ton. Iron products are being used in all trades as never before.

STEEL.—11¼@20c per pound.

TIN.—Unsettled; $32.50@32.75; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@ 14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

Since June 1st the production of Ætna is said to have been 50% greater than the average June and July production, being on a basis of 400 flasks per month. The production of the Napa and the New Idria mines has been steady.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8½c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4½ @5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 47c; cs., 52c; raw, bbl., 45c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18¾c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 52c; cs., 57c; No. 1 bbl., 46c; cs., 51c; Neatsfoot Oil, bbl., 65c; cs., 70c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia.)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¾	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 10, 1899.

9:30 A. M. SESSION.

150 Alta	09c	200 Overman	13c
100 Best & Belcher	70c	100 Savage	26c
800 Bullion	10c	300 Sierra Nevada	63c
100 Chollar	24c	200 Utah	11c
100 Con. Cal. & Va.	$2 20	100 Yellow Jacket	37c
300 Mexican	58c		

2:30 P. M. SESSION.

150 Mexican	57c	200 Yellow Jacket	38c
100 Gould & Curry	47c	100 Confidence	90c
300 Best & Belcher	71c	150 Union Con.	35c
150 Con. Cal. & Va.	$2 20	100 Caledonia	73c
200 Savage	27c	400 Challenge Con.	30c
100 Chollar	24c	600 Overman	17c
550 Potosi	44c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich.
Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial. U. S. A.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

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Coal Cutters,
Lift Pump, Pohle
and Stone Channelers.
The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO.,
203 Fremont Street.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE. A New Wilfley Patent Concentrator, complete. Only been used a few hours. Also, about 600 feet of 7-inch iron pipe, 14 gauge; as good as new. BEAR RIVER GOLD MINING CO., Colfax, Cal.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mining Properties
of merit, bought and sold. A specialty made of mines in Mexico and the Southwest. Whether a buyer or seller let me hear from you. Mines examined and reported upon.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Mines and Machinery for Sale at Public Auction.
The Harqua Hala (Arizona) Gold Mining Company will on Monday, August 14th, 1899, at 12 o'clock noon of that day, at the Court House door at Yuma, Arizona, offer for sale to the highest bidder all its mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery (fixed and movable), and stock of merchandise situated at Harqua Hala, Yuma Co., Arizona. Inventories and information may be obtained from C. Dallman, agent at Harqua Hala, or Lindley & Eickhoff, attorneys, 530 California St., San Francisco. Terms of sale: Cash, U. S. gold coin, payable twenty per cent on acceptance of bids, balance on delivery of possession. Title to mines U. S. patents. By order of the Board of Directors.

The State Ore Sampling Co.
DENVER, COLO.
We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.
Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.
BAILY & MONNIG, Managers.

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Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

F. B. COOK & CO., MINES AND MINING,
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Properties reported on and development work superintended for investors.

POSITION WANTED—By young man experienced in mill work, cyanide, assaying, and mining engineering; preferably to take charge of gold mill or cyanide plant. Technical graduate. Best of references to present employer and others. Address N. E. V., care this paper.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

WANTED, SITUATION
AS SALESMAN AND BOOKKEEPER IN MINING CAMP. Competent to take charge of store. Address S. E., this paper.

Underground Foreman
WANTS WORK.
Practical, experienced, intelligent, and up-to-date working of gold, silver or copper mines, whether small or large. Moderate salary. Good references. Address
C. L. LANG, Sonora, Tuolumne Co., California.

COPPER MINE.
Partner wanted (miner preferred) who has $5000 to spend developing a mining property in Mexico, which has lately produced a considerable amount of ore.
Object, deeper development and ultimate placing the property on the market.
No attention given to brokers or middlemen.
Address G. PETERSON, Ahlborn House, San Francisco, Cal.

Hydraulic Mines for Sale in Similkameen District, British Columbia.
667 ACRES. 5000 INCHES WATER IN DRIEST PART OF SEASON.
Two years' working bond will be given on favorable terms, or lease with option.
HOPE, GRAVELEY & CO.,
536 Hastings Street, - Vancouver, B. C.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

NOTICE.
To Whom It May Concern:
The so-called Cammett Concentrator which is being advertised and offered for sale by the Denver Engineering Works Company of Denver, Colorado, is a palpable infringement upon claims covered and protected by United States Letters Patent granted for the Wilfley Concentrator, and all persons who purchase and put the same in use will be promptly proceeded against as the law provides.
WHITE, ROGERS & COMPANY,
Exclusive Licensees for Building and Sale of Wilfley Concentrators on Pacific Coast under U. S. Letters Patent Granted A. R. Wilfley.
306 Pine Street, - San Francisco, Cal.

FOR SALE.
New Mining Hoist.
New Hercules Gasoline Hoist, 35 H. P.
Will hoist 3500 lbs. at 700 feet per minute. Made in sections not exceeding 1000 lbs. each.....$1400
ONE 4 H. P. HERCULES GASOLINE ENGINE—Second Hand.
Guaranteed order.....$200
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Guaranteed order.....$475
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Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.
W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
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AT SACRAMENTO, CAL.
TWO WEEKS—September 4th to 16th, Inclusive.
AN AGRICULTURAL SHOW, RACE MEET, AND AMUSEMENT EXPOSITION.
Over $10,000 in Premiums For Farm Stock and Agricultural Products
Beef and Dairy Cattle from the World's Fair, and the pick of American Herds. Sheep imported from England. Fancy Swine and Poultry.
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Bankers, Importers, Exporters and Commission Merchants.
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ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

Powell's Patent Swing Check Valve.



SIMPLE, EFFECTIVE AND TIGHT.

Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

SAILOR CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of July, 1899, an assessment (No. 1) of eleven cents (11c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 318 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of August, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 18th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
M. C. LUND, Secretary.
Office—318 Front street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of July, 1899, an assessment (No. 14) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
F. METTMANN, Secretary.
Office—237 12th street, San Francisco, California.
The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of July, 1899, an assessment (No. 13) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
WM. A. M. VAN BOKKELEN, Secretary.
Office—Room 9, 320 Sansome street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of July, 1899, an assessment (No. 116) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on FRIDAY, the 18th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 7th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
E. L. PARKER, Secretary.
Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of July, 1899, an assessment (No. 12) of ten ($10) dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 29th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
JOSEPH H. MOOSER, Secretary.
Office—320 Sansome street, room 24, San Francisco, California.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of July, 1899, an assessment (No. 9, new series) of five (5c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. P. THURSTON, Secretary.
Office—Room 10, 324 Pine St., San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1899, an assessment (No. 8) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California.
Office hours from 1 to 3 P. M.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 20) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors
J. J. CRAWFORD, Secretary.
Office—1209-11 Claus Spreckels building, San Francisco, California.

Trade Mark. Trade Mark.

SCHOTT & GEN. JENA

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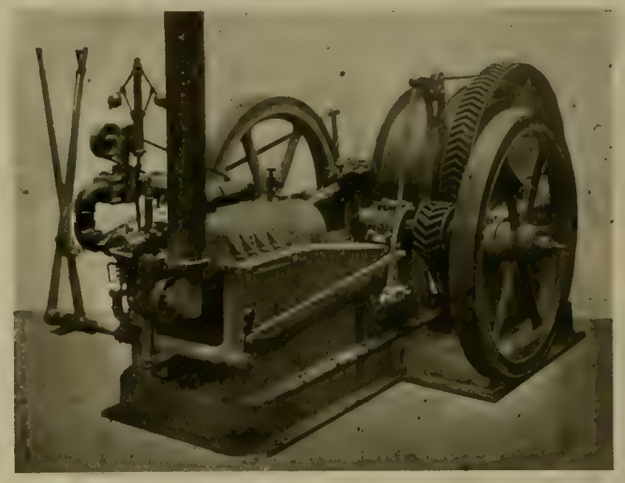
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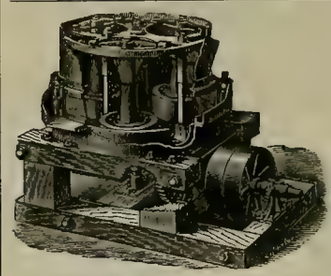
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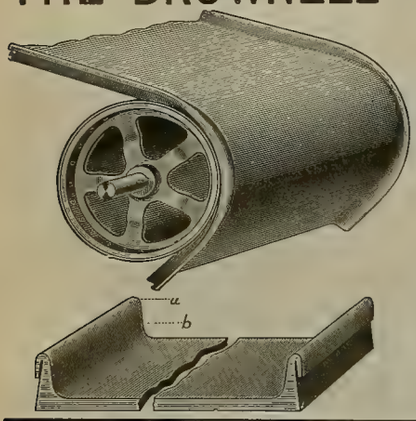
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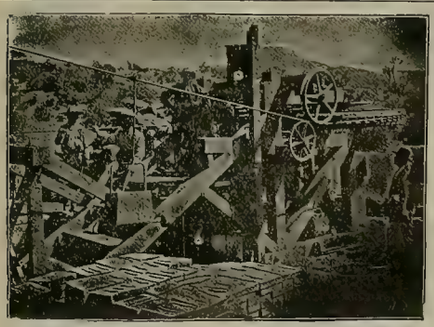
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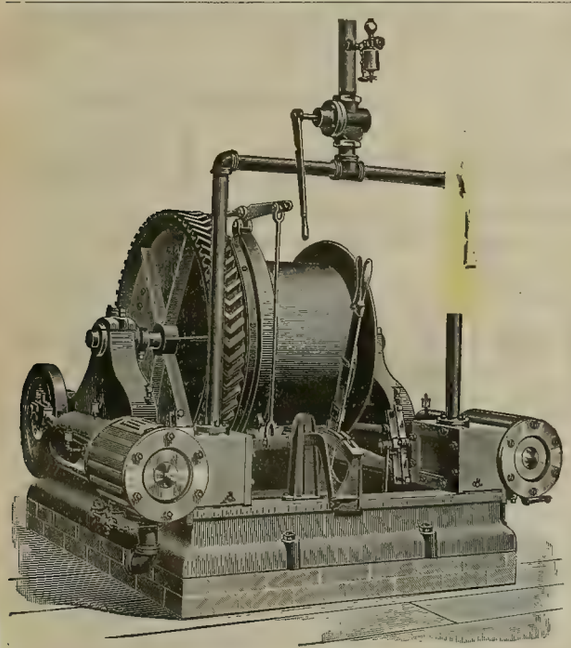
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No. 2041.—VOLUME LXXIX. Number 8. SAN FRANCISCO, SATURDAY, AUGUST 19, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Large Electric Motor.

The Sperry Mills, at Stockton, Cal., are installing what is announced as the largest electric motor in California. The motor stands over 8 feet in height; the armature is 6 feet in diameter. The Westinghouse Electric & Manufacturing Company especially built for the Sperry Mills one of their type "C" induction motors, rated nominally at 400 H. P., 2200 volts, but capable of carrying 500 H. P. An illustration of this motor is given in Fig. 1. In the San Joaquin valley numbers of these motors, ranging from 5 to 50 H. P., are employed for operating pumps. Gold dredging companies on the Yuba and Feather rivers employ several motors for operating gold dredgers and mining apparatus. In the Cripple Creek, Colo., gold mining district hundreds of such motors are in use for driving mine hoists, pumps, concentrators and rock crushers. In the Eastern States there are many industries using powers, in which this type of motor has been introduced with great advantage. They are virtually automatic and can be run by an inexperienced workman without danger. They are sparkless, and, in consequence, the United States Government has adopted them for the powder mills at the Indian Head proving grounds on the Potomac, and elsewhere. The motor has two main elements—the primary, which is directly magnetized by the current supplied from the circuits; and the secondary, in which low potential currents are induced by the action of the primary. The windings of the primary are so arranged that when supplied with alternating currents differing in phase, a rotary magnetic field is produced. This field acts upon the secondary winding and induces currents therein. Rotation is produced by the action between the secondary currents and the rotating field of the primary. From a mechanical standpoint, this motor is reduced to the smallest possible elements, a stationary part permanently connected to the main circuits, and a rotating part having no electrical connection with any other. The only parts that can wear are the shaft and journal boxes. This simplicity enables the motor to operate for long periods of time with a minimum of attention. The large motor supplied to the Sperry Mills at Stockton, Cal., has a hollow, cylindrical frame of cast iron, in which the primary is mounted. This frame for holding the primary is of two parts, which are separated horizontally.

The primary element, shown in Fig. 2, consists of a hollow cylinder built up of laminated rings of sheet steel, mounted on the inside to receive the conductors. In motors of a large size, such as supplied to the Sperry Company, the rings are not continuous, but are made up of segments, which are dovetailed and are fitted into corresponding slots in a hollow, cylindrical shell of cast iron. This shell is held in the cast iron frame of the motor. The conductors are machine-wound coils of wire, thoroughly insulated before being slipped into the slots of the primary iron core.

The secondary of this machine is illustrated in Fig. 3, and is built up of laminated steel discs, made of a high grade of metal, mounted upon an open spider, and carrying in slots around the periphery the rectangular copper bars of the winding. The whole secondary is simple, rigid and durable. The conductors of the secondary are all purposely short-circuited, hence no accidental short circuit can occur to cause injury to the windings. The construction is practically indestructible from heating, raising of coils or mechanical injury in handling. The advantage of so simple and substantial a construction without moving contacts and switching device has led to a wide use of this induction motor. The motor herewith illustrated by engravings specially prepared for this paper will be operated by electric power furnished from the Blue Lakes generating plant of Amador Co., Cal.

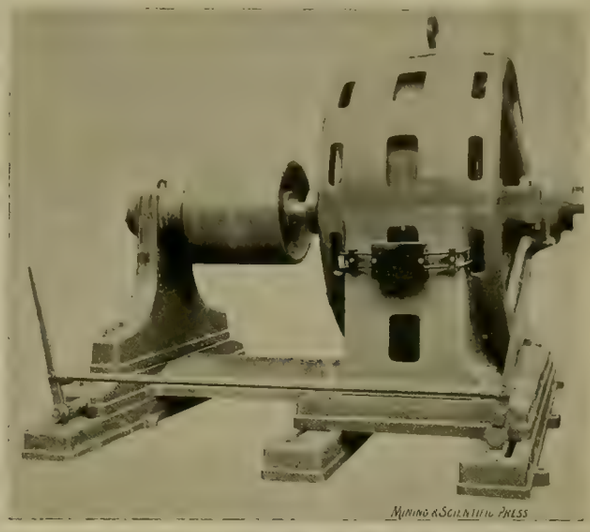


FIG. 1.—INDUCTION MOTOR, 400 H. P., SPERRY MILLS, STOCKTON, CAL.

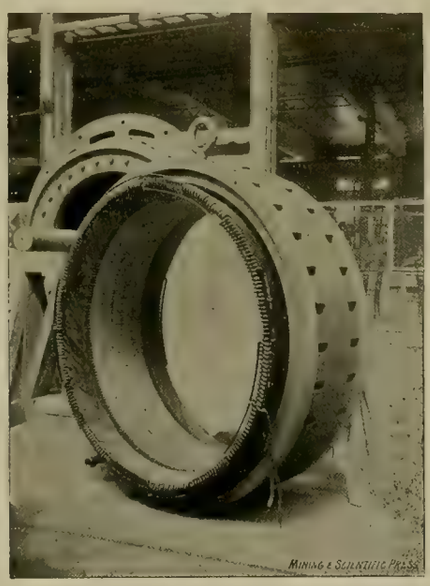


FIG. 2.—STATIONARY PRIMARY WESTINGHOUSE TYPE "C" INDUCTION MOTOR, 400 H. P., SPERRY MILLS, STOCKTON, CAL.

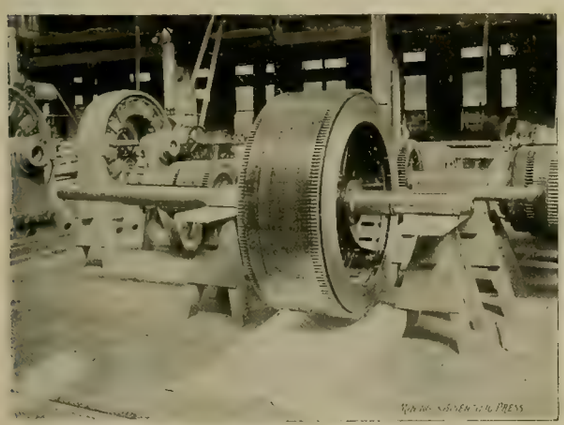


FIG. 3.—ROTATING SECONDARY OF WESTINGHOUSE TYPE "C" INDUCTION MOTOR, 400 H. P., SPERRY MILLS, STOCKTON, CAL.

AT the Hodbarrow mines in the south of Cumberland, England, an engineering project is being promoted to construct an embankment about the mine, calculated to keep the sea out of the workings of one of the principal mines. Ten years ago nearly $1,000,000 was spent in this manner and the enterprise proving successful it is now proposed to go farther seaward on a more ambitious scheme. The new wall will be in the form of an embankment with a puddled trench, with rough squares of concrete tumbled down the bank as a breakwater for the sea. This new embankment will be 6750 yards long and will enclose 170 acres of land, under which the new extension of the mine will be worked. Ore has been proved to exist in vast deposits under this area. The cost of the proposed scheme will probably be from £400,000 to £500,000, but is said to be well worth the enterprise, as Hodbarrow ore is the best hematite in England.

The Contract System.

The contract system of operating mines in British Columbia, introduced two months ago, at that time considered a dignified compromise between mine owners and miners, and which was said to give satisfaction to both sides of the eight-hour day controversy, is not working smoothly, for the reason, apparently, that some of the miners took contracts at figures too low to make it possible to make $3.50 per shift. The Rossland Miners' Union has passed a resolution to the effect that no union miner shall work on contract in that camp, and at Silverton the Miners' Union has demanded that managers of the Mine Owners' Association give written promises to pay no less than $3.50 per day on contract work. This the mine managers have refused to do. A miner takes a contract at a price which in his judgment will return him at least a full day's pay, and as on contract work men usually work harder, they expect to make more than the regular day's wages. If his judgment has been at fault, he refuses to take another contract at a similar price. The trouble in British Columbia, however, is due to the fact that the miners expect the eight-hour day at the same wages formerly paid for ten hours' work. The contract system, it was thought, would find a way to obviate further unpleasantness, and doubtless had British Columbia miners been able to make $3.50 or more in eight hours while on contract there would have been no further trouble, but failing in this they now demand that $3.50 per day be insured them.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Induction Motor, 400 H. P., Sperry Mills, Stockton, Cal.; Stationary Primary Westinghouse Type "C" Induction Motor, 400 H. P., Sperry Mills, Stockton, Cal.; Rotating Secondary of Westinghouse Type "C" Induction Motor, 400 H. P., Sperry Mills, Stockton, Cal., 197. Red Boy Mill, near Granite, Oregon; Bonanza Mill and Company's Buildings, near Sumpter, Oregon, 200. Lubricating Devices, 202. Latest Mining and Metallurgical Patents, 203. South Side of Arch Rock, San Francisco Bay; East End of Arch Rock, San Francisco Bay; North Side of Shag Rock, San Francisco Bay, 204.

EDITORIAL.—A Large Electric Motor; The Contract System, 197. American Institute of Mining Engineers; Condition of Affairs in the Transvaal; Miscellaneous, 198.

MINING SUMMARY.—205-206-207.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 222.

MISCELLANEOUS.—Concentrates, 199. Mining Activity in Eastern Oregon, 200. West Kootenay Ore Bodies; Removing Incrustation of Boilers, 201. Notes on Power and Transmission; Repealed or Not Repealed? Some Experiences of a Working Miner, 202. Latest Mining and Metallurgical Patents; German Zinc in America; Melting Babbitt Metal; Aluminum in Great Demand, 203. Proposed Removal of Arch Rock; Welding by Electricity; The Search for Iron Ores, 204. Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Catalogues Received; Books Received; Recently Declared Dividends, 207-208. The Homestake Mine; Wireless Telegraphy; Antidotes for KCN Poisoning; Hammer Hand Sling, 209.

IN California there is no such thing as "non-assessable stock" in a corporation. A California corporation is given power by positive statute to levy necessary assessments, and no power exists in a corporation to waive such legal rights.

TIN continues at a high price, due wholly to an increasing demand with a decreasing production. There is no syndicate buying up all the visible supply as in 1887. Unless the known mines can increase their output and new mines be successfully opened the metal is likely to go several points higher.

EVERYWHERE—except in the mining districts—there is a cry for "more men." Whether it is railroad work in Pennsylvania or California, foundry requirements in Ohio or Colorado, harvesting in Minnesota or Oregon, the present demand for labor is greater than the available supply. This condition of affairs does not obtain in the mining world, which is governed by rules and affected by conditions in some respects dissimilar from other branches of productive industry.

THE Washington, D. C., Commissioner of Patents has made a new ruling regarding applications for patents for machines or processes. Formerly an inventor was entitled to include in the one application claims for the machine or process and the resultant product. The new rule says: "A machine, a process, and a product are separate and independent inventions, and claims for each must be presented in a separate application." This necessitates filing two applications in a process case involving the steps for producing a certain result and the obtained product.

IRON and steel are still in great and increasing demand, and the mines have not yet been able to output more rapidly than the market requires. The continued upward trend of prices for raw material is beginning to affect all branches of manufactures of iron and steel. Machinery for mining purposes, because of its great weight, was the first to feel the effect of the high prices, and now other machinery of lighter kinds is advancing in price. That the prices will soon go to a lower figure there is little hope for this year, as it is now expected that the output will fall short of the estimate. Pig iron is not being produced as fast as consumed and a great deal of old machinery is going to the foundries to be recast and manufactured into modern forms.

American Institute of Mining Engineers.

Beginning September 25th, the seventy-seventh meeting of the American Institute of Mining Engineers will be held in San Francisco.

A banquet will be given to the Institute by the merchants and manufacturers of San Francisco, and receptions will be given at other places in the State. Following is the official programme furnished by Secretary Raymond:

"The special train will leave Chicago by the Chicago & Northwestern Railroad at 5:30 o'clock P. M., on Saturday, September 16th. If a sufficient number of persons, who have secured their places in the special train from Chicago and who desire to go together from New York City, will promptly notify Theodore Dwight, at the office of the secretary, arrangements will be made to have one or more special cars attached to the 1 P. M. New York Central train of Sept. 15th. Railroad and sleeper fares to Chicago are not included in the excursion rate of $225 already published; but a considerably reduced excursion rate to Chicago and return can be secured for a party of sufficient size. Particulars on this point and all changes of schedule or other matters of interest to the excursionists will be furnished by a personal letter to all those who have secured places in the special train.

From the responses already received, it is now clear that the special excursion will comprise a sufficiently large number of members to insure its interest and success, while, on the other hand, it will be possible to accommodate a considerable number of ladies and guests accompanying members. Great care has been taken in the selection of cars, porters, stewards, ladies' maids and cooks for the special train, insuring complete comfort and luxury for the party. The restriction announced in Circular No. 3 giving to members only the first opportunity of securing places in the special train has been rescinded, and applications will be received for guests accompanying members, up to the limit of the accommodation available. First come, first served. A considerable number of members have already applied for places for ladies accompanying them, and it is certain that many ladies will be in the party. Further applications should be made at once to Mr. Dwight, and the requisite advance of $50 for each person should accompany the application. The names of all persons should be given, and it should be stated whether they will go from New York or join the special train at Chicago, or en route.

After August 15th it will be necessary to deposit with each application the whole sum of $225 for the round trip from Chicago. But of this deposit $175 will be returned, if the parties notify this office by September 10th of their inability to go; of the remaining $50 the whole or part will be, in such cases, returned subsequently, as may be practicable.

If the accommodations thus set free by the failure of the original depositor to use them can be sold, for whole or part of the route, to others, the amount returnable will be correspondingly greater, amounting, possibly, to the whole. But as to this no guaranty can be given.

For the benefit of members not acquainted with the climatic conditions which may be encountered, it is recommended that both light and medium clothing and wraps be taken. Part of the trip will be very dusty, and old-fashioned "linen dusters" will be highly serviceable.

The itinerary given in the following paragraph will be seen to contain an important addition to the scheme already announced, namely, a trip to the Grand Canyon of the Colorado, which can be taken by those who can afford the extra time (about four days) involved, at a special reduced rate. If a sufficient number desire to take this trip, the special train will be divided at Flagstaff, Ariz., and one part will go on direct to Chicago, while another part awaits, at Flagstaff, the return of the Grand Canyon party. To those who have never made this trip, it can be said that the Grand Canyon presents, beyond comparison, the most impressive and memorable scenery on this continent. The trip from Flagstaff is a stage ride of about sixty-five miles, over a picturesque plateau, and the accommodations for travelers are comfortable, though not luxurious. The extra cost of this trip cannot be precisely stated at this time, but it is safe to say that it will not exceed $40, including the cost of holding part of the train at Flagstaff. Those who desire to include this extra excursion, the date of which is given below, are requested to notify Mr. Dwight immediately.

The following provisional itinerary is announced for the special train. Future changes will be promptly announced to those who have secured places in this train:

Sept. 15th.—Headquarters car, and probably one sleeper, leave New York at 1 P. M. by New York Central Railroad.

Sept. 16th.—Special train leaves Chicago at 5:30 P. M.

Sept. 17th.—Leave St. Paul, via Great Northern Railway, at 8 A. M.

Sept. 18th.—A stop of several hours will be made at Great Falls, Mont., to visit the works of the Boston & Montana Copper Co. and the Montana Smelting Co.

Sept. 19th.—The day will be spent at Butte, Mont., in visiting copper mines and smelting works.

Sept. 20th.—The concentrating and smelting works at Anaconda will be visited, and the train will leave at night for Spokane, Wash., by the Northern Pacific Railroad.

Sept. 21st.—Spokane will be reached early in the afternoon, and the train will leave for Portland, Or., about 6 P. M. by the Great Northern.

Sept. 22d.—Arriving in Portland in the evening, the train will continue to San Francisco by the Southern Pacific Railroad.

Sept. 24th.—The train will arrive in San Francisco.

Sept. 25th–28th, inclusive, will be occupied by the sessions of the meeting and by local entertainments.

Sept. 29th.—Special trains will leave in the evening for California mines, visiting Grass Valley, Nevada City, Oroville, Jamestown, Sonora, Dutch Flat, Redding, Sutter Creek, Jackson, New Almaden, etc.

Oct. 7th.—The party will reach Raymond, Cal., where the train will be left for the visit to the Yosemite valley.

Oct. 12th.—Los Angeles will be reached.

Oct. 13th (probably at a late hour), the party will reach Bisbee, Ariz.

Oct. 14th.—Visit to the Copper Queen mine.

Oct. 15th.—Arrive at Phœnix, Ariz.

Oct. 16th.—Arrive at Flagstaff, Ariz., the point of departure for a visit to the Grand Canyon of the Colorado. Those who take this trip will be delayed about four days, and a part of the train will wait for them. Those who continue their trip without stopping will reach Chicago, via the Santa Fe route, on Oct. 19th."

At the date of issuance of the above 178 members of the Institute and 36 ladies had secured places. It is thought that about 300 members of the association will make the trip.

FROM week to week the condition of things in the Transvaal has been referred to, but the past few days have seen the relations between the South African Republic and England strained almost to the point of rupture. Both sides evidently are in earnest and the Boers are hastily arming and placing soldiers at points of vantage. England has not been idle, and her troops are nearing the borders of the Transvaal, while active preparations are making to send a large army into the South African country from India, Egypt and England. It now looks as though war is inevitable. The Boers have refused to appoint members to a joint commission to inquire into the effect of the proposed changes in the law granting the franchise to Uitlanders; and while this in itself does not constitute an act of war, this refusal of President Kruger only tends to greater activity in the war department of Great Britain. The Boers profess to want peace, but desire England to recede from some of her demands. It is evident that the situation is being viewed by the majority of Uitlanders and England from a business and not a moral standpoint. The Boers impliedly threaten to destroy the mines and mining property at Johannesburg, in the hope that self-interest will impel the Uitlanders to advocate peace, though such vandalism would only make certain the very thing it was intended to prevent, insuring sharp reprisal.

ANOTHER accelerating motor—a sort of perpetual motion machine—has made its appearance in the market. It is known as the energizer momentum engine. The peculiarities of its construction are past explanation; but it may be said that it, together with all other mechanisms for which are claimed principles contrary to the forces of nature, is a "fake." No machine can transmit or produce power without a loss when compared with the generating force. A volume of water carried onto an overshot wheel is one of the most familiar applications of power, but the whole power represented in the weight of the water is not transmitted by the wheel. There is no such thing as accelerating or accumulating power in any device. Still the promoters of inventions of this class never fail in securing abundant capital for the promotion of their enterprises.

THE assertion is made in San Francisco that since the MINING AND SCIENTIFIC PRESS showed last Saturday the lack of power in the attempt of the last California Legislature to repeal the State mining law of 1897 Gov. Gage will call a special session of the Legislature to repeal that law—also to elect a U. S. Senator.

Concentrates.

GYPSUM is an excellent non-conductor of heat.

THE United States lead production for '98 was 220,000 short tons.

HEAVY stamps require heavier mortars and blocks than the lighter ones.

MONTANA mining men report an advance in the price of mining machinery.

ALASKA newspapers demand a Government mine inspector for that Territory.

A "GASH VEIN" is a mineralized fissure extending vertically a short distance, and comparatively shallow.

SHOES and dies must be of the same size, for if not the larger will cup and cause loss of crushing capacity.

THE object of substituting a steel for an iron rope should be to gain an increased wear from the rope rather than to reduce the size.

ALL pure gold is not of the same color. Australian gold has a reddish tinge, and some of the gold of the Urals is still more inclined to red.

WITH increasing altitude the boiling point of water decreases, until at sufficiently high altitude the hand could be immersed in boiling water without injury.

ORDINARILY gold amalgam will retort about one-third its weight if tightly squeezed. This varies considerably with the coarseness or fineness of the gold.

THE quantity of water used in a stamp battery varies with the character of the ore. It is advisable to employ as little water as will accomplish the work.

A PIECE of gold which weighed 640 pounds was found at Hill End, New South Wales, some years ago. It was claimed to be the largest single mass ever discovered.

AN explosive compound can be made by immersing the ter-chloride of gold in caustic ammonia. It is a dangerous substance and explodes when rubbed or struck.

IT is said by the owners that the Bonanza mine at Sonora, Cal., produced over $360,000 from a single pocket. Other pockets were found ranging from $50,000 downward.

STEEL flat wire ropes are composed of a number of strands alternately twisted to the right and left, laid alongside each other and sewed together with soft iron wires.

CARBONIC ACID GAS (carbon dioxide) has been drawn from the mines of New Almaden, in Santa Clara Co., Cal., compressed in steel cylinders and shipped for commercial uses.

UNDER the Federal laws of 1866, parallelism of end lines was not required; but under the law of 1872 parallelism of end lines was made essential to the exercise of the extra-lateral right.

WHERE a high head of water is not cheaply available, and a low head with large volume is easily obtainable, the latter should be adopted, using a turbine instead of an impact wheel.

AN administrator of a deceased entryman is without authority, under the homestead law, to relinquish the entry of the decedent, whether authorized to do so by the local courts or not.

GREEN GOLD made by jewelers is composed of twenty-five parts silver and seventy-five parts gold. Various shades of green are produced by varying the percentage of silver in the alloy.

RENEWING his subscription, a Moscow, Idaho, miner says: "Yours is the best paper for the mining man. I get enough out of any one number to pay for the whole year's subscription."

THE *Reveille* says that of the 2000 union miners in the Cœur d'Alenes all have left, except about 100. They have gone to Alaska, British Columbia and some to Butte, Mont., and the country south.

TO A CAPACITY of 100,000 gallons wooden tanks are believed to be superior to steel. With due care as to corrosion, steel is a good material to use for tanks of larger dimension than that specified.

THE U. S. Circuit Court in San Francisco has remanded back the anti-debris suit to the Yuba, Cal., Superior Court. The California State Miners' Association has engaged counsel for the defense.

EIGHT HUNDRED DOLLARS in United States gold coin weighs 43 ounces Troy. Nine-tenths of this is pure gold, one-tenth alloy. Hence, $800 divided by 38.7 gives $20.6718, the coin value of one ounce of pure gold.

STEEL ROPES should be of the best obtainable quality, as those made from low grades of steel are not as serviceable as good iron ropes. The constant bending and vibration soon causes poor steel ropes to become brittle and unsafe.

FOR guy ropes, stays, etc., galvanized ropes are superior, but galvanized ropes should not be employed for hoisting in mines, as the coating of zinc soon cracks off and, the corrosion of the iron following quickly, they become dangerous.

FOR safety in providing a rope for hoisting, allow one-seventh to one-fifth of its ultimate strength, in order to get good wear from it. In running ropes wear increases with speed, and for this reason it is better to increase the load than the speed.

THE term extralateral is used to denote the right to pursue a vein on its downward course outside of and beyond vertical planes drawn through the side lines of a lode location, into and underneath the surface of adjoining or contiguous land.

ALTHOUGH the law does not distinctly state that annual labor to the amount of $100 must be expended upon placer claims, the Land Department and the courts have held that the law of the lode claim applied also to placers and that annual assessment must be performed.

THE structural geology of the Calico, San Bernardino Co., Cal., region is not unlike that of Cripple Creek, Colo., substituting rhyolite breccia for the andesite breccia of Cripple Creek and liparite dykes and flows for the phonolite. There are also later intrusions of glassy rocks—vitrophyre and pearlite—in the Calico region; but these latter, so far as known, are not associated with any ore deposits.

AT Manti, Utah, a deposit of saltpeter, potassium, soda and magnesia, said to be the second deposit of its kind thus far discovered, the only other being in Germany, has been found. The owners expect to work the claims.

OCCURRENCE of cracks during rolling of brass is deemed due to impurities in the copper therein. Antimony in electrolytic copper used in the brass alloy will especially occasion such cracking, even when so small a percentage of antimony as 0.02 is present.

IT is not possible to temper steel in soapy water, for that is a non-hardener, because it does not rapidly abstract or conduct heat from the object to be hardened, and produces a heavy scale which sticks tightly to the surface, the scale being oxide of iron; this formation is the main preventive.

IN electrolytic extraction of zinc the ore is crushed, roasted, leached, the zinc being dissolved out. An electric current is passed through the solution, depositing the zinc at the cathode. In the Diffenbach process zinc chlorine produces the zinc by electrolysis; in the Siemens-Halske system zinc sulphate is used.

IT has been asserted that the appearance of native mercury in a quicksilver mine is an indication of an approach to the end of the deposit; but the facts do not seem to justify this conclusion, for the reason that cinnabar mines in California, in which native mercury was found years ago, are still in successful operation.

WITH metallic copper worth 18 cents per pound a unit (twenty pounds) is worth $3.60. The cost of treatment of copper ore varies with the character of the ore and the method of reduction. Some of the largest copper mines produce metal at a nominal cost of about 5 cents per pound. In most mines it is more.

SPECULAR IRON is a foliated, micaceous variety of hematite. Owing to its high metallic luster it is often mistaken for galena. An intimate mixture of galena and zinc blende is sometimes mistaken for tellurium ore. If zinc blende be treated with sulphuric acid the smell of escaping sulphuretted hydrogen is pronounced.

IF the end of a closed tube containing air is immersed in liquid hydrogen, the contents of the tube will be quickly condensed to solid air, and if the portion of the tube from which the air has been removed is sealed with a blow pipe, a vacuum will be obtained so high that it will scarcely allow the passage of an electrical discharge.

WHEN zinc spelter was selling at 7 cents per pound several years ago, the highest price obtainable for zinc ore was about $12 per ton. Now, with spelter at 5¾ cents per pound, zinc sulphide is selling readily at $45 per ton, and it is believed the business will become more profitable by the introduction of modern mining machinery and methods.

THE number of drops of a Gilpin county, Colo., mill ranges from twenty-eight to thirty per minute and the height of drop from 12 to 16 inches. In quick drop mills of the California type the drops average ninety-six, but in some run as high as 110 per minute. The latter is the extreme, and cannot be materially increased without the tappets striking the cams.

WHEN a slip joint is to be placed in connection with the discharge column of a pump in a mine shaft, place the sliding end uppermost—that is, the smaller pipe within the casing—otherwise any grit taken up by the pump and forced upward will settle around the inner pipe, filling the space between it and the casing and making it impossible to shift the pipe either way.

IN the issue of Oct. 15th, '98, is the illustrated article asked for, concerning boring for oil on the Santa Barbara, Cal., beach and pumping petroleum from under the sea. The drillers of these oil wells have no title except possession, but can thus hold their claims against all comers except the State. Title to these lands rests in the State, and the State can compel them to vacate—but is not likely to.

SOUTHERN CALIFORNIA'S present oil output is 5480 barrels per day. There is a present "boom" in oil in California, and new discoveries lead to the belief that in that direction lies largely the successful solution of the fuel problem. So far seventeen scientific articles have appeared herein, giving complete information, written with full practical knowledge of the subject, and the series will be continued.

PERFORATED tin screens for quartz mills are preferred by some for the reason that they are cheaper than Russia iron screens, though tin plate is only sheet iron tinned. These screens are burned before use, to oxidize the tin. If this precaution be not taken the tin amalgamates with the mercury and clogs the holes. The use of perforated tin for such purpose is not recommended, as iron is, on the whole, more economical.

IN a new process for preserving and fireproofing timber the wood is first impregnated with lime milk, and then with a solution of ammonia and boric acid. The milk is forced by a pump into the pores of the wood, which is in a partial vacuum chamber. Dry air is then forced through the chamber, and when the wood is dry the ammonia solution is applied. P. & B. paint continues to be used for such purposes with satisfactory results.

NATIVE GOLD, though yellow by reflected light, is green by transmitted light. When silver is employed as an alloy the color of gold by transmitted light is light green. When alloyed with copper the color is emerald green or even blue by transmitted light. When in a state of fusion, gold often exhibits a bluish green tint, and at a higher temperature it gives off purple vapors. It is one of the most perfect conductors of heat and electricity.

WHERE a tunnel is located for the development of a mine or group of mines, when the tunnel is outside of the limits of the mines to be benefited, assessment work may be done in the tunnel, and the holder of the claims is not required to perform work on the surface or elsewhere on the claims. The amount of work performed in the tunnel must equal $100 annually for each of the claims in the group for the development of which the tunnel is run.

WHEN an ore shoot pinches in depth and the vein walls continue and remain well defined, there is no positive assurance that another shoot will be found at greater depth, though this has been found to occur so frequently that there is a reasonable inducement to explore deeper in hope of finding such deposit. Not infrequently ore shoots are found to offset a few feet, the ends overlapping, but separated by vein material a few inches or several feet in thickness.

THE use of hydraulic separators in gold mills is recommended for sizing pulp before sending onto concentrating machines. A machine which will save a relatively large particle of sulphide with a given number of vibrations, quantity of water and grade, will not save a very fine particle of the same mineral. For this reason pulp which has been sized and delivered to different machines set to treat each particular class of material results in better work and a closer saving.

COPPER in ore is generally believed to be detrimental to the successful operation of the cyanide process. Such, however, does not always appear to be the case. Oxidized ores cause more trouble than sulphide ores. Some copper sulphides fresh from the mine which have not suffered oxidation give less trouble than those which are partly oxidized. Some mill managers keep iron and other sulphides which are to be treated by cyanide process under water to prevent oxidation.

WIRE ROPE must not be coiled or uncoiled like hemp rope. It should be mounted on a reel and rolled on or off as required. When receiving a new rope from the manufacturer that is not on a reel, but coiled up, the best way to put it in place is to take the coil to a distance from the shaft equal to its length and, releasing one end, roll it along the ground like a wheel, until it is entirely unrolled, when the end nearest the shaft may be passed over the sheaves and onto the hoisting reel and wound up.

THE law requires that labor shall be performed or improvements made upon each claim until a patent has been issued therefor. When application for patent has been applied for, proofs made and money paid, the equitable title of the purchaser is complete and the patent when issued is evidence of the regularity of the previous acts. In short, an entry made is in all respects equivalent to a patent issued, in so far as third parties are concerned.

THE main object in the regulation and adjustment of a quartz mill is to crush as much rock as possible with the available power within a stated time and to keep the loss of gold as low as possible. When a certain stage is reached it is usually found to cost more to save the gold remaining in the tailings than the value of the gold itself. After the highest saving with the greatest capacity has been attained, a few simple automatic devices may be introduced to save a little closer, in the way of mercury traps, etc. These require little attention and are cleaned up when occasion requires.

THE formation in which a vein occurs has little to do with the value of its ores. The condition of the wall rocks, however, is sometimes an indication which may guide the miner in his search for ore. When the vein occurs in a rock which in its normal condition is massive, like granite, diorite or diabase, and the wall rocks are found altered to a schistose or slaty condition—softened and mineralized—ore may be looked for, though it may not always prove to be pay ore. No hard and fast rules have been found applicable to all cases. A dyke may have a beneficial effect on a vein, but rich veins exist which have no dykes near them.

REGARDING steam engines exhaust the successful application of the cooling tower to the condenser renders it possible for steam users to run their engines condensing with economy of water use. In textile mills it is a common practice to operate engines with several pounds back pressure on the exhaust steam for the purpose of utilizing the exhaust for heating purposes. With the compound condensing engine, steam of about the right pressure and temperature can be taken from the receiver, thus furnishing it under the most economical conditions, and, at the same time, allowing the use of condensing engines.

GOLD is deposited in segregated bunches of greater or less size, as irregular masses, crystals, dentritic infiltrations, in foliated, fernlike and other forms in crevices in the rocks, and are called pockets. The genesis of these accumulations of gold is not understood, though it has been observed that they frequently occur in veins at the intersection with cracks which have a strike and dip differing from that of the vein. Sometimes they are found where a change of formation takes place. While there is a great variety in the conditions under which pockets occur, they are usually found in any particular mine surrounded by similar conditions.

THE California mining law of May 26th, '97, provides as follows: The discoverer of any vein or lode shall immediately, upon making a discovery, erect at the point of discovery a substantial monument or mound of rocks, and post thereon a preliminary notice, which shall contain the name of the locator or locators; the date of discovery; the number of linear feet claimed in length along the course of the vein each way from the point of discovery; the width claimed on each side of the center of the vein; general course of the vein or lode, as near as may be; that such notice is a first or preliminary notice. The notice shall be recorded in the office of the county recorder of the county in which the same is posted within twenty days after the posting thereof. Upon the erection of said monument and posting such notice the locator shall within sixty days of the discovery perform $50 worth of labor in developing his discovery, and distinctly mark his location on the ground, so that its boundaries can be readily traced, and must file in the office of the county recorder of the county in which the claim is situated, a certificate of location, which certificate shall state: The name of the lode or claim; name of locator or locators; date of discovery and posting of preliminary notice, which shall be considered as date of location; a description of the claim defining boundaries, and such additional description by reference to natural objects as will identify the claim. Also a statement that such certificate is the final or completed notice of location, and that he has performed aforesaid $50 worth of labor in development work thereon within the aforesaid period of sixty days. The certificate shall be dated and signed by or on behalf of the locators and verified by them or some one in their behalf, and when filed for record shall be deemed prima facie evidence of the facts therein recited. A copy of such certificate of location, certified by the county recorder, shall be admitted in evidence in all actions or proceedings with the same effect as the orignal.

Mining Activity in Eastern Oregon.

From a Staff Correspondent.

One of the most active sections of the Northwest the present season is that tributary to Sumpter, Oregon. Such mines as the Red Boy, Columbia, Bonanza and North Pole are working with greater results than ever, and such new properties as the Golconda, Cougar, Magnolia, Little Giant, Vananda and May Queen are being rapidly developed and equipped on a scale that involves the expenditure of half a million dollars the present year. The Sumpter Valley Railroad, whose line extends from Baker City to Sumpter, thirty-one miles in length, is doing a heavy business in freight and passenger traffic; and the town of Sumpter, built in a narrow valley among pine trees, is having a good growth. It has a population of about 2000, and, being the outfitting point for the mines, villages, sawmills and ranches from Bourne (on Cracker creek) to Canyon City (on the John Day river), it is a busy place.

The good record and success of a number of mines in this vicinity have established confidence and imbued the district with enthusiasm, the result of which is seen in the purchase of a number of prospects by Seattle, Spokane, Chicago and Montreal men; and the activity displayed by the newcomers in pushing development work and building mills is evidence of substantial backing.

In the Columbia, North Pole, Red Boy and Bonanza, which are extensively developed, the ledges of ore are known to be of good width, well-defined, extensive and the ore of good grade. The development so far pursued on the newer properties, such as the Golconda, Cougar, May Queen and Magnolia, discloses ore bodies apparently as extensive and as rich as those in the well-developed mines.

Those properties now attracting special interest may be grouped in four sub-districts: First, at Bourne, are the North Pole, Eureka & Excelsior, Columbia and Golconda, which are located on the same mineral zone; second, near Granite, the Cougar and Magnolia mark the location of another base of operations; third, the Red Boy, May Queen, Vananda and others comprise an important group; fourth, the Bonanza and Richmond have opened a number of great ledges of ore which makes Bonanza or Geiser a district within themselves. Tributary to and included in each of those sub-districts are other properties of merit which are being developed. The ores from all this section are similar, being oxidized quartz, mineralized porphyry and talc, carrying free gold, running into sulphides at greater depth. The veins are usually between slate walls. There are five or six mills operating in the vicinity, in all of which the principal values are saved by amalgamation, concentration of tailings being an important item. The North Pole mill, however, has a combination process, which, under Mgr. Melser's directions, is doing good work. It includes amalgamation, concentration and cyanidation. The Red Boy mill of twenty stamps and eight concentrators is to be supplemented by a forty-ton cyanide plant for working tailings.

Above are given the general features of the district. A more particular notice of the several mines, however, may be of interest:

The Columbia, under the management of Frank S. Baillie, is putting in a new hoist, two 100 H. P. boilers and a six-drill compressor. The hoist will be capable of working to 1000 feet depth. A shaft is being sunk to a depth of 500 feet below the main tunnel. About 8000 feet of work is laid out for the rest of the year. The ten-stamp mill saves 40% of the values on the plates, and about fifty tons of concentrates are shipped per month. The building of a new and larger mill is contemplated.

The Golconda is developed by two main tunnels, one of which goes in 750 feet in the foot wall and another 150 feet in hanging wall, a crosscut connecting the two. Half way between them a shaft sinks 250 feet from the tunnel level, from which are drifts in opposite directions to the vein walls. In the aggregate, there is 1800 feet of work done. On or near the surface the ores contain considerable arsenic and antimony, but at greater depth these elements are said largely to disappear, leaving the ores chiefly iron sulphide, adapted to concentration. The principal values are gold. It is 100 feet in places from wall to wall, there being within this rich streaks about 3 feet wide. On this property is the electro-chemical process mill—the chief agent in which is chlorine—patented and devised by Greenawalt & Robinson of Denver, Colo. In structure and equipment the mill is extensive and complete and is said to have cost $100,000. As yet it has not commenced to run regularly and it is too early to more than casually speak of it. Its operation and the results therefrom will be watched with much interest. Mr. J. G. English, owner of the property, is not sparing money to give the process a fair trial. W. H. Jackson is mine superintendent.

The North Pole mine and mill are operating steadily, being owned by the Eastern Oregon M. Co. It is considered one of the substantial and well-managed properties of this section.

The E. & E. has been closed down for several months, by reason of various complications, and it is claimed a sale is pending.

The Cougar group is owned by J. W. Larkin and D. R. Evans. It is opened by a drift on the ledge 600 feet, the ledge being reached by a crosscut tunnel. The vein is said to run from 3 to 20 feet between walls and has been opened by surface cuts for a distance of 1500 feet. Further development is being conducted through a shaft on the ore body. The ores are claimed to run $75 per ton. A 250-ton cyanide plant is being built on the property, it being considered that the ores are adapted to this process. This will be one of the largest mills in Oregon.

The Magnolia is being developed by W. L. Vinson and associates. Three tunnels—650, 495 and 300 feet, respectively—all following the strike of the ledge, develop a good showing of ore from 2 to 5 feet wide. The values here are good.



RED BOY MILL, NEAR GRANITE, OREGON.

The May Queen has made substantial progress within the past year, and I am informed by Mgr. Geo. J. Barrett that a 10-stamp mill is to be erected this season. The property is well developed by a series of tunnels, connected by upraises. The work aggregates 1500 feet. The ores are oxidized and free-milling, running from $8 to $10 per ton. This ore is similar to that of the Red Boy, which is doubtless on the same zone.

The Red Boy has an 1100-foot crosscut tunnel which cuts three parallel veins. The first vein, 600 feet from the tunnel entrance, is opened by drifts 400 feet each way from the tunnel, with large stopes. The second vein—800 feet from mouth of tunnel—has practically the same amount of drifting as the first. The third vein will soon be reached by the advancing work in the tunnel. The veins vary in width from 8 to 20 feet. As in various other mines of this section, the walls are porphyry and slate. The Red Boy mill is run by water power, there being four wheels under pressure of 120 feet head, conducted through a two-mile flume. Mr. Taber states that 75% to 85% of the values are saved by amalgamation. About sixty tons of ore per day are being milled.

The Vananda, two miles from the Red Boy, belonging to Blewett & Co., is being developed with a force of fifteen men. Three crosscut tunnels are being driven. Buildings and other improvements are being put up. The intention is to erect a mill.

The Little Giant development is being pushed by Vinson & Thompson. They have a tunnel 350 feet long to the ore body and two drifts on the ledge. Plans have been made for a stamp mill.

The Virginia, at Robinsonville, belongs to J. H. Mitchell and is said to be under bond to Blewett & Son. This property has a 165-foot shaft, with 300 feet of drifting from the shaft on the vein. Further sinking is to be done. The June Bug, belonging to F. Hopp, is also under bond. The Don Juan, belonging to Donnelly & Graham of Denver, Colo., is equipped with a 10-stamp mill, which is ready to operate.

The Bonanza was sold by Geiser Bros. last April to a syndicate of Philadelphia oil operators. Messrs. Geiser took the property eight years ago with an indebtedness of $8000 against it, and up to the date of the sale last April they had taken $1,100,000 from its veins. The figures agreed on in the sale are not given the public. The mine is developed by 10,000 feet of workings, there being one tunnel 2000 feet long on the vein and another of 2000 feet which crosscuts the veins. A third upper tunnel is 1500 feet long. A shaft is sinking from a point on the main tunnel 1100 feet from entrance. These workings disclose three or four parallel veins, the first being 3 to 4 feet wide, the second 10 to 50 feet and the third about 15 feet in width. The vein wall is slate, the ledges running eastward and westward. The work all begins at the south wall, and it is asserted that the north wall has never been found. The ores are free-milling quartz, with sulphides of iron, interspersed with streaks of tellurium. The last-named mineral appears to be peculiar to this particular property, as it has not been found in other mines of the district. Last year 8000 tons of ore were milled, the result being an average of $14.54 per ton, outside of rich streaks of tellurium, which ran from $400 to $1100 per ton. The mill is being enlarged to forty stamps and a ten-drill air compressor has been installed.

Adjoining the Bonanza is the Richmond group, belonging to Montreal parties and managed by E. D. LeClaire. They are undoubtedly on the same zone as the Bonanza.

Development is in progress through a system of tunnels aggregating 1500 feet, all being crosscuts. These tunnels are so located as to open up the ore body the full extent of their holdings. The ores run $6 to $15 per ton. A 10-stamp mill is to be built.



BONANZA MILL AND COMPANY'S BUILDINGS, NEAR SUMPTER, OREGON.

On the north fork of the John Day river the Grant placers are being worked under lease by Isaac Klopp. A canal, fourteen miles, and a flume, 1600 feet long, furnish water under 200 feet pressure. Mr. Klopp is operating with two giants and says he is obtaining good results.

The Bellevue, which belongs to Salt Lake parties, resumed operations last spring and is expected to increase the force. The work is in charge of Peter Roden, with Frank L. Robb as mill man.

It is asserted that Idaho and Montana parties will build a gold dredger to work on the Drain flats, near the north fork.

WASCOTT.

Sumpter, Or., July 31st, '99.

West Kootenay Ore Bodies.*

By R. W. BROCK, Ottawa, Canada.

Within the limits of this paper it is of course impossible to do more than take a brief and general survey of a field as extensive and varied as West Kootenay. It is proposed merely to review briefly some of the observed facts relating to its geology so far as it is connected with the ore deposits, and to the ore deposits themselves, and to indicate to some extent their practical bearing. Some of these observations may have been already recorded, others have been suggested as being probable and now stand confirmed in the light of further study. If any apology is needed for such a restatement let it be that such observations have a direct economic importance, for anything that contributes to a more exact and definite conception of the nature and mode of formation of a group of ore deposits has a commercial value, since it makes possible more intelligent exploitations of the particular members of the group, and more accurate forecasts, beyond present workings, of their probable form and extent. In discussing the ore deposits, while it is possible to separate them into a number of different classes, it is here proposed to touch upon merely some general features. The progress, prosperity and possibilities of the district are now so well known, and can be so eloquently supported by statistics, that it is quite unnecessary to go into such matters.

Geologically the district is a complex consisting of several series of crystalline schists and stratified rocks, dyked, metamorphosed by, and caught up in multifarious eruptives, which in turn treat each other in like manner. The crystalline and stratified rocks, while limited in distribution, include a considerable variety.

There is a series of gray gneisses, mica schists, quartzites, crystalline limestones and dolomites with old intercalated crushed igneous rocks. These rocks have been referred to as of probable Archæan age. They occur typically developed on Kootenay lake north of Crawford bay, and the West Arm. They are also found on the north end of Slocan lake, on Slocan river, at the head of Snow creek, and on Upper Arrow lake. Numerous small inclusions of gneiss in the eruptives in various portions of the district may probably be also referred to the Archæan.

A series of slates occurs, more or less altered to mica, staurolite and andalusite schists, with bands of greenish schists, quartzites and dolomites. This series has been classed with the Nisconlith series of the Cambrian. It is most largely developed in the southern portion of the district where a band several miles in width, interrupted once or twice by granite intrusions, extends from a point just south of the West Arm of Kootenay lake, a little east of Nelson to the international boundary. Along the boundary it has considerable width, extending from four miles east of the Pend d'Oreille crossing to within a few miles of its mouth at Waneta. It is also found in a narrow band north of Kaslo, parallel to Kootenay lake a short distance inland. Rocks which may also be referred to this series occur near Deer Park, on Cariboo creek near Burton City, and on Upper Arrow lake.

This series is overlain by a great thickness of rocks that have been classed with the Selkirk series. They are found east of the Salmon river on the divide between the Salmon river and Kootenay lake at the head of Wild Horse, Sheep and Lost creeks and down Summit creek for half its length. They are also found east of Kootenay lake from about Lockhart creek to near Gray's creek. They also occur in a band west of Upper Kootenay lake, succeeding in a westerly direction the Archæan and Nisconlith rocks. This band, north of Kaslo, gradually tapers as it continues southward till it runs out near the West Arm.

On Summit creek they are apparently overlain by a great volume of quartz and mica schists which extend eastward to Kootenay lake. These are classed as Upper Selkirk.

Another important group of stratified rocks is that known as the Slocan series. They consist of a group of dark and banded rocks composed of tuffs and ash rocks with some impure slates and limestones. They occur all around the north end of Slocan lake, southward, cut by one or two granite bosses, as far as Four-Mile creek, and eastward to the forks of Kaslo creek. From here a band extends south to the West Arm between the band of Selkirk rocks and a great granite mass. Similar rocks also occur on Cariboo creek.

Varied as are the schists and stratified rocks, the eruptives show still greater complexity. Among the oldest and most important, economically, is the Columbia group of volcanics. This group includes porphyrites of various kinds, monzonites, diabases, gabbros, breccias, tuffs, agglomerates and dark, fine-grained slatey ash rocks. The monzonites are interesting rocks, both on account of their petrographical peculiarities and also as being the country rock in the War Eagle, Le Roy and other Rossland mines. It is a peculiar type of rock referred to the syenite family. It exhibits wonderful differentiation ranging according to relative proportions of feldspar and colored constituents through syenitic, dioritic and gabbroitic types. Along the border of a mass it may present even a more basic facies.

The Columbia volcanics cover a considerable area. They are largely developed in the Rossland district and also east of the Columbia, where they extend eastward to the Salmon river and northward to the west arm of Kootenay lake and Kootenay river. Around Nelson and along the Columbia river they are cut off by granite, a large mass of which extends as a peninsula from the Columbia eastward into the volcanics. Porphyrites and associated rocks, which are probably to be referred to this group, occur on Arrow lake in the neighborhood of Deer Park, and up Cariboo and Snow creeks behind Burton City.

Younger than, and cutting all the rocks so far mentioned, is the gray granite, the commonest rock of the district. It is a biotite-hornblende granite, usually, but not always, gray in color. It varies considerably in texture and composition, being in places syenitic or dioritic, but apparently having a prevailing granitic habit. The feldspars are often large and porphyritic, in which case it is very striking and easily recognizable rock. When crushed, as it sometimes is, this porphyritic facies makes a beautiful augen gneiss. In occurs in large and small areas throughout the entire district, and is intruded through all the older rocks. A typical development of this rock may be seen at Nelson. Another granite, younger than the gray, is the older red granite, a very feldspathic rock found on Lower Arrow lake near Deer Park, and elsewhere along the Columbia valley.

Under the head of younger eruptives may be grouped a series of rocks which show a wide range of structure and composition, ranging from plutonic to volcanic types, from granitic to at least dioritic. They are sometimes developed in quantity, as the younger red granite along Lower Arrow lake and also near Trail creek, and northwest of Rossland. As dykes they occur in almost every part of the district, cutting all the older rocks.

The most important of these dykes are the white porphyries. These are usually white, compact dykes varying in size from broad masses to little stringers which cut sharply through the country rock. So far as is yet known, in structure and composition they appear to range from rhyolites to diorite porphyries, including felsites, granophyres, granite porphyries, and syenite porphyries. The acid, however, appear to be the prevailing types, at least in the northern part of the district and along the Salmon. Though varying in character these dykes may usually be recognized by their light color and their sharply defined contacts with the country rock. Near Rossland and in some other portions of the district darker types are, however, to be met with. This system of dykes seems to have immediately preceded the formation of the ore deposits.

Younger than this system of dykes and the ore bodies, and consequently cutting these, are the "black dykes," a group of lamprophyric and basaltic dykes.

The above constitute the main groups of rocks of the district so far as connected with the ore bodies. They present many facies, which have not been here noted. Other rocks occur, as comparatively fresh andesites, diabases and such volcanics, but these have not been observed to be connected in any way with the ore deposits.

The economic minerals which may be found in the ores are also various, as the following list shows: Native gold, silver, copper and arsenic; stibnite, bismuthinite, tetradymite, molybdenite, argentite, galena, altaite, hessite, chalcocite, stromeyerite, sphalerite, cinnabar, greenockite, pyrrhotite, bornite, chalcopyrite, pyrite, gersdorffite, marcasite, arsenopyrite, danaite, jamesonite, pyrargyrite, proustite, tetrahedrite, tennantite. The gangue is principally country rock, quartz, siderite, calcite, sphalerite. Oxidation products of the metallic minerals, such as the oxides, carbonates, sulphates, are found in the weathered zones.

The above list could probably be enlarged, but it will serve to show the variety and general character of the economic minerals.

The character of the ores varies more or less with the district, thus in the Rossland ores the auriferous iron and copper sulphides predominate, in the Slocan the lead and silver minerals with argentiferous tetrahedrite are characteristic, while the Nelson district mineralogically as geologically lies between the two. But while in the different portions of the district there is considerable variation in the relative proportions and mineralogical combinations of the principal elements, the elements themselves remain practically the same throughout. But why in one place the ores should be mostly silver-lead minerals, and in another mostly auriferous iron and copper ones, or why in one place there should be large bodies of metallic sulphides and little gangue, and in another the value should be in a small quantity of sulphides and much gangue, or why the silver and gold tenors should vary so, are points which cannot yet be very well explained.

It may be remarked, however, that the production of the quartz vein appears to have been about the last stage in mineralization; also that in places it appears that the country rocks exerted some chemical influence, causing the deposition of iron and copper sulphides in the massive rocks and the silver-lead in the fragmental, but this has not always been the case.

As to the age of these deposits nothing definite can be asserted, except that while the evidence tends to show that they are comparatively recent, they are certainly pre-Pliocene.

On account of their comparatively recent formation and the fact that the factors which determined the deposition were physical rather than chemical, they may be looked for in all the rocks except the latest dykes (and probably the younger eruptives) wherever the physical conditions are favorable.

As to manner of formation, the evidence afforded is conclusive that they were formed by mineralizing solutions, which followed lines of fractures, dissolving away the country rock and replacing it with mineral matter. In a large ore body, or where the country rock is a homogeneous one, such as some of the Slocan rocks, this history cannot be so clearly read as when the deposit is small and the country rock is a heterogeneous one, such as granite. Here it is sometimes possible to trace the alteration from the unaltered granite to the solid sulphides; first the more easily decomposable constituents show signs of alteration, then one constituent is removed and replaced, then another, until of the original rock only a skeleton of quartz remains, and finally this is almost completely or wholly replaced. But even if the process had not been exposed as in the example above, the evidence would still be complete. For in many of the large deposits cores of the unaltered country rock still remain; the country rock near the deposit has often been silicified, producing "capel" like bands. This silicification has proceeded in places until it almost amounts to complete replacement. Calcification in places has also been extensive. The country rock has often been more or less mineralized, and if it contained feldspars, bisilicates, and such alterable minerals, these often have been attacked in such a way as to indicate the action of hot mineralizers. In one case on Pine Ridge in the granite adjoining a small deposit, the feldspars have been altered, pyrite probably represents what once were bisilicates, and a violet-colored secondary fluorspar has been disseminated through the rock. A violet-colored quartz present is probably of the same origin as the fluorite.

Very little work has been done on the chemistry of these deposits and consequently few chemical data are available, but what there are afford additional evidence. In a paper by Gwillim and Johnson on "Some Ores and Rocks of Southern Slocan," in the Canadian Record of Science, the following analyses are published:

	(*a*)	(*b*)
SiO_2	60.09	70.70
Al_2O_3	17.20	18.25
Fe_2O_3	6.73	3.18
MgO	0.47	2.12
CuO	8.24	3.36
Na_2O	2.45	not estimated
K_2O	6.23	" "
H_2O	not estimated	" "
	101.41	98.61

(*a*) is an analysis of the country rock, a facies of the gray granite.

(*b*) is an analysis of a horse of this rock in an ore deposit.

As the localities of the two specimens are not given, an exact comparison between the analyses cannot be fairly made, but still (*a*) may be taken as expressing in a general way the chemical nature of the country rock to which (*b*) belongs. The water in an altered rock like (*b*) would probably be sufficient, if estimated, to raise the analysis to 100, so that the alkalies are here practically absent. In the unaltered gray granite their percentage is high. So that in the horse the large percentage of alkalies has been practically removed, together with the greater part of the lime and a large part of the iron, while there has been a corresponding raise in the percentage of magnesia, alumina and silica. This is the alteration to be expected in a rock subjected to thermal waters containing such reagents as carbonic acid and sulphuretted hydrogen.

(To be Continued.)

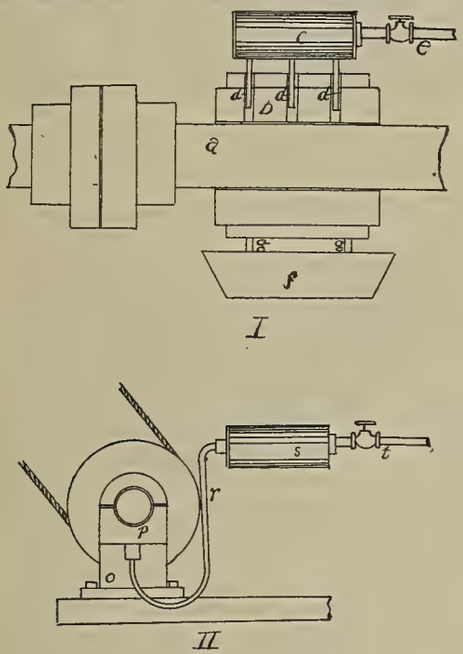
* Condensed from Transactions of Canadian Mining Institute.

A METHOD of removing the incrustation of boilers is announced by a French engineer, M. Savreaux. After extinguishing the fires, the boiler water is blown off very gradually, at the same time admitting an equal volume of cold water, so that the water gauge shows no change of level. As soon as the water has in this manner been sufficiently cooled down it is suddenly blown off. This latter operation is said to remove the major part of any incrustation which may be present, what remains being very easily detached by scraping. The cleaning of the boiler must, however, be taken in hand immediately upon completion of the blowing-off operation, as otherwise the furstone will harden and adhere again to the boiler plates.—The Engineer.

Notes on Power and Transmission.

Written for the MINING AND SCIENTIFIC PRESS by GEO. D. RICE, Medford, Mass.

Since the advent of so many methods for the filtering of oils so that the same may be used over and over again, power users usually plan exposed cable bearings in such a way that an abundance of oil will flow to the part and the surplus is caught, filtered and used again. I have put in oiling outfits like that



LUBRICATING DEVICES.

in Fig. 1 for exposed bearings of cable drives. A pump supplies oil through *E* to the cylinder *C* and the oil flows to the bearings through three leaders or tubes *D D D*. These tubes sink into oil channels in the box *B* and feed the oil liberally to the shaft *A*. The tank *F* is connected below by bolts *G G*, and when full of oil which runs from the bearings it is emptied into the filtering device and the oil used again. In some places the strain on both shaft bearings and belts is relieved over night and Sundays by means of automatic devices. How frequently we hear that belts need rest, and that there should be some way provided for running them off to recuperate a trifle over night, and, in fact, there are many concerns fitted up with binders for this purpose, to be slacked when the speed shuts down for the night, and tightened to the best running condition when the work starts up again. On the other hand, belts may be seen, when new, subjected to a steady strain for a long while, in the hope that they will never need taking up or give trouble by growing slack. Some very good and simple methods consist in using half-moon sleeves in the pulley hubs, which allows the belt on two pulleys to be slackened by merely shifting the moon piece on the loose pulley. The shifting is done with a clutch and bar. The material from which the belts are made has a little of that tendency to be drawn out of shape by the constant pull and the rolling-out action it receives from the tread of the wheels, and should have a chance to regain itself when idle, as long as that is one of the features of leather belting. Care should be taken to keep the laps of the belts in good condition. In the making of the belts, after the pieces of leather are thoroughly stretched they are worked smooth on the grain side, and both by hand and by machine labor are set down as solid and compact as possible. Then they are put into a drying room and thoroughly dried. Afterward one edge of the piece is straightened, and they are then cut into whatever width of belt they are best suited for. The pieces of each width are matched accurately as to thickness and then the laps (joints) are cut by a machine. The edges of the laps are feathered and the joints are cemented (glued) together and pressed under a hydraulic press, which pressure is considered the best by all first-class belt makers. All main driving belts over 40 inches in width have to be made in sections, consisting of two or more pieces of leather cemented together. The average hide for belting does not contain more than 40 inches in width of solid leather suited for belting, very rarely over that. Therefore wide main belts are made in sections. Ordinarily the pieces are not lapped parallel, but simply butted. For example: A 60-inch double belt receives two 30-inch pieces for the first layer, laid side by side, and a 30-inch piece over the center of the two lower pieces to break the joint, and two 15-inch pieces on the top of each edge of the lower layer to complete the width; thus the belt is cemented together. There is some difference in throwing on new belts and lacing up old ones, for it takes some skill and a little good judgment to get the best working tension for a belt that is to be laced up for the first time, while in taking up slack belts all that is required is to cut out a row of holes and lace up again, which will certainly improve the driving qualities, for a time at least. A belt and clamp that works on the pulley block principle seems to be a good device in this respect, as the tension on the drawing-up cord can be easily determined with spring balances.

Oiling Under Water.—In Fig. 2 is a plan used with effect for lubricating a cable wheel under water. The oil is forced into the receiving tube *S* through pipe *T*, from whence it passes through pipe *R* to bearing *P*. The main bearing of the wheel is indicated at *O*. The oil, being taken in at the bottom of the bearings, works upward and lubricates the parts with effectiveness. Water undoubtedly acts to reduce friction, but where it is only present in small proportion it can have but little effect. Indeed, in such cases it seems to act to render the oil less efficient rather than to increase its efficiency, probably because the water prevents proper oiling. There can be no doubt that the absence of a lubricant increases friction, and unless there is some condition to call attention to the lack of lubrication it often passes as not needing lubrication. That a bearing does not groan and act as though badly in need of oil is by no means evidence that the friction would not be decreased if oil were used.

Oily Scale.—An oily scale matter sometimes forms in boilers and produces trouble. This scale is composed of fatty acids and unsaponified oils, derived from the oils used to lubricate the cylinder of the engine. These elements are communicated to the feed water where the exhaust steam from a non-condensing engine is used to heat the feed, or where the feed is drawn from a hot well of a condensing engine. The deposit is an effective non-conductor of heat, and is a most frequent cause of overheating and consequent collapse of the boiler. The substitution of a good mineral oil, with a boiling point well above the temperature of steam, instead of the animal and vegetable oils frequently used in cylinders, is the best safeguard against the production of that very injurious form of scale.

Repealed or Not Repealed?

TO THE EDITOR:—The question whether or not the Cal. State mining law of 1897 has been repealed is one which must be passed upon by the court of last resort before it will be authoritatively settled. In the meantime miners are left in a quandary as to the manner of making locations. If they proceed upon the theory that the attempted repeal of the State law is effective, and the Supreme Court holds it to be ineffective, their acts of location will be void. On the other hand, if they proceed under the State mining Act of 1897, upon the theory that it is not repealed, and the Supreme Court holds the repeal effectual, they may be in an equally bad predicament, for a preliminary notice posted and recorded as provided in the State mining Act is not necessarily a compliance with the Revised Statutes; and, in the case last supposed, a subsequent notice posted and recorded by another locator prior to the recording of the certificate of location by the first locator might give the better title. In fact, it would most certainly do so if the first locator proceeded strictly under the requirements of the State law and the second locator included in his notice "such a description of his claim by reference to some natural objects or permanent monuments as will identify the claim," for the State law only required this in the certificate of location, and not in the preliminary notice, while the Revised Statutes provide that no recorded notice shall be sufficient unless it contain such a description of the claim. All of the printed blanks of preliminary notices under the State law that I have ever seen are entirely insufficient in this particular, and would not stand in the face of a contest if the State law should prove to be repealed.

Every locator who desires to make himself perfectly safe, and to be assured of having a perfectly valid location in either contingency, should locate as provided by the State law of 1897 and do his $50 worth of work within sixty days, as therein required; but he should also be particular to insert in his preliminary notice, as well as in his certificate of location, a particular description of his claim by reference to some natural object or permanent monument, sufficient to identify the claim. If he uses a printed blank, he should write in such a description.

Personally, I believe the Supreme Court will uphold the sufficiency of the repealing act of 1899. The able opinion of Mr. Ricketts in your last issue leads to the opposite conclusion, but there is a point of view which that gentleman has evidently not considered. It is this: It is admitted by all authorities that, when the meaning of the language in the body of the Act is doubtful, the title, taken in connection with other parts of the statute, may be resorted to for the purpose of removing ambiguity. Now in this case there is a manifest ambiguity in the body of the Act because the Supreme Court has, and must take, judicial notice of the fact that there is not and never was such an Act as is referred to in the body of the statute under consideration. There is therefore an obvious error upon the face of the Act in question which may easily be corrected by a reference to the title. This is not judicial legislation, because the error and its proper correction are both patent upon the face of the statute.

The case of Wilson vs. Spaulding, 19 Fed., Rep. 304, is exactly in point. In that case a statute purported, in its body, to correct Schedule M of Sec. 25 of the Revised Statutes of the United States, while Sec. 25 had no Schedule M. A reference to the title, an Act to "correct an error in Sec. 2504 of the Revised Statutes," etc., was held permissible to explain and rectify an obvious error.

The pertinency of this decision of the case in point must be as apparent to the layman as it is to the lawyer, and there are numerous other decisions of similar import. W. F. ARAM.

San Francisco, August 16, '99.

Some Experiences of a Working Miner,

NUMBER XXIX.

Written for the MINING AND SCIENTIFIC PRESS.

A prospector found the V—— mine. He worked on it a short time, but, not being familiar with methods of handling the ore, sold it. A company was organized by the new owners, of which T—— was the head. A large amount of money was expended and machinery erected. For a time all went well; but the company made the same mistake that so many others had made before and many have made since—they went into debt—and their creditors finally took possession and the mine remained idle for a long time. Finally it was brought to the attention of C——, who, upon examination, concluded he could make the proposition pay if handled carefully. The property was miles from a railroad, in a treeless region. Wages, supplies and transportation were high. Still, these drawbacks did not deter C——. He understood just what was essential to success, and, making all the necessary allowances for the conditions, he put in a plant suited to the ore, employed competent superintendents for each department, purchased adjoining property and commenced operations on a liberal scale. Success followed, and the plant was enlarged from time to time. Fortune seemed to favor the bold venture, for, although the outlook was good from the start, the value of the ore improved, and new, greater and richer bodies were discovered. To-day the U—— V—— is one of the greatest mines in America; but it has always had, what every mine should have, careful, intelligent and experienced management.

* * *

There was unusual activity in tin mining when C—— located a claim near H—— City. He put a shaft down 15 feet, and had a fine showing of ore, too—a clean vein in the bottom of the shaft, with 4 feet of good ore. At this depth he quit sinking and put in time prospecting on other portions of the claim. One day a man came along who wanted to examine the prospect, of which so much had been said. C—— showed him the prospect holes; then they climbed down into the shaft and examined the vein. It looked all right, and the stranger offered $8000 for the prospect. C—— wanted $10,000, and finally got it. The stranger wanted immediate possession and to continue work. C—— said no—cash first. The stranger returned the following day with the cash in bank bills. The mine was transferred and then C—— invited the stranger to dinner. Before leaving him, C—— said:

"Now, what do you intend to do with this property—work it, or sell it?"

"I will develop it further and then sell it," replied the stranger.

"Just take my advice," said C——, "sell it as it is, without doing any more work on it."

The stranger disregarded this advice and put men in the shaft. Before the second shift had finished the day there was no more ore in the shaft, and, when the stranger complained, C—— said:

"I told you not to do that."

* * *

When I first went to H—— gulch, with my blankets on my back, the gulch had been extensively worked the previous two seasons and a large amount of gold obtained. There were still a few miners working along the gulch and these were doing well. The earlier miners had worked successfully, getting good pay until they reached a place where the grade of the gulch was steep and the pay poor. At the head of this steep pitch a mass of bedrock outcropped, dividing the stream into two branches. Neither of these branches contained gold in paying quantity, but above this reef the gulch became flat again; for some reason a strip of a hundred yards or more in width had not been mined. I found an old prospect hole in this flat, and, although it indicated no gold had been found, I started in at the head of the bar in the middle of the gulch and got a good

prospect in the first pan. For several days I got fair returns for my labor and at the end of the week had reached the old prospect hole. I was hard at work when I heard a footstep. Glancing up, I saw a tall, spare man, with large beard, and dressed in the rough garb of a miner. He spoke pleasantly and informed me he had sunk the hole which I had just reached in my own work. I didn't know but that he might lay claim to the ground, so I didn't magnify the results of my labor at all. I asked if he had found anything in the hole and he answered:

"Only a single color—a piece worth $1."

"Why did you not continue?" I inquired.

"Thought it wouldn't pay," said he; "but I hope you will do well."

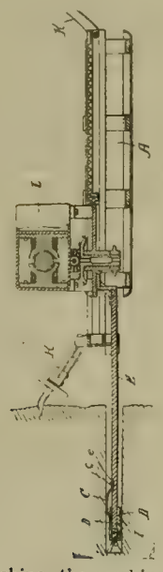
I hoped so, too, and he went on down the crooked little gulch. Before nightfall I had stripped and washed the ground at the end of the hole sunk by the old man, and had gone some little distance beyond it. The ground was rich, and the single piece, worth $1, he had found, lay within a foot of a pocketfull of nuggets. I could have covered over $50 worth with my hat. The remainder of the unworked ground on this part of the gulch paid as well as any portion had paid. Some men don't know a good prospect when they see one. MINER.

Latest Mining and Metallurgical Patents.

Patents Issued Aug. 8, 1899.

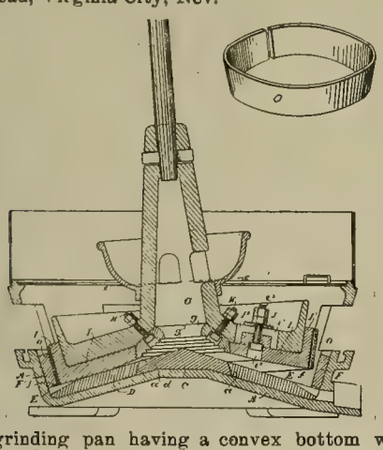
Specially Reported for the MINING AND SCIENTIFIC PRESS.

MINING MACHINE.—No. 630,388; C. W. Miller, Columbus, Ohio.



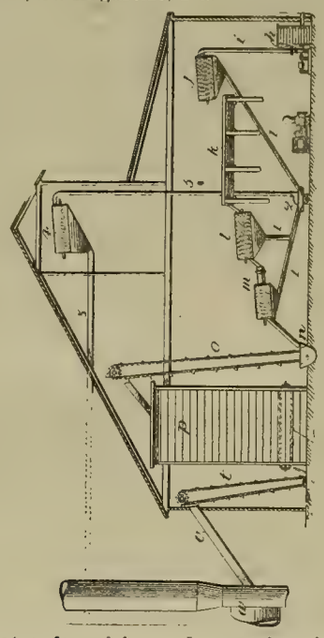
In a mining machine, the combination with a bed frame, adapted to be made stationary, carriage mounted on bed and movable longitudinally thereof, an endless cutter chain supported on the carriage, and means for moving the carriage longitudinally of the bed and for actuating cutter chain; of a vertically yielding holder, *C*, consisting of an elastic plate having one end secured to the front crosshead of the carriage, an intermediate curved or bowed portion, *c'*, adapted to contact with the adjacent horizontal wall of the kerf formed by the cutter chain, and having an oppositely curved end portion *c*, bearing upon the carriage and sliding longitudinally thereof, and means bearing against the opposite wall of the chain kerf to relieve the carriage of displacing pressure.

ROCK CRUSHER AND GRINDER.—No. 630,511, J. H Kinkead, Virginia City, Nev.



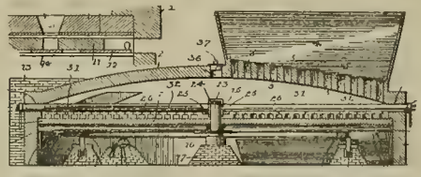
A grinding pan having a convex bottom with a flat circular central portion and inclined sides extending upwardly and outwardly at approximately right angles with the conical portion of the bottom, an independent circular central die having a conical upper surface and outwardly and downwardly diverging periphery, and a concave bottom fitting the flat central opening fitting over the periphery of the central die and locking it in place, die extending to the inner periphery of the pan and having radial grooves or channels made at intervals around the periphery, independent removable segments resting upon the periphery of die and forming a lining for the interior periphery of the pan, segments having grooves or channels made in their lower edges coincident with those of the bottom die, a circular muller having a concaved bottom of lower pitch than the bottom of the pan and adapted to contact at successive points with the pan bottom by gyrations of the muller, shoes fitting the muller consisting of a hollow central conical section fitting the corresponding hollow interior of the central portion of the muller, and bolts whereby it is secured thereto, sectional shoes fitting the sides and bottom of the remaining portion of the muller, with their inner peripheries abutting against the periphery of the hollow shoe, lugs cast upon the upper surfaces of the outer shoe sections, corresponding concavities made in the bottom of the muller to receive lugs, and bolt holes through the lugs having countersunk spaces in the bottom to receive the heads of the bolts whereby the latter are coincident with or above the bottom of the muller, and one or more split rings adapted to loosely fit between the inner pheriphery of the dies which cover the pan sides and the outer peripheries of the corresponding shoes which cover the periphery of the muller.

APPARATUS FOR MINING, TRANSPORTING, WASHING AND DRYING PEBBLE PHOSPHATE.—No. 630,395; L. R. McLain, St. Augustine, Fla.



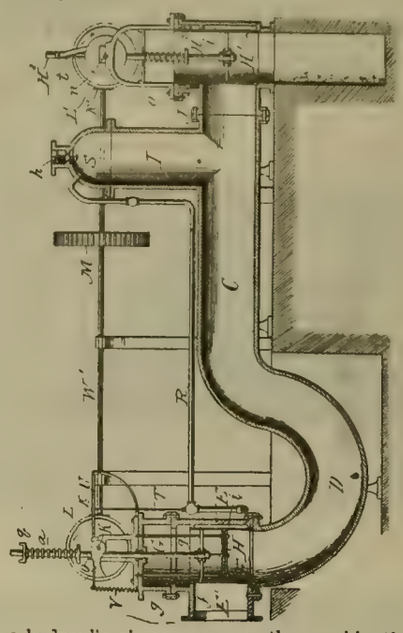
Apparatus for mining and preparing phosphatic pebble comprising, in connection with means for mining the material, the dredge, primary pump thereon, connections by which pump takes the mined material from the sump, a pipeline leading from pump to the shore end of the apparatus, an auxiliary pump which connects with the shore end of the pipeline, and also with an upright pipe for lifting the material received through the pipeline, and apparatus at the upper end of lifting pipe which receives the material discharged from pipe, and automatically separates the pebble from the water and debris mixed with it.

ORE ROASTING FURNACE.—No. 630,510; J. F. Keiper, Everett, Wash.



An ore roasting furnace having a rotary hearth provided with a central spindle and annular supporting devices, and also provided with discharge openings extending radially from the periphery approximately to the center of the hearth, valves for controlling discharge openings and means for scraping the contents of the hearth into discharge openings. A rabble located above the hearth and having a revoluble blade carrying spindle mounted in fixed bearings, arranged approximately parallel with the surface of the hearth and adapted to be turned to remove its blades from operative relation with the surface of the hearth, and means located exteriority of the furnace for securing the spindle in its adjusted positions, to maintain the blades in the desired relation to the plane of the hearth. The rotary hearth provided with discharge openings, exposed operating lever or handle attached to the rabble spindle, and means for securing lever or handle at the desired adjustment.

AIR COMPRESSOR.—No. 630,495; R. L. Dunn, San Francisco, Cal.



In a hydraulic air compressor, the combination of a motive water pipe, connecting above with a source of water supply, and connecting below with the casing of an inlet water valve whereby the acting in it by gravity develops the kinetic energy required, a compression chamber horizontally disposed, a water trap at the inlet end of the compression chamber, a vertical extension of the compression chamber near the outlet end adapted to contain the air volume after compression; an inlet water valve between motive water pipe and the water trap, an outlet waste water discharge valve from the compression chamber, adapted, also, to admit air to the chamber, a compressed air outlet valve, valve operating mechanism for operating the inlet and outlet water valves successively and continuously, and means controlling the entrance of water to pipe whereby the amount of kinetic energy developed may be adjusted by regulating the amount of water acting in the motive water pipe.

German Zinc in America.

United States Consul C. W. Erdman at Breslau, Germany, states that upon an examination of the books of the consulate it was found the exports of zinc dust to the United States during the last seven fiscal years were as follows:

Years.	*Amount.*
1892–93	$10,533 58
1893–94	9,808 43
1894–95	37,454 40
1895–96	19,465 37
1896–97	39,024 27
1897–98	19,766 67
1898–99	41,779 39

This table shows that the export for the past fiscal year is the largest on record, not even excepting the year ended June 30, 1897, when the German manufacturers, expecting an increase in the American tariff laws, were flooding the American markets with wares of all descriptions.

IN many shops it is customary to melt babbitt metal in the smith's forge—a very wasteful and vicious method when it is considered that the forge gives too intense a heat for properly melting babbitt and that babbitt metal injures the working of the forge whenever any of the metal finds its way into and remains in the tuyeres. Lead there will effectually prevent the welding of iron as long as it is exposed to the action of the vapor of the lead. A much better way and a cheaper one is to rig up a little gas bench for the melting of small lots of babbitt. When a quantity of it is to be handled, a furnace similar to that used for melting out—and melting in, too—the lining of axle and motor boxes will do. But the gas bench is made of one or two heavy gas burners similar to those used in kitchens for cooking. They are placed in an iron bench and proper iron bearers rigged for holding the ladles in place. With this rig the heat can be regulated at will.—Iron and Steel.

ALUMINIUM is now in great demand for various purposes, such as alloys with copper, for electrical conductors, and for lithographic plates. It is superior to tin or iron for cooking utensils, and the high price of copper is causing the new metal to be used for power transmission wires. America produced 5,200,000 lbs. during 1898, being over half the total yield. The Foyers and Swiss works also show an increase, but Germany has ceased to manufacture the metal.

Proposed Removal of Arch Rock,

Written for the MINING AND SCIENTIFIC PRESS by EDWARD B. DURHAM, E. M.

Arch Rock is the largest and most prominent of a group of rocks in San Francisco harbor, that form a menace to shipping and which the United States engineers have decreed shall be removed to a depth of 30 feet below mean low water.

The group consists of Arch Rock, Shag Rock No. 1 and Shag Rock No. 2. The first two are familiar objects to all who cross the bay on the ferry to Sausalito. They are situated on a line drawn from Alcatraz to Sausalito, and almost directly in front



FIG. 1.—SOUTH SIDE OF ARCH ROCK, SAN FRANCISCO BAY.

of the Golden Gate. They are in the vicinity of the anchorage usually chosen by vessels while waiting inspection by the Government revenue and quarantine officials, as well as close to the track often taken by the ferryboats.

Not only are these rocks in the way themselves, but they are surrounded by strong tide currents, which make them still more dangerous. The tide has



FIG. 2.—EAST END OF ARCH ROCK, SAN FRANCISCO BAY.

a velocity of 5 feet per second when at the height of its ebb flow and a velocity of 3 to 4 feet per second on the flood tide. The strength of the current is apparent by the constant surf about the rock, and it is with difficulty that a landing can be made from a rowboat.

The top of Arch Rock stands 30 feet above the low water plane, at which level it is about 40 feet



FIG. 3.—NORTH SIDE OF SHAG ROCK, SAN FRANCISCO BAY.

east and west by 25 feet north and south and rectangular in shape. A little above the water line and extending 11½ feet below water is a hole, about 9 feet wide, cut through the rock from north to south, which gives it the archlike appearance from which it receives its name. This is well shown in the photographs.

Below the water line the rock gradually spreads out, until at a depth of 30 feet it has a breadth from east to west of about 300 feet and a length from north to south of 350 feet, or, taking the irregular outline into consideration, it covers an area of $1\frac{6}{10}$ acres. This rock contains 25,512 cubic yards of material, according to the United States engineers' estimate.

Shag Rock No. 1 lies north of Arch Rock and has a projection above low water of only 8 to 10 feet and an area at the low water plane about 24x30 feet. Its volume above water is small, and is well illustrated by Fig. 3, which shows the north side and one of its inhabitants for whom it is named. Under water it spreads out so that at a depth of 30 feet it measures 95 feet from N.E. to S.W. and 140 feet from N.W. to S.E. It contains 3800 cubic yards of material above this plane.

Shag Rock No. 2 is about 250 feet southeast of Shag Rock No. 1 and is unknown to most landsmen, as it is covered at low tide by 17 feet of water. But at the 30-foot plane it is 120x140 feet and covers nearly twice the area of Shag Rock No. 1. Its volume, however, is only 2979 cubic yards.

The rock in these reefs is a metamorphic sandstone and seems identical with the rock on Telegraph hill, where large quarries have been in operation for a dozen or more years. The rock, both on Telegraph hill and on Arch Rock, is broken by a series of fissures into large blocks, and these in turn are filled with minor cracks, so that, as the rock is exposed to the weather, it breaks up into irregular cubes. This easy cleavage, together with the fact that the rock is not hard to drill, will make it comparatively easy to mine.

The bids for removing these rocks were opened at noon on Aug. 12, 1899, at the Engineers' office, Flood Bldg., San Francisco. Rudolph Axemann of Los Angeles, Cal., was the lowest bidder, his figure being $253,500, or about $8 per cubic yard. The other bids were: Perrine & Buckman, San Francisco, $452,000; City St. Improvement Co., San Francisco, $277,439.40; Pacific Construction Co., San Francisco, $520,000; C. A. Warren and Healy, Tibbitts & Co., San Francisco, $317,000; California Bridge & Construction Co, San Francisco, $559,350; Christie, Low & Heyworth, Chicago, Ill., $287,379; Dunbar & Sullivan, Buffalo, N. Y., $443,840.90; A. C. Bull, Jr., Eureka, Cal., $444,000—making the range of price from $8 to $18 per cubic yard for removing the entire 32,291 cubic yards. The bids were taken under advisement by Major W. H. Heuer, who will inquire into the responsibility of the bidders and their bondsmen before awarding the contract.

Until the opening of the bids, the interesting question was: Who will be the lowest bidder? Now all interest centers on who will receive the contract and how the work will be done.

Blossom Rock, in San Francisco harbor, and Flood Rock, in New York harbor, were mined out, leaving only a thin shell, and then a giant blast blew the remaining rock into fragments, which were then removed by dredgers. Other rocks have been removed by drilling holes in the rock by machines carried on scows or on platforms set on spuds, which rested on the bottom, charging the holes with explosive and firing by electric current, thus removing slab after slab from the side of the rock, as in quarrying. The debris has to be gathered up by a dredger, as before. Other rocks have been removed by special methods designed by the contractors.

Welding by Electricity.

Some trolley companies of this country are welding their rails together by electricity—a process which has reached a high state of perfection. A welding plant of particular completeness is operated by the Lorain Steel Co. at Buffalo, N. Y.

The plant consists of five cars. One of these cars is termed the sandblast car, and it goes ahead and prepares the rail joint for the coming of the welding apparatus. This car is provided with curtains so that it can do the work of preparing the joints without annoying travel on the street. Following the sandblast car come three cars, the first of which is the welder car. Next to the welder car is the car containing a rotary transformer and then comes the motor and booster car. These three cars are coupled together. Between the welder car and the transformer car there is a sliding coupling which allows the welder car to move ahead or back several inches without any change of position of the cars following. This is so that the welder car can easily move along the distance of the joint, being made without disturbing the other two cars. This welding of joints can be made on either old or new track and on paved or unpaved streets. Where old track is to be welded it is necessary to remove about 17x22 inches of the paving in front of the rail joint so that the welder can do its work. On new track the weld may be made before the pavement is laid, or spaces of the size referred to may be left until after the joints are welded.

When a joint is to be welded a bar of steel 1x3 inches and 18 inches long, on which are three bosses (a boss being a projection of the metal on the side of a bar), is placed at each side of the rail web and the jaws of the welding machine allowed to grip it. Then a pressure of about 1400 pounds is applied by means of an hydraulic jack connected to the upper end of the welding machine. As soon as this pressure is applied the electric current is turned on. Instantly the metal between the welder jaws begins to heat. It grows brighter and brighter until a welding heat is reached, and then the current is immediately cut off; and, simultaneously, the pressure on the weld is increased to about thirty-five tons. Artificial means of cooling are immediately applied to the weld in order that the cooling may be hastened while under pressure. The comparatively cold portions of the bars about the boss prevent the more plastic metal from spreading, and the heavy pressure so confines it that there is no opportunity for coarse crystallization while cooling. The center weld is made first and then the ends of the bar are similarly treated, making three welds at each joint. This occupies about fifteen minutes, during which time the current has been on about six minutes.

As the welding bars cool they exert a most powerful influence to bring the ends of the rail together and make a perfectly tight joint. A car with emery wheels operated by a motor follows and dresses any rough portions of the joint. The welded joint offers no obstruction whatever to paving, any more than the rail web itself, as it is perfectly flat. The roadbed or ties are not disturbed, as it is not necessary to go below the rail flange in making the joint. By this process the head of the rail is heated but slightly, and thus the danger of annealing the rail head and softening it is avoided. It is conceded that a continuous rail joint should last as long as the rail itself, as their wearing qualities are the same.—Iron and Steel.

The Search for Iron Ores.

At no time in the history of the iron trade has there been so great an interest in the exploitation of deposits of iron ores in various parts of the world as at present. The Orinoco river deposits are now in a fair way to be opened by prospecting work by an American company. There is renewed activity in Cuba, and now it is stated than an English syndicate has employed some mining engineers to prospect the Australian ores. The greatest interest is now being shown in deposits which lie convenient for water transportation, although some large deposits that lie inland are being connected with shipping ports by rail, as for instance, the newly opened Swedish ores at Kiirunavaara and Luosavaara. Blast furnace establishments that are near the seacoast or that command cheap freights from the coast are especially active in the search for ore, and it would appear that the whole world is being examined for ores that will bear transportation. The newly organized Whitney Syndicate, to operate in Cape Breton, will be in the market for ores unless the explorations now in progress in that island and in Newfoundland shall prove up better than is anticipated. Two years ago there was a sensational article about the exportation of Lake ores to England and the Continent, one report going so far as to name the amount contracted for and the sellers. This story was shown to be without foundation, and doubtless originated in the fertile brain of some irresponsible reporter. There has been very little exportation of iron ore from the United States, the total amount for the eleven months ending with May, 1899, being 29,184 tons, valued at $62,931, and for the eleven months ending with May, 1898, 11,007 tons, valued at $32,976. The situation as concerns the exportation of iron ore is pretty much the same as is to be seen with anthracite coal. The Anthracite Coal Operators' Association sent its secretary, H. S. Fleming, abroad last year to study the question of sending coal to Europe, but he reported against the undertaking.

There is very little hope of anyone being able to send iron ore to Europe from this country under present conditions. What the situation would be if the proposed canal connecting the Georgian Bay with Lake Ontario should be constructed, of course no one can say. This scheme has been on the carpet for some time, but it does not appear to gather much headway. The saving in distance to the upper lakes would be between 400 and 500 miles, as, instead of going through Lake Huron, Lake St. Clair and Lake Erie, vessels would come into the Georgian Bay and by ship canal into Lake Ontario in the vicinity of Toronto, or Point Whitby. It is said that at one time, several years ago, the Whitney people contemplated the control of iron properties on the Lakes in connection with what afterwards became the Dominion Coal Company. But if any such hopes were ever entertained they seem to have been given up, and the blast furnaces to be built in Cape Breton will look elsewhere for their ores. Naturally they turn to such ores as can be secured for water transportation, and it is possible that Cuba or Venezuela will be called on for the supply. There is not enough known as to the Newfoundland ores to warrant one in saying that they can be used on a large scale by the Cape Breton furnaces.

The large iron ore properties in the United States have already passed into the hands of the great iron and steel companies, not so much, perhaps, for present as for future use, and if anyone should go into the market to-day for an iron property he would have difficulty in finding it. The recent acquirement of the Hanna interests on the Lakes by the National Steel Company is a striking illustration of the trend of events.—American Manufacturer.

Mining Summary.

ALASKA.

(Special Correspondence).—The Alaska Gold Standard G. M. Co., under the management of Capt. Chas. P. Dyer, is developing and equipping a mine twenty miles from Ketchikan and sixty miles south of Wrangle. The property comprises seventeen claims and extends from tide water up the mountain sides. A tunnel has been driven 200 feet on the ore, which is 4 feet wide. From the tunnel a shaft sinks 50 feet on the vein. A tunnel is in 50 feet at another point. The ore is sulphide of iron with large streaks of quartz, which carry free gold. The ore thus far worked ran $180 per ton. Within the last two years $25,000 has been produced from this ore by an arrastra. Last week an order was placed in San Francisco for a stamp mill and concentrators for this property. It is stated there are ores ready for milling to the value of $100,000.

Ketchikan, Aug. 5th, '99.

(Special Correspondence).—The property of the Sea Level M. Co. is twenty-four miles southeasterly from Ketchikan. The fissure vein is exposed by a system of shallow cuts and shafts every 50 feet along the strike of the ledge. From the bottom of a 50-foot vertical shaft a 115-foot crosscut has been driven. Sinking to the 100-foot level is in progress. The surface workings, it is asserted, show ore for 1300 feet. The vein exposed, it is claimed, will average 27 feet in width for 950 feet in length. The ledge is reported as containing two mineral-bearing veins—one adjacent to each wall. The material between the two is blue feldspar, carrying iron sulphides. The vein walls are mica schist. E. Lobe, W. A. Steel, J. D. Hoge, Jr., and others of Seattle are owners. A stamp mill is to be erected this fall.

Seattle, Aug. 11th, '99.

Copper ledges have been found at several places in the Chilkat mountains, back of Pyramid harbor. One of the discoverers is J. O'Mally. His ore carries gold, silver and copper. The vein is 8 inches to several feet in width.

The recent strike on the Dalton trail was a copper find near the White Horse rapids in the Copper Blow-Out district.

Nowell Bros. report the prospective sale of two Berners Bay quartz properties to English purchasers for $2,500,000. E. A. Digby is inspecting the properties.

One thousand dollars in placer gold from the Cape Nome district was brought to Seattle by Captain Harkens of the schooner Una. The gold is from one of the claims owned by Captain Harkens and partners. He does not predict anything great for the country as the season does not exceed four months. Scarcity of wood prevents winter mining and will make wintering there expensive. When he left miners were having difficulty with frozen ground. He says it is no place for a poor man and the country is staked. Up to the time of his departure, July 17, not to exceed $20,000 had been taken out. There are 6000 people at Anvil City, but many are leaving.

At Anvil City a meeting of miners was held July 15th, at which a committee was appointed to raise funds to investigate the law relating to powers of attorney and also to investigate the holding of claims by Laplanders. It is alleged that Laplanders are aliens, and as such have no right to hold mining claims in American territory. Orders have been issued and contracts let for the building of a military post at Cape Nome which will cost $16,000.

ARIZONA.

MOJAVE COUNTY.

Chloride on the 16th celebrated the completion of the Arizona & Utah Railroad. On that day a trainload of visitors left Kingman to see the last spike driven to connect the camp with the Santa Fe trunk line.

PINAL COUNTY.

J. W. Parke will put in an electric plant on the Arivaipa river to transmit 200 H. P. electric power fifteen miles to the Mammoth mine. The mill is now operating fifty stamps; forty more are to be added.

YAVAPAI COUNTY.

Phœnix *Herald*: The Whipsaw copper claims in the Castle Creek district have been sold in Phœnix. It is said the price was $30,000.

Journal-Miner: A strike of rich copper sulphurets was made last week in the News Co.'s property south of Jerome, operated by Owen & Van Zandt. The property is equipped with a steam hoist. The parties having a bond on the property have taken up the bond. The Decatur Co., near Jerome, last week struck a body of copper sulphuret ore. These finds demonstrate that the Jerome ore belt extends in a southerly direction. The News and Decatur properties are between Jerome and the Copper Chief mine.

Prescott *Courier*: J. Milligan of Colorado, who owns properties east of Cherry Creek station, says a copper-gold belt runs through that section, and has shipped to the sampler a ton of copper, silver and lead ore. A previous shipment carried 20% copper. One of the claims of his group carries 147 ounces of silver per ton and 25% copper. The property is between Copper mountain and the United Verde mines.——Eastern parties have bonded mines near Thumb Butte, four miles west of Prescott, from Mr. Johnson, for $10,000.

YUMA COUNTY.

Twenty placer claims have recently been located and filed upon along the Colorado river above Yuma.

The Harqua Hala G. M. Co.'s property was sold on the 14th inst. at auction. The sale comprised mines, mill site, pumping plant, 40-stamp mill, cyanide plant, engines, boilers, machinery fixed and movable, and stock of merchandise at Harqua Hala. The property was bought by Mr. Hubbard of San Bernardino, Cal., one of the original owners of the property.

CALIFORNIA.

Amador.

New pottery works are to be established at Carbondale, where there is a bed of pottery clay.

The Mutual Co., which recently purchased the Fernando ranch, on the Amador road, for $60,000, is operating under the management of S. R. Porter of the Ballol. Grading for a three-compartment shaft, to sink 2500 feet, is in progress.

The crushing of 100 tons of Central Eureka ore at the Zelle mill in Jackson is not completed, but it is said to be rich.

It is reported at Plymouth that Hayward & Lane will resume operations at the Hazard mine, one and one-half miles north of Amador City.

The shaft at the Lincoln mine at Sutter Creek is down 1070 feet in hard rock. It is the intention to sink to the 1500 level, with a 100 sump, when crosscutting to the vein will begin. A west crosscut is being run on the 500 level for the foot wall vein encountered on the 300 level. In a drift on the 500 level the vein is 8 feet wide, runs $2 to $3 per ton and contains 3% sulphurets which assay $75 to $100 per ton. Twenty-four men are on the payroll.

The three-compartment Emmerson shaft of the Wildman-Mahoney mine, started in December, 1897, is down 555 feet. Machine drills are now in use. It is proposed to sink 3000 feet, but at the 1400 level crosscuts will be run. The Wildman shaft is down 1300 feet. No. 10 level is being opened from the Mahoney shaft and sinking will be resumed. These mines have eighty stamps.

Amador *Record*: The Poker Bill mine, opposite West Point, is doing well. A shipment of two and one-half tons of ore netted $602. Another shipment of higher grade has been made. The second shipment is said to have been solid metal. Charles Zavella and Frank Stewart are the owners.

Sutter Creek *Record*: At the Ballol mine sinking is still in progress. The shaft is down 400 feet and will be sunk 200 feet deeper before the mill is started. Seventeen men are on the payroll.

Butte.

Flagler & Taber of San Francisco are developing the Wagner gravel mine, at Morris ravine.

Calaveras.

At the Melones on Carson hill a 10-ton cyanide plant has been installed to determine the practicability of dispensing with concentration and treating the pulp as it comes from the plates by the cyanide process.

In the Swank land case at Copperopolis Registrar Maxey decided that the ground known as the Ida Elenore and Mosier placer claims, is agricultural land and Agent Pryor claims that they are mineral lands. The latter states that as the case was tried before and it was declared to be mineral land, that when the Government ordered further testimony to be taken that the Commissioner declared the burden of the proof was on the agricultural claimant and that the mineral claimants had shown its mineral character by a preponderance of evidence. The case will go to the Land Commissioner at Washington.

San Andreas *Prospect*: The Big Horn mine on San Domingo is being crosscut by a tunnel.

Angels *Echo*: The Mount Echo M. & D. Co.'s mine has been sold to James Burke by Frates, Newman & Bagley.

San Andreas *Citizen*: The Thorpe mine, near Fourth Crossing, which for some time has been under bond to the Thorpe Gold Mining Syndicate, has been closed down and the bond returned to the Thorpe Gold Mining Co. The contract demanded that they should sink 500 feet on the lode during the year, which they failed to do. They put in heavy machinery and, including the forfeit of $25,000, they have spent over $125,000. They have put in a 3-compartment shaft to the depth of 500 feet, 200 feet above the depth reached by the old company. The rest of the time was put in stoping the upper levels, upon which the mill has been working since it went into operation. The old company has reappointed L. Allgewahr superintendent, and it is reported that work on the property will not be suspended. ——Exploration work has been pushed on the Veritas mine at San Andreas by Supt. Clark. Several strikes have been made.——Three shifts are sinking the shaft on the Commodore mine, near San Andreas, and an average of 5 feet a day is made.——The Fort Wayne stockholders have, through F. J. Solinsky, paid all claims against the company contracted by J. F. Clapp, and work is to be resumed, with W. Knight as superintendent.

El Dorado.

The Indian Diggings are being opened by Hayward & Lane. They are using 800 inches of water. A pit 700 feet long and over 100 feet deep at the upper end has been piped out to carry the flume into the pay dirt back in the hill. They have 30 feet of gold bearing deposit at the bottom. Most of the deposit being piped is a loam that goes off rapidly, but there are occasional bunches of lava cement that have to be blasted. They are using water six hours per day as the supply is not equal to all their requirements. Oliver Ball is in charge of the work.

Amador *Record*: The German mine has closed down on account of scarcity of water. ——W. Biggs and others have leased the Belmocido mine.——J. G. Mayer & Bro. have purchased the North Star claim from C. Padilla and T. Franklin and they are now unwatering the same.——The New Montezuma Mining Co. have bonded the Red Cloud location from A. W. Harvey, it being the northern extension of the Montezuma.——Work on the old Montezuma shaft is to begin in a few days. A hoisting engine is on the way. This shaft has been flooded since 1871. The water is 75 feet from the surface. At this point a few days ago a sample of ore was assayed, returning $148.82 per ton.

Placerville *Republican*: The Pacific gravel mine is south of Fair Play and consists of 60 acres of land on the Coyoteville channel, between Spanish creek and Cedar creek. Their main tunnel is in 268 feet and several cross drifts have been run in pay gravel. A space 30 by 90 feet has been worked and paid $4 a day to the man. The gravel is cemented and will require a mill. The owners are Sacramento people.——The El Dorado W. & D. G. M. Co. are reopening the old Iowa canal, which heads in North Long canyon and takes up the waters of its three branches. There are 14 miles of ditch to be opened up.

Placerville *Nugget*: There is a large force working at the Blue Gouge mine near Sly Park. Mr. Bind is Supt.

Inyo.

Bishop *Register*: G. L. Albright has built a 5-stamp mill for working Poleta ore, two miles north of east of Bishop station at the foot of Silver canyon. Two thousand feet of flume, giving 125 feet fall, will be completed before the mill can start.

Kern.

Coal is reported fifteen miles west of Randsburg. It is lignite and is said to burn freely, with a good heat.

Los Angeles *Times*: A. W. Collins, president of the Eureka G. M. & M. Co. of Randsburg, which owns the Black Hawk mines in Rand district, reports that the cyanide plant at Cuddyback lake will be moved to the Black Hawk group, where there are 1000 tons of tailings.——It is reported at Randsburg that a new vein of ore has been struck in the Hercules level of the Yellow Aster mines, 60 feet wide, which mills $12 to $20 per ton.

Madera.

(Special Correspondence). — The purchase price of the Standard and Contention claims, near Central station, has been paid in cash—$8000 for the former and $3000 for the latter claim. They are bought by Messrs. Kiefsaver, Struntz and Lindsey, who have just completed a 15 H. P. hoist on the Standard and have finished the grading for a mill with concentrators to be placed at the nearest point on Fine Gold creek.

The Lily mine has recently sunk 150 feet and is engaged in sinking an additional 150 feet when drifts will be run. About twenty men are at work on the pipe line to convey water from Fine Gold creek. It is taken out at the Sulphur springs.

The Waterloo is working a full force of men.

The grading has been done for the smelter at Madera, a large quantity of brick has been delivered at the site and building will commence in a few days.

Gold, Aug. 15th, '99.

Mariposa.

Copper mining is active along the belt extending southerly from Hunter's valley through White Rock into Madera county. Eighty tons of ore were recently shipped from the Walker mine in White Rock valley which netted $54 per ton.

Nevada.

The Champion M. Co. will build a new hoist on the Merrifield mine, near Nevada City.

Nevada City *Herald*: It is known that the ledges now being worked by the Empire, W. Y. O. D. and Pennsylvania Co's. run under and pitch toward the town of Grass Valley, and representatives of the Empire and Pennsylvania mines have been endeavoring to buy mineral rights of the individual owners who hold the continuation of these ledges. The Empire Co. has bought the Crown Point and Rodda's property. The principal owners of this property are F. Trevillian, A. Henderson, M. Provine, J. Williams, C. Barker, H. Champion and others. They have formed a combine and the whole tract will be offered to the Empire Co. If it can be arranged, the ledges will be sold separately—the Pennsylvania ledge to the Pennsylvania Co., the W. Y. O. D. to the Grass Valley Exploration Co. and the Empire ledge to the Empire Co.

Grass Valley *Union*: At the Malakoff gravel mine, near North Bloomfield, the drift method of operating gives indications of success, as the company is in good gravel. The pay dirt was struck below the tunnel, bedrock having pitched downward. It is reported that a recent washing averaged $5 per car.

Placer.

The directors of the Morning Star mine, at Iowa Hill, at a recent meeting, declared the regular monthly dividend of $2 a share.

Auburn *Herald*: The Jupiter Con. has 2 feet of gravel which prospects well.——The tunnel at the Red Point mine, near Damascus, is in two and three-fourths miles. The loaded cars run out by gravity and are drawn back by horses. The pay is chiefly in gravel on bedrock, and sometimes 2 or 3 feet in the bedrock itself. The channel is winding and crooked and was passed in opening the mine, owing to a sharp curve, although within 12 feet of the tunnel, which was run 1500 feet past it. Seventy-five men are employed under Supt. J. A. Ferguson.——A New York company has located a ledge below the Pioneer mine, near Damascus, and named it the Southern Cross. R. J. Trimble is in charge. The Bellevue Con. M. Co. has been incorporated by F. E. Brye, P. S. Lozano, A. L. Smith, E. L. Hawk and S. Bartlett.

Colfax *Sentinel*: Development is in progress at the Jupiter gravel mine, above the Morning Star, near Iowa Hill. With a 12 H. P. engine and hoist, an incline of 45° has been sunk 350 feet to the channel. Recently $200 in gold was washed from gravel taken out in crosscutting the channel. Twelve men are employed. C. A. Wickman is Supt. and F. H. Harvey of Galt is consulting engineer.——L. L. Chamberlain of Auburn has given a working bond on the Dardanelles drift mine, near Forest Hill, to W. McDonald, J. Marchant, A. McDonald and F. E. Vennewitz. The mine has a 5-stamp mill. The lessees have a two years' bond with the privilege of purchasing the property for $15,000.

Plumas.

Marysville *Appeal*: J. Smith, Supt. of the Golden Ancient mine on Bear creek, reports that the work of sinking the shaft has been suspended for the season, unless the company decides to put in a hoist, as the water that has been furnishing the power is exhausted. They are down 275 feet.

San Diego.

For years dry washers have taken gold from the gravels of Picacho basin. The gold district covers an area of twenty-five square miles. All of this is not gold bearing but the beds of the gulches within this area and the gravel of the plateaus all contain fine gold. The workmen are mostly Mexicans who are satisfied with small returns. In the southern half of this area and extending from the banks of the Colorado river back for two miles or more to the lava beds are found numerous veins and large zones or lodes which are auriferous. Some of these are over 100 feet in width and can be seen outcropping for several thousand feet. In a portion of these the gold is alloyed with silver to such an extent that the bullion is worth only $10 to $12 per ounce. This portion of the district is known as the White Gold basin. The northern half is somewhat like that described but the ore deposits are smaller and less prominent. In this section there are numerous white quartz veins running irregularly through the country but these have not been found to contain gold. The ore deposits occur as fissured zones in which the country rock has been altered to ore. Silica in these deposits is not abundant and the values are chiefly in gold.

The American Girl M. Co. has incorporated with H. H. Markham as Pres.; T. Johnson, Vice-Pres.; G. H. Coffin, Sec.; F. S. Daggett, Treas. The company owns a group of claims in the central portion of the Cargo Muchacho range, five miles from Ogilby station. These mines resemble those at Hedges, four miles farther north. The principal claim is the American Girl.

Yuma *Sentinel*: T. W. Brooks has been to the Potholes district, above Yuma on the Colorado river. He is president of the Colorado River Gold Dredging Co., which proposes to operate in that vicinity.——At the Colorado mine, owned by A. Modesti and F. Avila, twenty-five men are at work and $6000 worth of ore will be shipped this month.

San Mateo.

On the coast below Half Moon bay E. M. Hoagland has a 600-foot well down, with every indication of oil. About $150,000 has been spent in oil prospecting in that locality.

Santa Barbara.

Oregon G. M. & M. Co. of Santa Barbara has been incorporated; capital $100,000; R. B., V. E. and M. E. Trace, L. Rethune, W. J. Bradley.

Shasta.

The reported strike in the Oro Fino mine was made at a depth of 75 feet, 16 feet below the floor of a 200-foot tunnel.

Redding *Searchlight*: A strike on new ground is reported by C. Hartman, owner of the Tarantula mine, near Iron mountain. A crosscut tunnel 115 feet long tapped a 15-inch vein at a depth of 60 feet that assays $300 per ton in gold. He will run his arrastra on this ore while doing development work with the view of building a mill. In the old works is a body of ore ranging from $7 to $30 per ton.——A San Francisco company is running ten stamps on the Gopher mine. The rock is from a large porphyry dyke which carries gold in quartz seams.

Redding *Searchlight*: At the Boulders Mining Co., which recently purchased the Boulders property near Castella for $75,000, pumps and a hoist are to be installed. G. W. Carr is superintendent.

Sierra.

G. W. Parsons, at the Alta mine, Forest, has established the first cyanide plant in that section.

Dr. Keith has finished surveying his Phœnix mine at Sierra City.

Employes of the Mountain mine have filed liens for $6000, unpaid labor claims thereon. G. M. Pinney, the Supt., expects to satisfactorily adjust matters.

The Mammoth Springs drift mine, near Forest City, has been sold to W. L. Ducey by G. R. Tuttle and J. W. Maguire. The gravel has improved in quality and more extensive operations will be carried on. At Alleghany City the Kenton and Alta mines are running. At Forest the Harper claim has rich ore and the gravel properties are looking well.

C. C. Weisenburger and T. Jewett, of Grass Valley, have a 3-stamp cyanide mill at the Alta mine, near Alleghany.

Grass Valley *Union*: James Arnott Jr. reports that at the Rocky Peak mine they have struck gravel.

Downieville *Messenger*: At the Mountain mine an attachment has been put on the property by the laborers. The amount due is about $6000. The men attached the bullion, amounting to $1800, and also filed liens on the property. The Mountain View M. Co. is a consolidation of the '76 and Pennsylvania claims, near Forest City, and was recently incorporated. The company is running a tunnel to strike gravel at the end of 200 feet from the point where they are now working.——The Mammoth Springs drift mine, near Forest City, was sold recently to W. L. Ducey by G. B. Tuttle and J. M. Maguire. The channel is 300 feet wide and extends one and one-half miles in length.

Siskiyou.

The Little Tiger Co., which started with

two claims near Yreka, has purchased five others, including a mill site, with a good water supply and several thousand dollars' worth of timber. The company has secured long options on five more claims.

W. H. Crooker has bonded for Eastern parties the Reeder & Brown group in Fool's Paradise district, on Shasta river, half way between Hawkinsville and Klamath river, and they are to be prospected with a stamp mill.

The Salmon River Hydraulic M. Co. has suspended operations on account of scarcity of water.

The Mabel quartz mine, in the ridge between Oak Bar and Scott Bar, is building a sawmill, and a quartz mill is to be brought from Ashland.

Mr. Garret, at Hamburgh Bar, has made a strike and is moving his derrick to the newly discovered channel.

The American Bar mine, on Klamath river, below Hornbrook, is being worked with fifty men, running day and night.

The Schroeder quartz mine, at Deadwood, worked by the Canadian Co., is yielding good pay. Twenty-five men are employed.

Sonoma.

The Great Eastern quicksilver mine, four miles north of Guerneville, is producing more than at any former time.

In Pine Flat district a ten-ton furnace has been completed at the Cloverdale mine, and the Boston will soon become a producer.

It is reported that a company has been organized to operate the Oakland mine, on Sulphur creek.

Most of the quicksilver mines in this county occur in serpentine. The quicksilver mining industry was at one time active in Sonoma, but the mines have been idle for a long time until recently.

Tuolumne.

The mill at the Shawmut mine, near Jacksonville, was struck by lightning recently and burned.

Sonora *Union-Democrat*: The Crystalline mine, two miles northwest of Jamestown, is bonded to a Scotch company. The shaft is being sunk without reference to the vein, but at a uniform angle. The shaft is down 250 feet. A tunnel is being run from the west which will tap the vein at a depth of 300 feet. The mill is nearly completed. Battery blocks for twenty stamps have been put in, though the mill will start with ten stamps of 900 pounds each. Later ten will be added.——The Punch Bowl gravel mine, two miles below Rawhide, is being worked by C. E. Shafer. On the north side of the mountain an incline shaft has been sunk 220 feet, where water was encountered. This shaft is intended to strike the main channel. Before this is accomplished arrangements must be made for a pumping plant.——The F. B. Gandy mine, half a mile north of the Tarantula mine on the east vein of the lode, prospects well in the slate. A tunnel is being run to tap the vein.

Sonora *Independent*: Rich rock is being taken from the 100-foot level of the Toledo mine, southwest of Tuttletown, and west of Mormon creek. Some of the specimens were exhibited in Sonora this week. This mine produces arsenical sulphides rich in gold.——H. Nelson is developing a copper prospect on the Ohio ranch, west of Jamestown, called the May Day mine. There are three parallel veins. Sinking is in progress north of the old shaft on a new vein.——At the Draper mine, near Soulsbyville, Supt. G. T. Dyer reports the mine dry and the pumps working. Two shifts are working.

Trinity.

Weaverville *Journal*: The Unity Co.'s mining property in Minersville, owned by an Eastern company, has been equipped with hydraulic mining plant and will be ready for work when the rainy season begins. A dam has been built across the east branch of Stuart's Fork, 100 yards in length. Five miles of ditch will convey water to the mine.

Yuba.

Grass Valley *Union*: A mill will be erected at the Blue Point gravel mine, near Smartsville. W. Kilman and F. Wright will open the property and $20,000 will be spent developing it.

COLORADO.

ARAPAHOE COUNTY.

The Denver Smelting & Mining Co. was incorporated at Denver on the 11th inst. It is stated that the company will build a smelter in Denver to compete with the trust; capital, $1,000,000. The incorporators are N. M. Joralmon, F. W. Crocker, Denver; N. Tooker, New York; T. Scattergood, Philadephia; I. Champlain, Providence, R. I.

BOULDER COUNTY.

The pyritic smelter at Ward is reported working satisfactorily.

Boulder *News*: G. Teal, Mgr. of the Pennsylvania group at Sunnyside, has ordered the machinery for a stamp mill. He has been developing for two years and has reached a depth of 300 feet. Large bodies of ore are blocked out, and twenty men employed.——Spence and Booth have taken the Silent Friend and are putting in a new compressor. They will sink 400 feet.——J. Luxon, Supt. of the Ermine group, has let a contract to sink 100 feet.——The Horsfal employs eighteen men and ships sixty tons per week to the Culbertson mill. ——The old Slide gives employment to forty leasers, and on the Cash there are eighteen. ——The new Cold Springs Co. has thirty-five men employed, and this week a compressor was started on the tunnel being driven to cut the leads.——At Wall Street the shaft on the Garland is being sunk to 700 feet and the Hastings tunnel is being driven 700 feet to connect with the bottom of the shaft. The vein in the shaft is 2 to 4 feet wide and a contract has been made to furnish the Culbertson mill 200 tons of ore. Supt. J. Tergarden of the Wood Mountain properties has contracted to furnish one carload of ore a day to the same mill.

Ward *Miner*: Since the Muldoon Co. started work they have driven the Deliverance tunnel 10 feet; the breast of the tunnel is mineralized and will return $8 per ton.

CHAFFEE COUNTY.

In this county J. C. Baird has a copper mine which carries nickel, gold, silver and 14% copper. He will put in a pump and open up the ore. The group embraces the Silver Coin, Humboldt and Tamarack.

CLEAR CREEK COUNTY.

Central City *Register-Call*: Goodyear & Miller are working the Lee or Ross lode at Yankee Hill and are taking out ore which is being treated at the Lee mill.——Joyce & Utley are working their Last Hope property through a tunnel, which is in 200 feet. They have 2 to 3 feet of milling ore.——Gow Bros. are working the Puritan on Chesapeake mountain and are taking out ore worth $100 per ton.——C. Dow is running a tunnel into Chesapeake mountain near St. Mary's lake and has struck rich ore, reported to be tellurium.

GILPIN COUNTY.

Following is a list of the mills running in Black Hawk, with the number of stamps dropping:

Mill.	Stamps—Slow drop.	Fast drop.
Cashier	..	10
Hidden Treasure	75	10
Mead	40	..
Eagle	..	35
Polar Star	40	..
Bobtail	75	..
Gilpin	50	..
Randolph	40	..
New York	50	20
Penn	35	10
Iron City	..	25
Totals	405	110

A total of 515 stamps, of which the slow drop are supposed to treat an average of one ton per stamp each day, while the fast drop stamps are treating from two tons upwards to the stamp, the total tonnage being 750 tons. In addition, the State Ore and Chamberlain sampling works are treating 125 tons per day and the Rocky Mountain concentrator 40 tons per day, making a total of over 900 tons of ore daily treated at Black Hawk, and this does not vary much at any time of the year. The Perigo mill in Gamble gulch is crushing 100 tons per day, and the Rollins and Daisy mills in the same gulch are running, which, with the mills at Gilpin camp, brings the total daily tonnage of the county up to 1050 tons. The Cashier mill is running on ore from the East Whiting mine on Gunnell hill, handling 30 tons per day.

Central City *Register-Call*: W. C. Stanley has a lease on the War Eagle lode on War Eagle hill and is taking out ore which will be crushed in his new stamp mill in Lump gulch. ——L. Essman has given an option on his Last Chance lode to J. Kemp of Eldora.——E. W. Morse is in 125 feet in the tunnel he is driving on the Gold Anchor lode, and reports a body of ore that averages $10.

GUNNISON COUNTY.

(Special Correspondence).—R. L. Hamill has purchased machinery for the Lucky Strike M. Co., to be erected on the Lucky Strike mine. Water nearly fills the shaft at present. When the water is out sinking to 500 feet and running drifts on the vein will commence. The ore is free milling at present depth, and as there is little or no iron sulphides it will likely continue to be so. The vein is 2 feet wide, a dark bluish quartz, resembling agatized quartz. Mill runs made in the early history of the mine were said to be $100 per ton. It is not far from the Mineral Hill mill. The property is owned by New York people.

Gunnison, Colo., Aug. 14th, '99.

HINSDALE COUNTY.

Lake City *Times*: F. Hill, who is working the George III at Carson, has opened up rich ore.——Work on the Vermont tunnel has been resumed under the management of D. McCafferty, who has taken the contract to complete the work.

LAKE COUNTY.

Leadville *Miner*: The continued idleness of the trust smelters outside of Leadville is working a hardship on miners and operators of this district. The zinc and steel-iron shipments, together with the ore taken by the Philadelphia and other independent smelters and two local trust smelters, makes the present output 1800 tons per day, but it could be easily made 3000. The Arkansas Valley works are receiving 700 tons.——The Lillian gold mine on Printer Boy hill is making heavy shipments, the Vaughn, Smith & Bray, Davis & Foutz and Chamberlain leases being the principal outputters of high-grade gold-lead ores.——The new Northern is sending 120 tons of silver-iron to the Arkansas Valley and Durango trust plants daily; the Louisville is sending 50 tons per day; the Dollie B. gold mines, under the superintendency of T. Simpson, is sending 50 tons a day.——The Philadelphia smelter will draw on this market, particularly for sulphides. The works will be enlarged.

MONTROSE COUNTY.

The La Sal Copper M. Co. is going to build a 100-ton reduction works in Paradox valley, and a wagon road to Cisco, Utah. W. J. Cashin is Mgr.

For several months the La Sal Copper M. Co. has employed thirty-six teams hauling ore to Placerville. The company has run a crosscut connecting with the shaft for ventilation. The La Sal Co. owns twelve claims, but the principal work has been done on the Angell and Red Cliff. The veins are fissures cutting through the sandstone and traceable on the surface for miles. The Angell and Red Cliff cross each other and at the intersection a shaft has been sunk 220 feet, from which levels have been run in both directions at intervals of 50 feet. The ore shipped came from these workings and has yielded a good profit. On the dumps and in the bins are 1500 tons of lower grade. Tests of this grade of ore show an average value of $35 per ton, which will not stand transportation by wagon seventy miles to the railroad. The tunnel is in 500 feet and will reach the shaft in 200 feet further. The shaft will have to be sunk 50 feet to make the connection, when the ore will be taken out through the tunnel. A compressor plant will be installed. The company has bought a smelter and had a building erected, but after a number of tests decided to treat the low-grade ore by the leaching process. The company owns a water power, carrying the water in pipes 3000 feet, securing a fall of 100 feet. A wheel has been installed to furnish power. The vein is 4 feet wide and carries good values in copper throughout, with some silver. In all of the workings it maintains its width.

In the claims of Galloway Bros. & Hamilton, on the north side of the valley, the Angell vein outcrops through the sandstone bluffs and the ore is of the same character as that in the workings of the La Sal. A short drift has been run on the vein. A carload of first-class ore has been shipped which ran more than $160 to the ton, and several tons of second-class ore are now lying on the dump. The Sunrise claim is being developed, but no shipments made at present.

SAN MIGUEL COUNTY.

The tracks at Ophir Loop are crowded with loaded cars waiting for the smelters to resume. The most serious effect resulted from the closing of the Carribeau. The mine was operated for several weeks after the strike commenced, but closed, throwing 70 employes of the mine and mill out of work. The Silver Bell and Butler are running, but will soon shut down, unless the smelters resume.

SUMMIT COUNTY.

The three dredgers of the North American Gold Dredging Co. are now in successful operation near Breckenridge, the hydraulic elevators handling 1000 cubic yards every twenty-four hours.

Breckenridge *Journal*: A number of the old mines of this county about Breckenridge are being reopened. During July the quartz mines of Breckenridge are reported to have produced $22,000, mostly the work of leasers. Including placer operations, the output was $50,000.

TELLER COUNTY.

The new machinery is in place at the Isabella and sinking will be resumed. The mine is as well equipped as any in the district. It is learned that the production of the 11th level is being maintained, the ore is of good grade, not the high-grade mineral produced in the level above.

In the District Court Judge Stimson has decided that the Independence Town & Mining Co. could not take ore from the disputed ground between that company and that of the Wilson Creek Con. M. & M. Co. It is the first decision against the legality of the title to the Hull City placer. The Wilson Creek Con. Co. is also restrained from extracting or mining any ore from the ground in dispute.

Cripple Creek *Times*: The Chapin Co. have the property of the Smith-Moffat Co. under bond and lease and contemplate building a sampler to handle the ore mined before it goes to the mill.

Denver *Republican*: In the Doctor-Jack Pot apex controversy, the concensus of opinion in Cripple Creek is that the Creston M. Co. is in no danger of being interfered with in its work of extracting ore from the Jack Pot. An agreement had been entered into between the officers of the Jack Pot and C. J. Perkins, attorney for the Doctor people, by which a joint survey was to be made of the two properties. The Jack Pot surveyors appeared at the Doctor mine with their instruments, were lowered to the first level, and were commencing work when they were ordered off the property by the lessees. The reason given was that the lessees did not enter into the agreement. The Doctor surveyors did not put in an appearance at the Jack Pot. It is stated there are two separate and well defined veins in this property. As a matter of fact, the so-called Doctor vein, where it has been proved up in the Jack Pot, is better defined than the Jack Pot vein, although it fails to carry values. The old Jack Pot shaft was sunk on an incline to a depth of 278 feet. At a depth of 80 feet the Doctor vein was cut in the shaft, and was followed on its dip to the depth stated. The bottom of the shaft was found by survey to be 28 feet over the Work Co.'s line. A crosscut was started from the bottom of the shaft, which was driven 55 feet, when the Jack Pot chute was encountered. Having determined the trend of the ore body, the Jack Pot lessees opened it on their own ground. A drift was started from the bottom of the shaft on the old vein and was driven back to the Jack Pot line. By survey it was estimated that 65 feet of crosscutting along the line would cut the chute. The two veins were thought to be parallel, but subsequent work has proved them to diverge as they go north. The crosscut was driven 75 feet before the ore shoot was cut. All the drifting upon the old vein has not resulted in a pound of ore, while developments in the other shoot have exposed very rich ore. At a depth of 280 feet the shoot was cut in the Boyd shaft, on the Morning Glory. At a depth of 383 feet in the Jack Pot the shoot was found 12 feet west of the new shaft. Between the two Jack Pot levels run from the straight shaft there is a difference of a little more than 30 feet between the points at which the ore was found. Allowing that the dip of the shoot is 30 feet in every 100, and that it keeps its course to the surface, its apex is well within the Jack Pot claim. The wash is deep and no work has ever been done to prove up the apex.

IDAHO.

The Salmon and Clearwater placer mines in Idaho, according to Wells - Fargo Express Company's receipts, yielded in gold dust and nuggets from $38,000,000 to $40,000,000 between 1860 and 1864. This district is now being searched for the veins from which the gold in the placers came, and important discoveries made.

ADA COUNTY.

Deposits of gold at the U. S. assay office at Boise have this year been running above the record of any previous season. For the week ending Aug. 12th the amount was $71,434. The total for the corresponding week last year was $31,769.

BOISE COUNTY.

By the caving of the shaft of the Wolverine mine at Banner, five pumps, three cages, tools and iron pipe were lost, worth in the aggregate $5000.

CANYON COUNTY.

Gov. Adams and others of Denver, Colo., will run an 800-foot tunnel to turn the Deadwood fork of the Payette river one and a half miles to work the gold gravel. The enterprise will cost $30,000.

Boise *Statesman*: A. B. and D. G. Caswell, discoverers of Thunder mountain, have taken more than 200 ounces of gold from their claims this season. They have twelve claims, fourteen acres of which is soft rock, which, they say, averages $12 per ton in gold. The air slacks off 5 feet deep of this formation each year. One hundred and fifty locations were made this year, some of which are paying. The gold-bearing territory in the vicinity of the Caswell claims is four miles square. At a recent meeting a district was organized and W. Richey made recorder.

IDAHO COUNTY.

(Special Correspondence). — The Central Idaho Gold Dredging Co. have built a new dredger, which is operating at Elk City, on Red river. Its working capacity is 1500 cubic yards per day. In the main it is of the Bucyrus type, but has a gold-saving feature, designed by Howe & Juessen of Spokane, Wash., consisting of a system of adjustable tables, capable of being adjusted to the quantity and character of the material handled. There are 1280 acres of ground in the tract, the average depth of the material being 8 feet.

Elk City, Aug. 14th, '99.

Litigation between owners of the Black Warrior mine, in the Seven Devils, and the owners of the Decorah, has been settled, and it is reported the Boston & Idaho Copper Co. of Boston has bought the two properties. Mr. Hancock of Boston is Mgr. of the purchasing company.

OWYHEE COUNTY.

J. B. Irvin, Gen. Mgr. War Eagle Tunnel & Development Co., says he will start work next week on a tunnel through War Eagle mountain from Sinker creek.

The eighth annual report of the De Lamar Mining Co., Ltd., has been issued for the year ending March 31, 1899. The revenue for the period amounted to £15,345 3s 11d. The directors paid from this amount £10,000 as a dividend of 6d per share for the year, and £1832 17s 11d were paid out for royalties for operating under a patented process; £2273 11s 6d were paid in completing air compressor and tailings plants. The report of Manager D. B. Huntley states that 51,527 wet and 46,333 dry tons were treated assaying $10.52 gold and $1.30 silver. Of this amount assays of tailings show that 70.47% were saved, though, according to bullion returns, the actual saving was 72.73%. Of shipping ore sent to smelters there were produced 34.124 tons, yielding $13,420.60, or $393.28 per ton. The total product of the mine was £90,777 11s 10d at a cost of £74,389 13s 3d. The cost per ton including development work and other expenses was $7.86, as compared with $9.53 and $11.14 in two preceding years. To reduce expense of treatment and to profitably treat the ore, which is decreasing in value, additions were made to the leaching and tailings plants. Vigorous prospecting has been prosecuted during the year, resulting in some discoveries. The manager has been directed to look for another property, which led Mr. Huntley to investigate the Buffalo Hump country. By comparison the figures of cost per ton in the report may seem excessive to those who are more favorably located, but the isolated position of this property and the excessive cost of supplies and transportation in a measure accounts for this.

SHOSHONE COUNTY.

In the Cœur d'Alenes mine managers now have opportunity to employ all the men they need and everything is running smoothly. Supt. McDonald of the Helena-Frisco reports that the mine is producing as much ore per man as at any time in its history, and that everything is in better shape than ever before. G. Bixby, formerly of Owyhee county, is general foreman of the Helena-Frisco.

MICHIGAN.

HOUGHTON COUNTY.

Rich copper is being secured in twelve and thirteen levels south of No. 3 shaft at North Tamarack, some rock running 15% copper.

MISSOURI.

The miners at a recent meeting at Joplin fixed the minimum price for zinc ore containing 63% metal at $46 per ton, and for every 1% less of metal in ore a reduction of $1 per ton.

Iron and Steel: There is no surplus zinc ore in Joplin district. All of the product is sold or contracted, and unless the association authorizes the resumption of night shifts there is likely to be a scarcity.

MONTANA.

MADISON COUNTY.

The smelter at Twin Bridges will be in operation Oct. 1st, '99.

JEFFERSON COUNTY.

The Katie smelter will blow in Oct. 1st.

SILVER BOW COUNTY.

The suit between the Montana Ore Pur-

chasing Co. and the Boston & Montana Co. is in progress in Butte before Judge Clancy. The Montana Ore Purchasing Co. owns a portion of the Johnstown claim and brought the suit to determine its right to the dip of veins from the Johnstown under the Pennsylvania, which the Montana Ore Purchasing Co. claims have their apexes in that part of the Jownstown which it owns. It is a question of extralateral rights. When the suit was filed heavy damages were asked, but this part of the case has been dismissed, leaving only the question of equity to be determined by the court. The Boston & Montana Co. in its answer denies the allegations in the complaint and denies that any of the veins or lodes beneath the surface of the Pennsylvania belong to the plaintiff, and claims the ownership of all such veins and lodes. It is said that in the disputed ground there are veins or ledges of ore carrying deposits of minerals separated by bodies of rock mineralized so slightly as to be virtually barren, and it is supposed that the contest will be between the zone theory and the single ledge principle. The zone theory is that a belt or strip mineralized as stated is to be regarded as a single lode, however many different veins and ledges it may contain. The separate ledge theory holds each vein or ledge thus situated to be a distinct lode, no matter how many others there may be within the same mineralized zone.

NEVADA.

CHURCHILL COUNTY.

In the U. S. Circuit Court a judgment last week gives possession of the nickel properties in litigation to the Nevada Nickel Syndicate, an English corporation. The property was ordered sold to pay $28,504 and interest.

ESMERALDA COUNTY.

Hawthorne *Bulletin*: In the Huntoon valley, forty miles southeast of Hawthorne, F. M. and J. H. Lee have a ledge 2 to 8 feet in a depth of 30 feet. Water sufficient for a 10-stamp mill can be had within three miles of the mine, and wood is plentiful.

NYE COUNTY.

Bishop *Register*: Twenty-five miles east of Silver Peak the De Lamar Co. has bonded for $200,000 a property which gives assays of 276 ounces silver and $67 gold.

STOREY COUNTY.

Pumping at the C. and C. shaft on the Comstock continues without cessation. Manager Ross' latest telegram reads as follows:

VIRGINIA, Nev., Aug. 17, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco—At 6:30 this morning the water was 20 feet 8 inches below the 1950-foot level station, the water having risen steadily during the past twenty-four hours, while the elevator was working continuously. A rush of water from some unknown source is probably the cause of the raise. We hope to start No. 2 elevator to-day. G. M'M. Ross.

The Sutro tunnel is being put in order and repaired from its mouth to the C. & C. shaft.

OREGON.

BAKER COUNTY.

The Banzette mine, Robinsonville district, was bought this week for $33,000 by Eastern, Spokane and local capitalists and the Banzette Con. G. M. Co. formed; incorporators, C J. Johns, Sumpter; B. Shipp, Baker City; J. M. Burke, Spokane; H. B. Branner, C. T. Gates, Knoxville, Tenn.; capitalization, 1,000,000 shares, par value $1 each. The new company will put up a pump and hoist, sink 200 feet on the ledge and build a 10-stamp mill.

LINN COUNTY.

Mining Review: A group of mines in the Bohemia district on Fairview mountain, belonging to Ziniker and Graber Bros., was sold recently to Eastern capitalists for $35,000. There are 1000 feet of tunnels and the ore is free milling. The vein is 3 to 5 feet wide. The new company will begin sinking a shaft.——Nelson & Edwards struck free gold while doing assessment work on their Peekaboo mining claim, a mile south of the Music mine, Bohemia. The vein is 3 feet 4 inches wide.

SOUTH DAKOTA.

CUSTER COUNTY.

Custer *Chronicle*: The Bismarck concentrating mill at Keystone is reported to be a success, and the company expects to erect another plant to treat the ore from the Big Hit mine. The concentrates from the Bismarck mill are being shipped.

UTAH.

BOX ELDER COUNTY.

Lewisohn Bros. will build a smelter at Copper mountain. E. Tuttle is Mgr.

JUAB COUNTY.

Nearly 200 men are now employed at the Mammoth mine.

At the Tetro of Tintic ore is reported that returns $90 in gold and twenty-five ounces silver per ton, and from a breast of quartz 6 feet in width samples obtained that gave 5 ounces in gold, with 21.8 ounces silver per ton. The quartz in which the values have appeared is 1500 feet from the mouth of the tunnel and is streaked with iron.——The new strike in the Star Consolidated at Tintic is developing. The drift on the 600 level, by which it was opened, has progressed 30 feet, the shoot being followed in opposite directions. In each of these laterals, ore is exposed in top, sides and bottom, the copper streak showing 12%. The drift off the 300-foot level has broken into ore again in a shoot independent of that at the 400.——In the Grand Central the main shaft has reached a depth of 800 feet and still sinking.

Manager John Hunt of the May Day has shipped a carload of fine ore to Salt Lake. With the completion of the electric power line of the Telluride Co. they will put in a hoist, when the output will be increased. The Telluride Power Co. has its pole line finished to Tintic and is stringing wire from the Provo end. Several properties are awaiting the completion of the line and will put in electric machinery.

Tintic *Miner*: The drift from the 300-level of the Showers Con. shaft at Diamond has cut the vein at 40 feet from the shaft and exposes 20 feet of ore, a large part of which is shipping grade. The ore is galena and lead carbonates, the silver values of which run 300 ounces.——At the Apex group, above the Uncle Sam and Godiva mines, a 25-foot body of quartz was cut by the tunnel recently that yielded good assays in lead, with silver.

SUMMIT COUNTY.

The Marsac mill and tailings dump are affording a source of revenue. Recently 20,290 pounds of silver sulphides were shipped, worth $200,000. This represents the output since the mill resumed the last time. In addition to this source of revenue are the crude ores.

It is reported that the Ontario tunnel has connected with the Daly workings. When the vein is reached it will be at a depth of 1700 feet—700 feet above the greatest depth of the old workings. J. Quinn, formerly foreman, is picking over old ore bodies under lease.

Park City *Record*: Parties working a portion of the West-Ontario on a lease and bond will drift for the vein. They are down 75 feet, and by running a drift 25 feet in a southerly direction, they expect to cut a vein of high-grade ore that they know is in the ground.

SALT LAKE COUNTY.

At Bingham in the Dalton & Lark a distinct and independent copper and gold-bearing shoot has been discovered. The shoot was opened by the drift south from the 640 level, where, after it passed through 2 feet of copper, it broke into galena. Assays from the copper ore show 12%, with some gold. In the drift running south on the 800 level a body of galena was found a few days ago.

Bingham *Bulletin*: In the Morning Star No. 1, while clearing out an old tunnel which has not been used for twenty years, a breast of shipping ore 5 feet wide was encountered recently and the output keeps two teams busy hauling.——Several fine specimens showing native copper have been taken from the main ore body in the Congor properties recently, and a large quantity of ore is now in sight. Shipping will begin soon.——The Dewey mill is again running on Neptune ore, under lease to Sampson & Sherman.

TOOLE COUNTY.

Salt Lake *Tribune*: Mgr. McVichie of the Golden Gate mine has increased the daily output to 1350 tons. The caving method of extraction is employed.

WASHINGTON.

(Special Correspondence).—The Black Bear and Crown Point mining claims are on Railroad creek, eighteen miles west from Lake Chelan, Okanogan county, in the Stehekin mining district. The property contains two veins, one 8 feet wide, composed of a white quartz carrying free gold and silver, assaying on the surface $8, and also molybdenite thickly embedded all through it, from the size of a hen's egg to that of a man's head. The dip of this vein is 45° and the walls are granite. An order has been placed by a New York firm for three carloads of it per month at $100 per ton f. o. b. at Wenatchee. A Philadelphia firm has offered $195 per ton for it if it runs 50% pure, and for every unit it runs over 50% will pay $2 50 extra. Average samples tested in New York and Montreal show this molybdenite to be practically pure. The other vein on this property, lying in granite and diorite, is a well-defined vein 3 feet wide with an 18-inch paystreak running gold $2.89, silver $1.18, copper 14.52%, total $57.79.

Lake Chelan, Aug. 10th, '99.

(Special Correspondence).—The Sunset Copper M. Co. reports substantial progress in the development of their copper property near Index. The holdings comprise thirteen claims, through four of which a ledge of bornite and chalcopyrite ore is traceable. Development consists of about 1200 feet of work on drifts, crosscuts, open cuts and raises. The width of the ledge is said to vary from 20 to 41 feet, within which is a pay streak as wide as 4 feet in places. A crosscut encounters the ledge in a distance of 230 feet, at which point the vein matter is 4 feet in width. Drifts are driven both ways on the vein. A tramway was recently built from the mine to the railroad station, six miles distant. It is stated that ore shipments will begin this month.

Index, Aug. 12th, '99.

OKANOGAN COUNTY.

(Special Correspondence).—The Methow district, east of Lake Chelan, is being developed slowly. The outcrop showing of that section is good, though the mountains are precipitous. The ores are iron and copper sulphides, with arsenides, the values being chiefly in gold and copper. Some of the ore will average $70 to $80 per ton gold and from 1% to 7% copper.

Among the properties being developed are the Orient, Marbie and Trinity. A contract to drive a 400-foot tunnel on the Marble has been let. W. Rust, of the Tacoma smelter, is interested in the Marble, which has a large body of ore.

The Oregonian, St. Lawrence and Big Eight, in the same locality, are preparing to develop.

Chelan, Aug. 13th, '99.

J. W. Heggarty of this county is reported as saying "there are no free-milling properties in the Okanogan country. They may show free-milling ore on the surface but not at depth. The values are there, but the ore is not free milling, and it's a mistake to hustle a stamp mill onto a mine without having attained sufficient depth to know what the character of the ore is. We are not building stamp mills in Okanogan. Concentrators are needed until railroads come, and then smelters at home."

Spokesman-Review: Reports from Myers Creek district, on the reservation, state that McEntire, McDonnell & Co. have cut a vein in the Review mine, 48 feet between walls. The crosscut is made on a large swell in the vein.

SNOHOMISH COUNTY.

Seattle *Post-Intelligencer*: The Ethel group of claims, 4¼ miles from Index, have been sold by Fourtner & Engle to G. A. Pounder of Seattle. The price, it is said, was $45,000. Mr. Pounder will put 20 men at work. He thinks that five of the mines will be shipping a carload of ore daily by January 1st.

STEVENS COUNTY.

The crosscut tunnel in the Golden Lion mine has reached the Mountain Lion vein, at a distance of 440 feet from its mouth.

WYOMING.

CARBON COUNTY.

The Eureka vein at Grand Encampment, at a depth of 20 feet, has widened from 2 feet to the full width of the shaft. The ore contains sulphides and oxides of copper.

FOREIGN.

BRITISH COLUMBIA.

A petition for the dissolution of the Le Roi Mining & Smelting Co. has been filed by a majority of the stockholders.

The Rossland Miners' Union have decided that hereafter no member of the union should be allowed to do contract work in the mines of that camp.

A rich find of coarse gold is reported on Horsefly creek, Cariboo, on the Ward Shaw property, and a "rush" is anticipated.

A press dispatch from Nelson says: Hennessey Brothers have bonded their claims on Sixteen Mile creek for $300,000 to Spokane parties. There is a 10-foot ledge of solid galena traversing the claims, and an iron cap 15 feet wide carrying fair values parallels it. Nothing but surface work has been done.

F. McCathy, Mayor of Revelstoke, and I. T. Brewster have returned with reports of a big gold strike seventy miles away, on Smith creek, in Big Bend district. A rush has commenced to the new mines. Both placer and quartz discoveries have been made.

British Columbia *Mining Record*: The Cariboo mine at Camp McKinney continues to make a good showing, the dividend last month swelling the total profits to $348,000, in all twenty-seven dividends. The success of the Cariboo mine is due to systematic development, good management and reasonable capitalization.

CHINA.

It is reported that the Russians have forced the Chinese officials in the Manchuria mining district to stop working the gold mines, which employ 2000 men, and will take possession of them. The Russians have also assumed possession of the coal mines north of Moukden.

MEXICO.

A. J. King will build new reduction works at the Cinco de Mayo mine, Pilares district, Sonora.

Two Republics: In Pachuca the Santa Gertrudis mill will be running in a few weeks.——Within a year a large pump will be put in the San Francisco mine. It will raise a stream 18 inches in diameter and has a capacity of 1500 gallons per minute.——At the San Guillermo a shaft of 530 meters is being sunk.——The San Rafael has declared a 10% dividend.——Early in September the smelter of the Trinidad M. & S. Co. will be in operation. The mines are fifteen miles from the Balsas.

SOUTH AFRICA.

Mining Journal: The Village Deep Co. will start crushing with 100 stamps, but it is intended that the eventual capacity shall be 800. It is a year and a quarter since work was started, and it will probably take from two and a half to three years before the necessary mine work has been completed to make a mill necessary. The Robinson Central Deep, which will put in 100 additional stamps to be erected at the Crown Deep mill, should strike the reefs about the middle of 1900. When the South Rand area has been adjusted to make a more suitable block, four and a half years may be allowed from the commencement of sinking to the milling stage, on a 100-stamp basis. At the Village Main Reef there is a likelihood of an increase to 200 stamps.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING AUGUST 8, 1899.

630,437.—FLUSHING TANK—C. J. Ball, Los Angeles, Cal.
630,438.—BUREAU—J. Barker, S. F.
630,649.—BICYCLE GRIP—F. A. Briggs, New Whatcom, Wash.
630,591.—SOLDERING MACHINE—W. S. Case, San Jose, Cal.
630,448.—ELECTRO-MAGNETIC ENGINE—M. S. Conly, Los Angeles, Cal.
630,488.—OILER—W. Cooper, Seattle, Wash.
630,495.—AIR COMPRESSOR—R. L. Dunn, S. F.
630,453.—CARRIER AND SERVER—E. W. Fairbanks, Los Angeles, Cal.
630,535.—BEET PULLER—I. Goble, Chino, Cal.
630,504.—MAIL POUCH FASTENER—W. E. Griffin, Reno, Nev.
630,830.—MECHANICAL MOVEMENT—S C. Houghton, S. F.
630,510.—ORE FURNACE—J. F. Keiper, Everett, Wash
630,511.—ROCK CRUSHER—J. H. Kinkead, Virginia, Nev.
630,512.—GEAR MECHANISM—A. Meyers, Spokane, Wash.
630,389.—CORSET FASTENER—Sarah R. Mills, S. F.
630,734.—BOWL HOLDER—Helena L. Oothout, Fresno, Cal.
31,379.—DESIGN—W. F. Clark, S. F.
31,343.—DESIGN—H. S. Winn, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Industrial Notes.

—Montana woodchoppers are paid $1.40 per cord.

—There is a building boom in Salt Lake City, Utah.

—Skaguay expects to be the metropolis of Alaska. Juneau is.

—The Salt Lake Exchange has taken charge of Utah's mineral exhibit.

—An electric railway is projected by John Cross in Grass Valley, Cal.

—A new short railroad line is projected from Denver to Cripple Creek, Colo.

—Dillon, Montana, has voted $75,000 bonds to build a water works system.

—At Floriston, Cal., 100 men are employed on the site for the new paper mill.

—Returning soldiers from the Philippines say that country is not a good place for white people.

—The Canadian Parliament has voted $358,500 to be expended "for the encouragement of immigration."

—The electric and steam railway line between Seoul and Chemulpo, Korea, are in successful operation.

—A railroad from Stockton to Sacramento, Cal., is locally stated to be a present project of the Santa Fe Co.

—The Illinois Steel Co. announces its intention to give preference to English-speaking applicants for work.

—For the first time in the United States the "West" is loaning money to the "East," and investing in Eastern securities.

—The Kootenay Power & Light Co. have bought for $80,000 the property of the Rossland Water & Light Co., of Rossland, B. C.

—A big log raft, containing nearly 5,000,000 feet of timber, is being towed from the Columbia river 500 miles by ocean to San Francisco.

—The Oregon Short Line Ry. Co. has eight new chair cars costing $8500 each, three new buffet cars costing $9000 each, three new dining cars costing $10,700 each, and twenty-seven new locomotives.

—After the 1st prox. the republic of San Salvador announces a 50% reduction in tariff on steel in bars, sheets or plates, copper and brass in bars and sheets, plows, machetes and cutlasses to be used for work.

—The Southern Pacific Railroad will make a half rate for all exhibits or goods sent to the National Export Exposition, which opens in Philadelphia September 14th. Goods will be transported at the ordinary rates and returned free.

—The tunnel being bored through the Cascade mountains, Wash., by the Great Northern railway, is being worked from both sides and will be completed in 1901. It will be nearly 14,000 feet long, through solid granite, and needs no timbering.

—It is expected that next year through trains will be running between Port Arthur and Vladivostock and St. Petersburg. The first railway train to enter Manchuria rolled over rails from Philadelphia, nailed to ties from Oregon and hauled by an American engine.

—Japan's importations have grown in the past five years from 88,257,172 yen to 277,502,166 yen. (A yen is worth 49.8 cents gold in U. S. money.) Meantime her exports have grown from 89,712,864 yen in 1893 to 165,733,752 yen in 1898. The exports have doubled and the imports trebled during this period.

—Koshichi Tanabe & Co. is the name of a firm recently formed in Yokohama, Japan, with a capital of $75,000, to build an electric road in that city. About the end of September they will want bids on the various requirements from different manufacturers in England, Germany and the United States.

—The State Fair at Sacramento, Cal., from Sept. 4th to Sept. 16th inclusive, will be worthy of a visit from every miner who can find time to get there. Unusual interest is manifested in all the displays this year; about $40,000 premiums go in racing alone, and the exhibits in all departments will make the fair the most attractive one for years.

—The National Association of Gas and Gasoline Engine Manufacturers met at Detroit, Mich., on the 2nd inst for their first convention. The association was organized last April in Columbus, O., to regularly bring together manufacturers of gas and gasoline engines, to discuss matters of interest to them. The Detroit session was devoted to amending by-laws and putting the association on a regular footing. S. E. Baker of Springfield, O., was elected president; R. E. Weber, Kansas City, vice-president; A. S. Rodgers, Springfield, O., secretary and C. D. Dudgeus, Columbus, O., treasurer. The association will hold its next meeting in Chicago November 1st, '99.

—The Pennsylvania smelter at Sandy, Utah, will use electrical power throughout its entire plant. Current was turned on at the generating station in Big Cottonwood canyon last week, transmitted by aluminum wires six miles to the transformers and motors in the smelting works; a 40 H.P. motor operates an ore roaster, and a 50 H. P. motor an ore crusher. Motors capable of developing about 500 H. P. in all are installed at the smelter. There is transmitted a three-phase alternating current, through the medium of three No. 4 aluminum wires, at a pressure of 12,000 volts; at the smelter end of the line this high pressure is reduced by static transformers to 450 volts three-phase alternating current, then fed to the induction motors, which operate at 450 volts. Aluminum wire has about 60% of the conductivity of copper wire of equal cross-sectional area. The loss of pressure is eliminated by increasing the size of the wire.

Personal.

A. WARTENWEILER of California is in Butte, Montana.

O. O. HOWARD JR. is in Los Angeles, Cal., on mining business.

PAUL JOHNS is the new Supt. of the Crowned King M. Co. of Arizona.

CAPT. CASE succeeds H. Shipman as Supt. Cornucopia, Oregon, mines.

ALFRED PAGE, Wardner, is the Idaho agent for the Last Chance M. Co.

H. W. H. PENNIMAN has removed from San Andreas to Santa Cruz, Cal.

L. ALLEGEWAHR is again Supt. of the Thorpe mine, near San Andreas, Cal.

C. W. STICKNEY goes to Gunnison, Colo., as Supt. Granite Mountain G. M. Co.

L. C. CLARK, of Jno. Taylor & Co., San Francisco, has returned from Alaska.

M. MARCONI, of wireless telegraphy fame, expects to visit the U. S. next month.

D. B. HUNTLEY of De Lamar, Idaho, has returned from the Buffalo Hump country.

GEO. E. WOODBURY has returned to San Francisco from a business visit to Denver, Colo.

IRVING M. SCOTT, Mgr. Union Iron Works, San Francisco, has returned from Washington, D. C.

JOHN HAYS HAMMOND'S proposed visit to California is deferred by illness at Carlsbad, Germany.

F. M. JOHNSON, former Mgr. Tom Boy, Colorado, mine, is inspecting property at Bingham, Utah.

W. F. ARAM, mining attorney, has returned to San Francisco from a visit to Madera county, Cal.

JAS. JOHNSON is Gen. Mgr. and J. E. Clennel chemist at the new cyanide plant at Sonora, Mexico.

F. H. DAKIN, Supt. of the Uncle Sam mine, Shasta county, Cal., has returned to the mine from San Francisco.

EDWARD KERVIN, once in charge of a mine on the Comstock, Nevada, has a similar position in Ashanti, West Africa.

E. B. KIRBY of Denver, Colo., expects to return to that city in thirty days from a present visit in British Columbia.

J. W. NEILL, Supt. U. S. M. Co., Salt Lake City, Utah, is testifying in the Anaconda-Parrott suit at Butte, Montana.

JAS. QUINNE of Yreka, Cal., is in San Francisco to buy a 1000 H. P. dynamo for use in his Shasta river electric power enterprise.

RICHARD A. PARKER is now examining the zinc fields of southwestern Colorado and expects to return to San Francisco about Sept. 1.

BEN STANLEY REVETT has left Murray, Idaho, for Breckenridge, Colo.—interested there in dredging for gold—and from there goes to Oroville, Cal.

W. J. ADAMS of San Francisco, Cal., has gone to Mariposa Co., Cal., to make examinations of gold and copper mines. He will return in about a week.

VICTOR M. CLEMENT is in San Francisco, en route to the Spanish mine, El Dorado county, Cal., where quartz gold ore has been worked at a total cost for mining and milling of 62 cents per ton.

C. F. HOFFMAN, formerly Supt. of the Red Paint, Placer county, Cal., mine, who for three years has been in Siberia and the Argentine Republic for an English syndicate, is expected to return to California in August.

RECEIVER C. W. PAULY of the Golden Cross gold mines, Hedges, Cal., will be replaced by D. M. Delmas, I. Trumbo, J. Chandler, T. S. Fuller and D. T. Hedges, who will act as receivers without salary as long as the mine is in debt.

THE Union Pacific geological expedition now searching the fossil-bearing formations of Wyoming is headed by Prof. Wilbur C. Knight of the University of Wyoming, and not by Prof. A. R. Crook, as was stated in the issue of Aug. 5.

GEO. MCCULLOUGH has returned from Chemulpo, Korea, where he had charge of part of the extensive mining operations of J. Sloat Fassett. A 60-stamp mill is crushing $50 free milling ore. Native labor is 50 cents per day, and the capital invested in mining property there meets good returns.

THE jurisdiction and duties of the officials of the Florence & Cripple Creek R. R. Co. have been extended over the properties of the Golden Circle R. R. Co., the Canyon City and Cripple Creek R. R. Co., and the La Bella Mill, Water & Power Co. The officers of the Associated Companies are now as follows: Directors—S. T. Smith, E. Smith, G. E. Ross-Lewin, D. H. Moffat, W. E. Johnson. General officers—S. T. Smith, Pres.; E. Smith, Vice-Pres.; W. F. Jones, Sec'y, Auditor and Claim Agent; G. E. Ross-Lewin, Treas.; C. J. Hughes, Jr., Gen'l Counsel; T. S. Dines, Gen'l Attorney; C. F. Elliott, Executive Sec'y, Traffic Mgr. and Purchasing Agent; L. L. Summers, Consulting Engineer, all with headquarters in Equitable building, Denver, Colo. Officers of the lines—A. C. Ridgway, Gen'l Supt.; R. D. Stewart, Chief Engineer; R. Patterson, Master Mechanic; G. R. Simmons, Gen'l Storekeeper; C. S. Morse, Supt. Telegraph and Train Master; M. McGrath, Supervisor; M. J. Neligan, Road Master, all of the line officers with headquarters at Florence, Colo.

Catalogues Received.

BULLETIN No. 5134 of the Bullock Electrical Mfg. Co., Cincinnati, O., discusses construction details of the Bullock engine type generators, with half-tones thereof, diagram of efficiency curve, etc.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ROCK CRUSHER AND GRINDER.—Jas. H. Kinkead, Virginia City, Nev. No. 630,511. Dated Aug. 8, 1899. This invention relates to improvements for crushing and grinding rock. It consists of a grinding pan having a convex bottom with a flat circular central portion and inclined periphery extending upwardly and outwardly at approximately right angles with the conical portion of the bottom, an independent circular central die having a conical upper surface and outwardly and downwardly diverging periphery, a concaved bottom fitting the flat central surface of the pan bottom and extending a short distance down the inclined portion, a die having a central opening fitting over the periphery of the central die and locking it in place, said die extending to the inner periphery of the pan and having radial grooves or channels made at intervals around the periphery. In connection with this is employed independent removable segments resting upon the periphery of the die and forming a lining for the interior periphery of the pan; one or more split rings are fitted between the shoes and dies around this outer periphery and these take the wear as well as providing double grinding surfaces. Whenever these rings become worn too thin others may be inserted and the wear practically taken up.

CAN SOLDERING APPARATUS.—W. J. Case, San Jose, Cal. No. 630,591. Dated Aug. 8, 1899. This invention relates to an apparatus by which square cans are delivered into holders and caused to traverse a solder bath with means for rotating the cans at stated intervals so as to present each of the edges to be soldered while the can is passing through the bath. It consists of a trough for melted solder, a framework fixed diagonally with relation to the trough having a support in which the sides of the cans rest and a second support against which the bottom of the can rests so that the angular edges will be submerged in the solder. A device is employed for moving and turning the cans consisting of an endless traveling chain, shafts journaled transversely of the chain and in line with the axis of the can, arms fixed to the upper ends of the shafts and fixed stationary lugs with which the arms engage successively as the chains travel, thus turning the shaft at intervals to submerge the new edge of the can in the solder bath. A transversely slotted disk is fixed to the lower end of each shaft and a carrier head is loosely attached to the disk and movable radially with relation to it. Arms project from this head and are adapted to clasp the end of the can so that the movements of the head will allow the angular can to turn as it moves through the bath.

MAIL POUCH FASTENER.—W. E. Griffin, Reno, Nev. No. 630,504. Dated Aug. 8, 1899. The object of this invention is to provide a reliable closure and fastening for the mouths of mail pouches. It consists of flexible hinged metal plates secured transversely across one side, and other plates across the flap which folds over the opposite side of the pouch, so that when the pouch has been closed and the flap folded over they form an absolutely rigid strip extending across both sides and the top of the pouch.

Recently Declared Mining Dividends.

The Missouri Zinc Fields Co., regular monthly dividend of ⅜ of 1% on preferred stock; Aug. 10.

The Aurora Zinc Co., regular monthly dividend of 17 cents per share on preferred shares; payable Aug. 25.

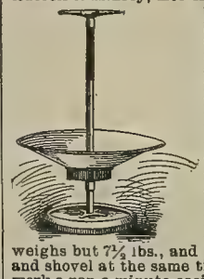
Morning Star Mining Co., Placer Co., Cal., $2 per share; Aug. 10.

Books Received.

"*Patents and How to Make Money Out of Them*," pp. 232, octavo, W. B. Hutchinson and J. A. E. Criswell; a practical work regarding patent procedure, official requirements, how best to introduce and make money out of an invention, etc. Published by D. Van Nostrand & Co., 23 Murray St., New York City; price, $1.25.

Alaska Gold Washer.

The Little Alaska gold washer, put out by Russell & Kinsey, Los Angeles, Cal., is built upon scientific and practical lines. The soil as thrown in is first brought to the center by the rotary motion, back and forth, then by a long whirl of the pan will be thrown out, while the gold of its own weight remains in the hollow cup at the center, from which it is impossible to dislodge it. This machine, costing only $6, weighs but 7¼ lbs., and one man can work it and shovel at the same time. Two men can work a pan a minute easily. Of course, it can use but very little water. They are being extensively used in this country, in Canada and Mexico. *



Commercial Paragraphs.

THE WOLFF & ZWICKER IRON WORKS, Portland, Or., have successfully launched the torpedo destroyer Goldsborough.

THE E. P. ALLIS Co. of Milwaukee, Wis., have leased the Lake Erie Engineering Works at Buffalo, N. Y., and expect to have 500 men at work there by September 1st.

THE MINE AND SMELTER SUPPLY Co., of Denver, Colo., has filed its articles of incorporation in Salt Lake City, Utah, where Mr. Warren C. Bogue has charge of the Salt Lake branch of the business.

THE Southwestern business of the New York Belting & Packing Co. is handled by the Los Angeles, Cal., Rubber Co. The New York Belting & Packing Co. has made what is claimed to be the largest piece of suction hose ever produced. Their line of hose for all purposes; of rubber belting under three different brands, of packing, gaskets and numberless specialties cover the whole range of needs in these lines, and the reputation of the company as pioneers and leaders in their line of manufacture always insures satisfaction to the users of these goods. The Los Angeles Rubber Co. also carries goods of the Carton Belting Co., full lines of rubber clothing of every description and druggists' rubber sundries.

THE results achieved by the Pioneer Mutual Mining & Exploration Co. of Los Angeles, Cal., will attract attention, as their plan is an adaptation of the building and loan idea to mine development. They propose to sell non-assessable stock, to be paid for in monthly installments, the income thus created being used for development work on an increasing series of likely properties. The dividends are to be derived from the profits of these properties, distributed among the stockholders on the basis of amount paid up on stock and time it has been carried. There is no treasury stock. Stock is non-assessable and non-forfeitable. The company is entirely mutual and may prove to be an available plan for developing minor properties of possible value.

THE city of Santa Ana, in Orange Co., Cal., has recently replaced two smaller boilers in the city water works with a 125 H. P. boiler, after their own specifications, made by the Gem City Co. of Dayton, O. It is built with double-butt straps, triple riveted and full flush front. In the same city, the packing plant of the Cutting Packing Co. has been completed. The steam plant comprises complete oil, water and feed pumps, heater, etc. Both outfits were furnished and placed by the Howe-Curry Co. of Los Angeles, Cal. This company, which has been recently incorporated, is the outgrowth of the business of Frank H. Howe, and carries a full line of milling and mining machinery, irrigating plants, engines, boilers, pumps, etc.

THE dredger built by the Bucyrus Co. of South Milwaukee, Wis., for Hingston & Woods, Buffalo, N. Y., for use on the Great Lakes, is said to be the largest dipper dredger ever constructed. The dipper has a capacity of 8¼ cubic yards (about twelve tons). The working capacity in water 25 feet deep is 5000 to 6000 cubic yards in ten hours. The hull of the dredger is of white oak and fir, 136 feet long, 42 feet 3 inches wide, 13 feet 6 inches deep, braced with four longitudinal steel trusses 119 feet long and 13 feet deep, two being placed at the sides, the other two spaced 26 feet apart, or 13 feet on each side of the center line. The sides of the hull are 8 inches thick, except at the bow, where the thickness is 12 inches; the bottom and sides are connected by 136 wrought iron knees. The hull and spuds contain 250,000 feet (B. M.) of timber. There are four spuds, the two at the bow each being 4x4 feet in section, made up of four 24x2¼-inch fir timbers 50 feet long; the two spuds at the stern are each 2x2 feet in size. Each bow spud is raised by means of a wire rope running over a sheave at the top of the spud. No attempt was made to distribute the weight of the hull so that it would float on an even keel, and when the spuds are off the bottom the bow sinks several feet lower than the stern. This arrangement was intended to place a preponderance of the weight of the hull at the forward end, to bear heavily upon the spuds and hold the dredger against the digging thrust of the dipper. The power applied to the spuds is able to lift the end of the hull 2 feet in the water, thus compelling the spuds to sustain a weight of about 180 tons. The A-frame and boom are of steel, the former 53 feet high, the latter 53 feet long, weighing thirty tons. The dipper handle is wood, reinforced with steel plates, and weighs sixteen tons. A noticeable feature of the dredger is the use of a single-part wire rope hoist for the dipper, instead of a chain hoist in several parts. The hoisting rope is of extra flexible plow steel, 2½-inch diameter, running over a sheave 8 feet in diameter, at the end of the boom, and another sheave of like diameter at the foot of the boom. The hoist is operated by an 18x24 inch double, high-pressure engine. The considerations which led to the adoption of a single-part cable for the hoist were the saving in weight and rapidity of action. It is estimated that a hoisting chain to do the work of this dredger would necessarily have to be in three parts, requiring a chain 2⅞ inches in diameter and 275 feet long, weighing about ten tons.

THE Cochrane feed water heater and purifier is having a great sale. Parke & Lacy Co., 21-23 Fremont St., San Francisco, are the sole Pacific coast agents. Among recent buyers of this money saver and economical appliance are: Bethlehem, Pa., Steel Co., 12,000 H. P.; Pennsylvania Mfg. Light & Power Co., Philadelphia, 3000 H. P.; Waterbury Rope Co., New York, 850 H. P.; Durham Iron Works, Reigelsville, Pa., 600 H. P.; Blodgett Estate, Boston, 300 H. P.; Thorley Bldg. (Pabst Brewing Co.), New York, 300 H. P.; E. P. Allis Co., Milwaukee, Wis., 200 H. P.; American Nut & Bolt Works, Cleveland, O., 350 H. P.; People's Independent Rice Mill Co., Crowley, La., 350 H. P.; Plaza Hotel, New York, 300 H. P.; International Paper Co., Franklin Falls, N. H., 350 H. P.; Providence Machine Co., Providence, R. I., 250 H. P.; Lorain, O., Street Railway Co., 850 H. P.; Warden Power Bldg., Philadelphia, 1000 H. P.; Pittsburg, Pa., Brewing Co., 600 H. P. Recent sales of Cochrane separators were as follows: Red Oak, Ia., Electric Co., 5-inch; Bellefonte, Pa., Furnace Co., 10-inch; U. S. Navy Yard, Bremerton, Wash., 4½-inch; Pressed Steel Car Co., McKees Rocks, Pa., two 3-inch, two 5-inch, three 6-inch, two 7-inch; Benj. Atha & Illingsworth Co., Newark, N. J., 7-inch; Edison Electrical Illuminating Co., Topeka, Kan., 6-inch; Howe-Browne & Co., Pittsburg, Pa., 10-inch; McCormick Harvesting Machine Co., one each 6-inch, 5-inch, 4-inch, 10-inch and 14-inch, and four 3½-inch; Norfolk Navy Yard, Portsmouth, Va., two 4-inch; East Jersey Water Works, Little Falls, N. J., two 8-inch; Waterbury Rope Co., New York, 6-inch; Armour Packing Co., Kansas City, Mo., 14-inch, 16-inch and 20-inch; G. A. Suter & Co., New York, 8-inch; Hecht Bldg., Boston, 5-inch; Illinois Steel Co., Joliet, Ill., 22-inch Vac. Oil; Pittsburg Valve & Machine Co., Latrobe, Pa., 3-inch; E. Keeler & Co., Williamsport, Pa., one 8-inch and two 6-inch; Euston & Co., Chicago, 5-inch; Cleghorn, Eglee Co., Boston, 5-inch; Columbus, O., Street Railway Co., 20-inch Vac. Oil; Ostby & Barton Co., Providence, R. I., 4-inch; Michigan Portland Cement Co., Quincy, Mich., 3½-inch and two 6-inch; P. Lorillard & Co., Jersey City, N. J., 6-inch; Salem Iron Co., Leetonia, O., two 12-inch, one each 6-inch and 3-inch; Wheeler & Wilson Mfg. Co., Bridgeport, Conn., three 1¼-inch and one 10-inch; Fabrica de Hielo, Manila, Philippines, 8-inch; Page Woven Wire Fence Co., Monessen, Pa., special 7-inch; Carbondale, Pa., Machine Co., two 1½-inch Ammonia and 3-inch; Chicago, Ill., Telephone Co., 8-inch; Torpedo Boat No. 34, Tingey, two 5¼-inch and one 1½-inch. The Parke & Lacy Co. are also sole Pacific coast agents for the Cochrane separator.

M. & E. Ore Cars.

The M. & E. ore cars have several strong points to recommend them. No part is made unnecessarily heavy and none so light as to be easily broken or quickly worn out. The box is made entirely of steel and swings easily to dump in any direction. The wheels are cast



iron and all other parts are of forged and hammered wrought iron or steel. The Mining & Electric Co. of Los Angeles, Cal., supply cars of all sizes in any weight required; standard gauge (18 in.) unless otherwise ordered. Estimates on special weights or sizes promptly furnished. The M. & E. Co. are finding only the highest praise for Cling-Surface belt dressing and state that not a single person who has used it according to directions has ever claimed that it would not produce all the results claimed for it. It is different from any other dressing in that it produces an absolutely clinging surface on any belt, whether leather, rubber, or a rope drive; it does not become sticky, it simply *clings*. The material fills the pores of the belt, making it as soft as calfskin and at the same time firm. When once well filled with Cling-Surface a belt pulls like a chain and can be run so slack that the sides almost touch, and all slipping is absolutely prevented. It is positively guaranteed to do these things and to permanently increase the power. *



The Homestake Mine.

At the Homestake mine, in Lead City, South Dakota, the Ellison hoist is about completed and all the machinery is rapidly being installed. Its capacity is 500 H. P. and will lift a double-deck cage from a depth of 3500 feet, loaded with four cars of ore containing one ton each. The hoist is located on the southern dip of the largest vein of gold producing ore in either hemisphere; it will ultimately be mined to a much greater depth.

The Homestake operations embrace 6000 feet in length by 2000 feet in width, and within this area, it can safely be said, that 5% of all the material composing the mass will yield down to the explored depth of 850 feet not less than $4 to the ton in gold. The associated companies composing the syndicate lift from the mine every twenty-four hours each day in the year and crush in their stamp mills about 3200 tons of ore, or in the aggregate for the year 1,168,000 tons of rock, from which is recovered $4.80 per ton, which gives an annual production of $5,496,400. According to Supt. T. J. Grier's report, the 3200 tons of ore which is mined and milled every day can be continued for twenty years from the ore already blocked out above the 800-foot level.

The Homestake mine was incorporated Nov. 5, 1877. The first mill of eighty stamps commenced crushing on July 12, 1878, and another of 120 stamps, the Golden Star, was added in 1879. The Homestake mine, since December, 1879, has paid dividends continuously, and up to this date has mined approximately 22,000,000 tons of ore, valued at more than $80,000,000.

The combined width of the gold-bearing veins, where the Ellison hoist is situated, is nearly 1000 feet, and widening as lower levels are exploited. It is stated that developments now expose sufficient ore to furnish mills of 5000 tons daily capacity for twenty-five years, a total of 45,625,000 tons. The dividends paid since the inauguration of mining on the belt is approaching the $12,000,000 mark, with the mine in a better condition to increase the net monthly profits than since the first mill was built.

The yearly labor and supply expense of the companies under the management of Mr. Grier is about $2,500,000, the number of men employed in all departments being about 2000. This concern leads in the economic mining of gold ore in the United States. The equipment for concentration is nearly perfect, and practically all the sulphides are now saved. This being accomplished, attention is being directed to cyaniding the quartz gangue, which contains the small amount of 70 cents to $1.25 per ton after the ore has been amalgamated and concentrated.—Deadwood Independent.

WIRELESS telegraphy will perhaps have its first great test during the holding of the National Export Exposition to be held in Philadelphia during the fall. No effort will be made to duplicate the Eiffel Tower, but a structure of some kind is being considered that will hold up a copper wire 1000 feet in air. It is claimed by Marconi, the inventor of wireless telegraphy, that if this is done by the Exposition people he will telegraph by flashes of electricity from the top of Eiffel Tower in Paris.

Antidotes for KCN Poisoning.

The increasing use of cyanide of potassium, and the number of cases of cyanide poisoning continually occurring in gold recovery works, makes it desirable for all engaged in cyanide works to be familiar with the best known antidotes. Sometimes the precipitate obtained by swallowing ten grains of ferrous sulphate, with one drachm of the tincture of ferric chloride in an ounce of water, and followed by a dose of twenty grains of potassium carbonate dissolved in an ounce of water, proves effective. Peroxide of hydrogen, sold by most druggists under the name of pyrozone, or aqua hydrogenii dioxide, is also favored. It is employed as a 3% solution for washing out the stomach, and for hypodermic injections which are made every four minutes in different parts of the body. Dr. Johann Antals' nitrate of cobalt remedy is also good. A. Wauchope, of the Woodside Cyanide Works, Woodside, South Australia, states that several years ago, when he was employed at the Australian Gold Recovery Co.'s Works, at Cobar, New South Wales, he experimented with this remedy. He obtained a rabbit and injected a solution of cyanide of potassium into its stomach. The effect of the poison was seen almost immediately, and in a few minutes the rabbit appeared to have breathed its last. When he could not detect any further action of the heart, he leisurely forced a solution of cobalt nitrate down the rabbit's throat, plunged it into cold water and breathed into its nostrils. After the lapse of one minute the muscles began to show signs of returning animation, and in the course of about ten minutes the animal attempted to run away. He caught it again, and to make sure that the cure was permanent, kept it until the following day, when it effected its well-earned liberty by hopping away as lively as a cricket. An excess of cobalt is necessary, and its effect is to form an insoluble flesh-colored precipitate, which, on account of its insolubility in the stomach, is evidently non-poisonous. Mr. Wauchope has such a high opinion of the nitrate of cobalt as a remedy in cases of cyanide poisoning that he has some always on hand at his works, and recommends his friends to keep it.—London Mining Journal.

A BRITISH COLUMBIA MINER has invented a hammer hand sling, which is intended to be an assistance to miners when drilling an overhead hole. The idea is to transfer the weight of the hammer from the handle grasped by the hand to the wrist or forearm by a sling connecting the head of the hammer and the wrist of the operator and a clutch connecting the handle of the hammer to the sling, so that the workman can sling the hammer and strike the drill without the effort of constantly grasping the hammer handle.




"GIANT" SHOES AND DIES.

Made of hammered steel, forged and hardened by special process. These shoes and dies are made in San Francisco and can be furnished within a week after receipt of order.




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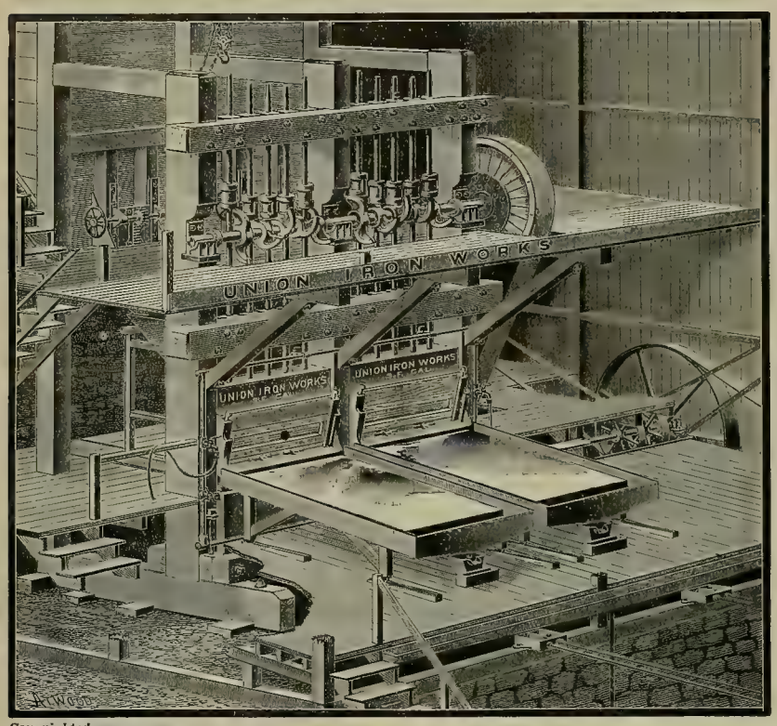
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BUILD THIS

MODERN TEN-STAMP BATTERY.

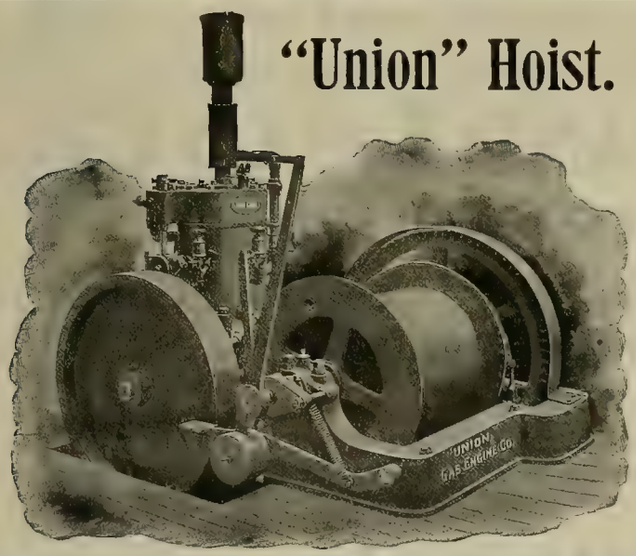


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The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

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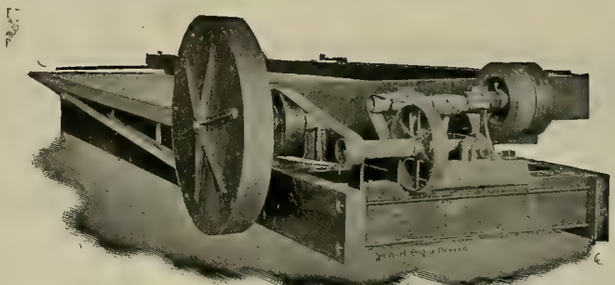
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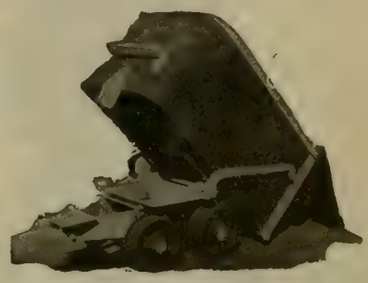
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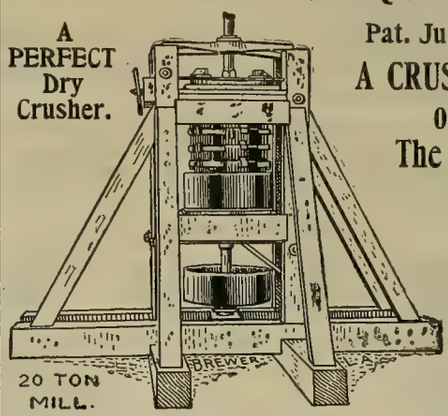
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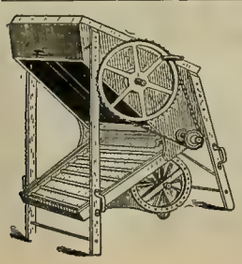
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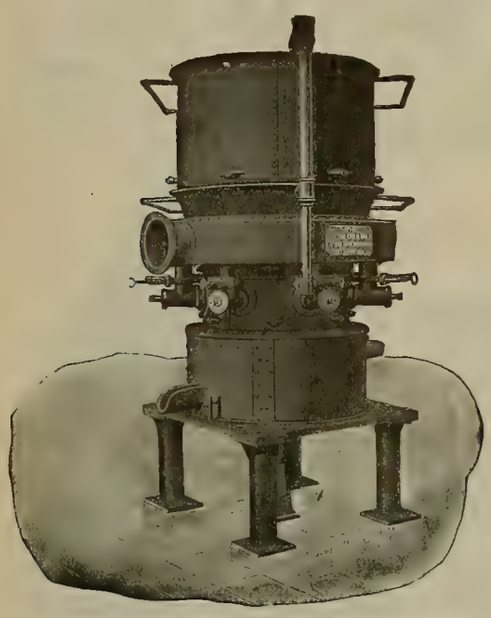
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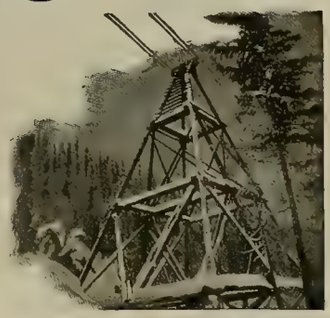
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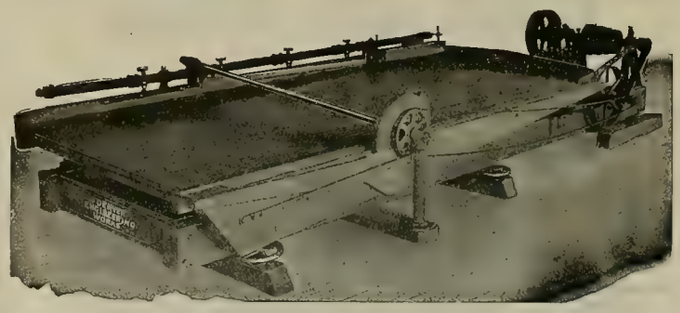
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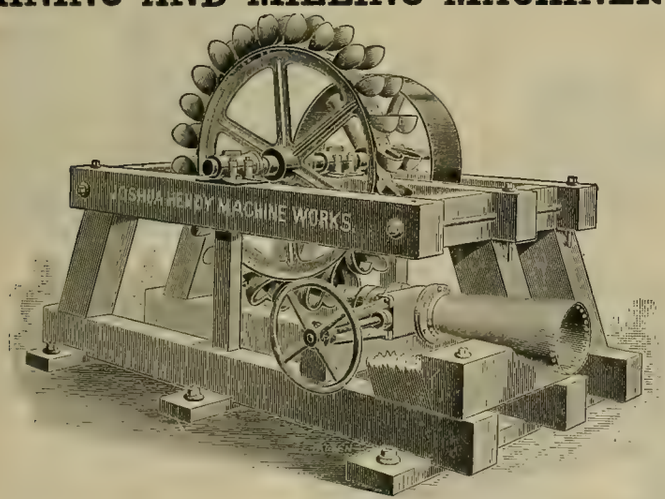
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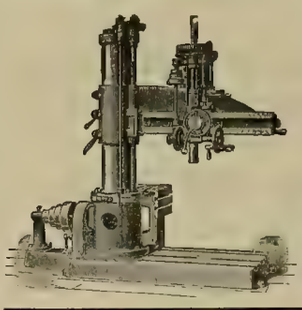
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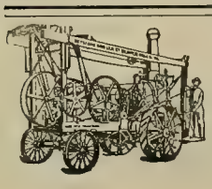
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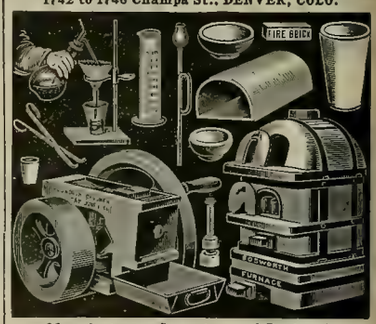
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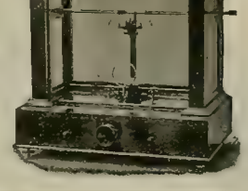
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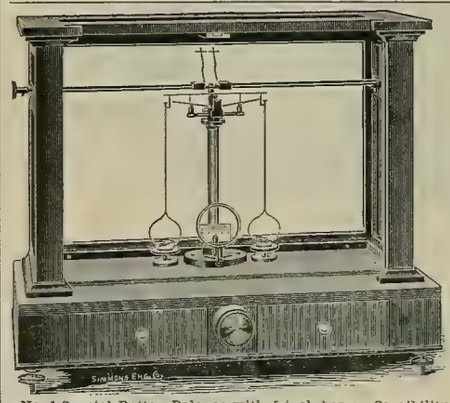
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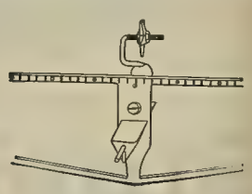

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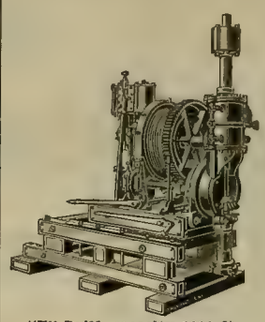
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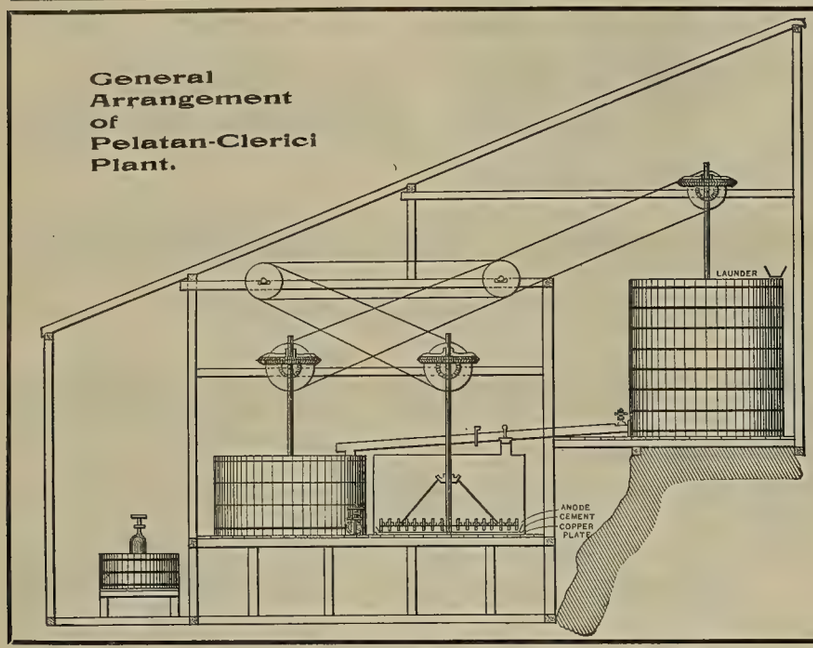
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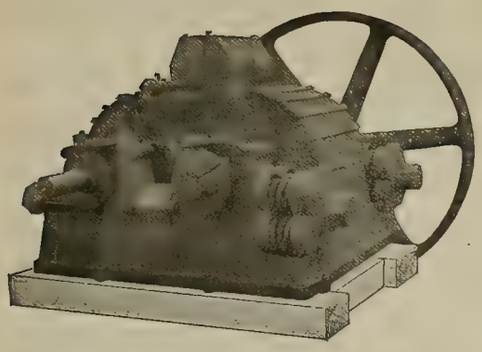
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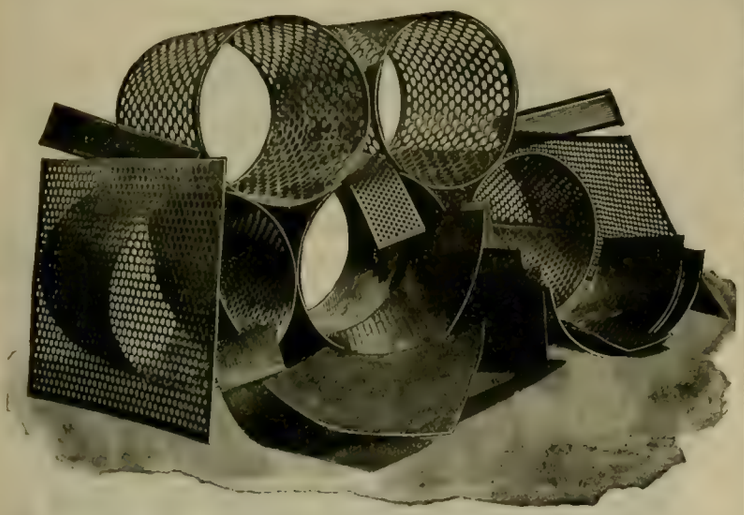
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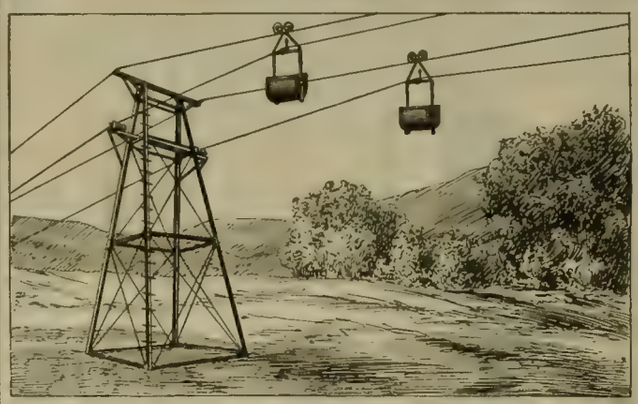
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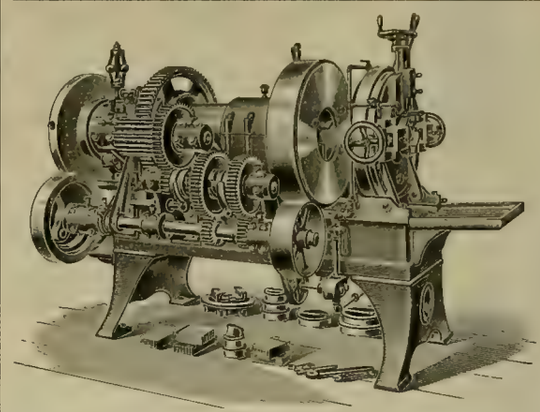
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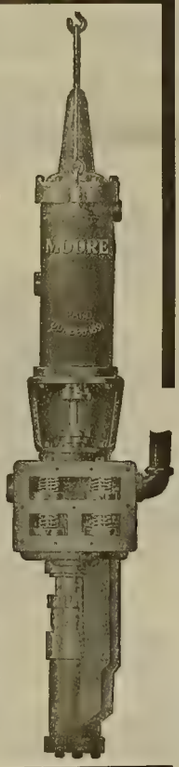
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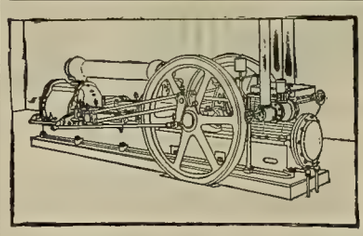
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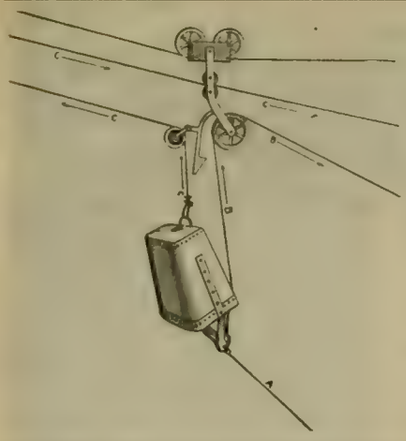
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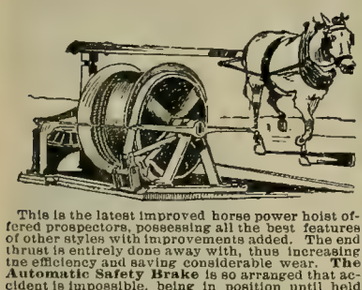


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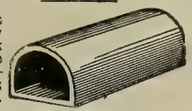
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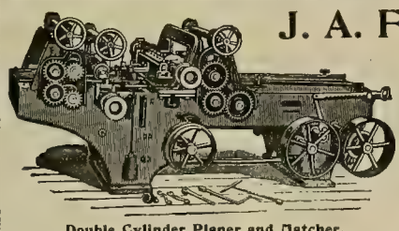
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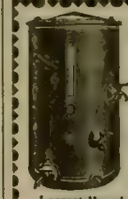


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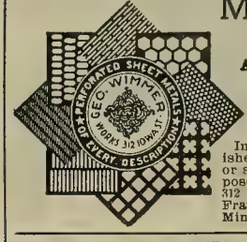
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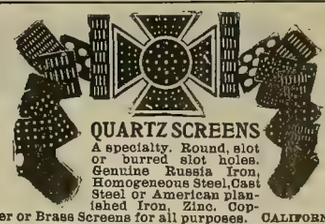


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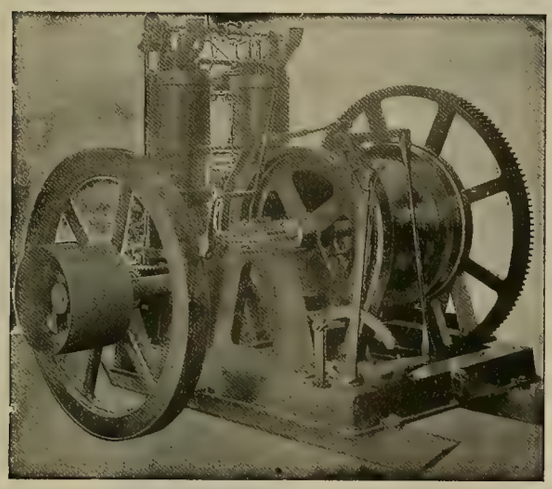
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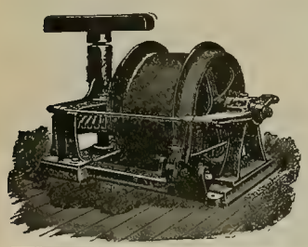
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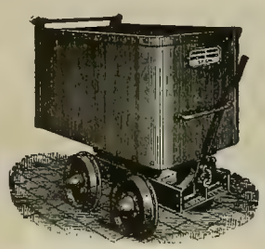
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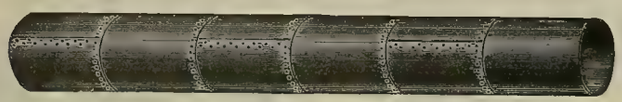
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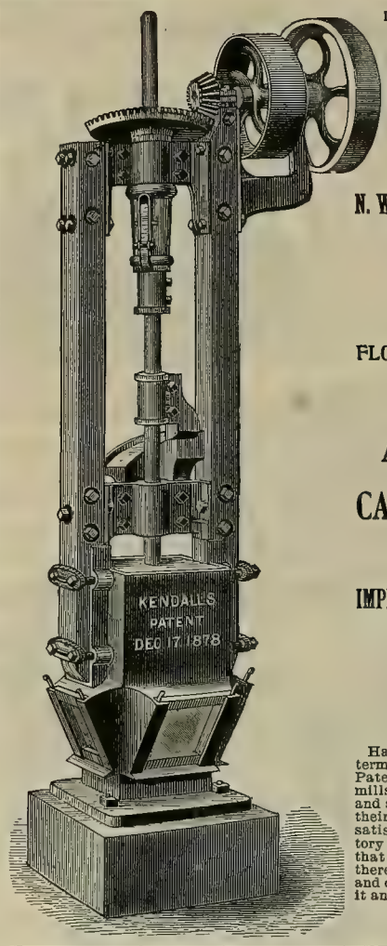
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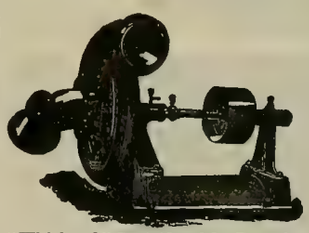
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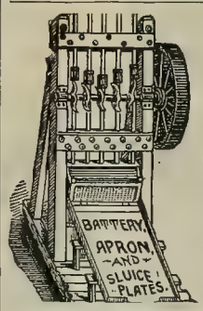
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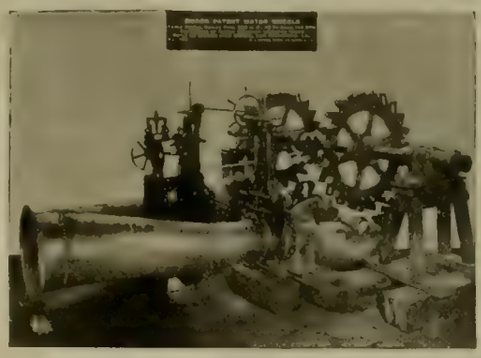
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And other Chemicals for Mining Purposes.

THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

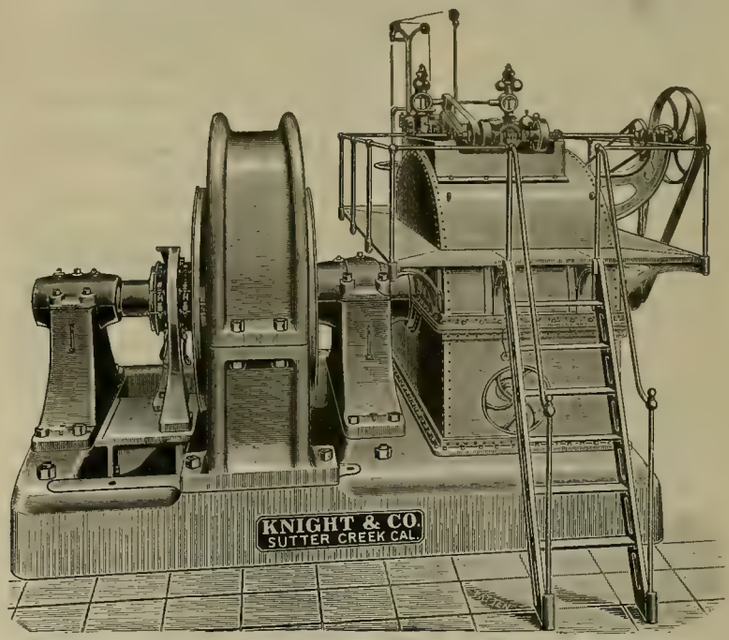
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

121 & 123 MAIN STREET, SAN FRANCISCO, CAL.

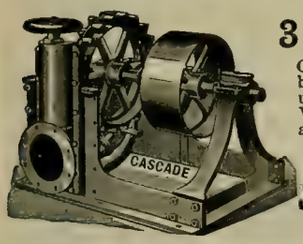
KNIGHT'S WATER WHEEL.



The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

TURBINE AND CASCADE WATER WHEEL



Adapted to all Heads from

3 Feet to 2000 Feet.

Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.



P & B PAINT

For keeping your iron and wood work in perfect condition. Nothing else "just as good." Circulars cheerfully furnished.

PARAFFINE PAINT CO., 116 BATTERY ST. SAN FRANCISCO.



TUTTHILL Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

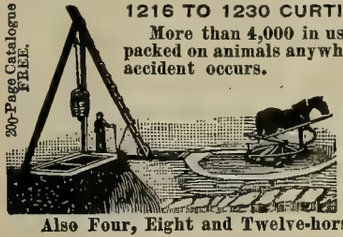
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OAKLAND IRON WORKS,
330 Market Street,
Room No. 610. SAN FRANCISCO, CAL.

THE J. H. MONTGOMERY MACHINERY COMPANY.

1216 TO 1230 CURTIS ST., DENVER, COLO., U.S.A.

20-Page Catalogue FREE.



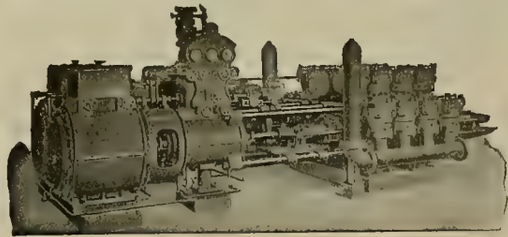
More than 4,000 in use. Made of wrought iron and steel. Can be packed on animals anywhere. The deadlock holds the load when an accident occurs.

Price of One-Horse Whim, complete, with shieves..... $90.
Two-Horse Whims, complete, with shieves..... $150.
Pumping Attachment with Pipe for either..... $40.
Blower Attachment with Pipe for either..... $30

Also Four, Eight and Twelve-horsepower Whims.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.
Write for Catalogue and Estimates.



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JEANESVILLE, PA.

Western Office,
Columbia Hotel Building,
1328 17th St.
Denver, Colo.
Telephone 2298 A
A. MIDDLEBROOK, Manager.

Market Reports.

SAN FRANCISCO, Aug. 17, 1899.

SILVER.—London, 27¾d; New York, 60¼; San Francisco, 60¼; Mexican Dollars, 49@50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.57½ bid, $4.62½ asked; brokers' price, $4.35.

Local, pipe, 7¼@7¾c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake unchanged at $18.50; brokers' price, $18.75. Local—Mill copper plates, 23½c.

The copper market remains practically unchanged. The demand continues unabated and the supply does not change materially.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

Iron is firm. The mines are making great effort to make as large an output as possible, but it is absorbed as fast as it appears, and higher prices may be looked for until some new source of cheap ore is discovered. Vigorous prospecting is in progress.

STEEL.—11¼@20c per pound.

TIN.—Dull; $31@31.25; pig, 36@39c per lb.

There appears to be an increasing demand for tin with a decreasing output. The visible supply is small. The fluctuations in price are the result of brokers' operations.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¾c; less than one ton, 11¾c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 4¼@5c per lb.; borax, refined, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 2¾c; alum, $1.90@2.00; flour sulphur, French, 2½@2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in 10-lb. tins 15c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10 @2.25c; saltpeter, 14c; chlorate of potash, 25c; caustic potash, 12c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16¼c; Astral, 16¼c; Star, 16¼c; Eocene, 18¼c; Extra Star, 20¼c; Elaine, 21¼c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 17, 1899.

9:30 A. M. SESSION.

100 Andes	16c	100 Mexican	54c
300 Best & Belcher	65c	600 Potosi	24c
300 Bullion	09c	200 Sierra Nevada	72c
100 Caledonia	70c	100 Union Con	32c
1000 Chollar	22c	300 Utah	10c
100 Con. Cal. & Va.	$2 05	100 Yellow Jacket	34c
200 Gould & Curry	43c		

2:30 P. M. SESSION.

200 Gould & Curry	42c	700 Yellow Jacket	32c
200 Best & Belcher	68c	200 Sierra Nevada	70c
450 Con. Cal. & Va.	$2 05	50 Union Con	33c
400 Savage	22c	200 Challenge Con	26c
100 Hale & Norcross	31c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. M. BREITUNG, Marquette, Mich.

Cable address Edbee. Codes, Liebel's Bedford, McNeil's, A B C Universal Commercial. **U. S. A.**

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.

GRAHAM, GARRETT & CO.,

211-212 Peyton Block, SPOKANE, WASH.

MINE PROMOTERS AND BROKERS.

Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co, Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

A Fortune Maker.

The oil fields of California are rivaling those of the world as fortune makers for the lucky investors. Stocks that are now selling for a few dollars will bring hundreds and in some instances thousands per share

When Oil Is Struck.

We have 2000 acres right in the wonderful Panoche Belt. The leading experts declare it positively oil bearing. Sinking of wells commences immediately. Our stock is $4 per share now. A few shares may fix you comfortably for life. Prospectus with full particulars free.

Union-Consolidated Oil & Transportation Co.

332 PARROTT BLDG., SAN FRANCISCO.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mining Properties

of merit, bought and sold. A specialty made of mines in Mexico and the Southwest. Whether a buyer or seller let me hear from you. Mines examined and reported upon.

H. E. RUNKLE, Mining Broker, El Paso, Texas.

CORRUGATED IRON CHEAP.

About 3000 Sq. Ft. No. 24 Gauge, Galvanized.
" 2000 " No. 26 " "
" 5000 " No. 28 " "

SLIGHTLY DAMAGED BY WATER.

PHELPS & ARNOLD,

220 MISSION STREET, SAN FRANCISCO, CAL.

NOTICE!

FOR SALE.—Group of seven claims, gold bearing and free milling. Development by tunnels—one 700 ft., one 150 ft., one 125 ft. About 30,000 tons of ore in sight. Plenty timber on group and water close and convenient. Average size of ore body, 3 ft.: average pay of ore body, $8 and $10. Close to wagon road. Formation porphyry, slate and quartzite. Salmon River & Liberty Mining District. Price reasonable. Address owner, H. H. MERRIAM, P. O. Box 93, Sawyers Bar, Siskiyou Co., Cal.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. S. Goodwin, in the Birdseye Creek Placer Mine, at You Bet, Nevada Co., to deposit tailings in an old pit; from Mrs. E. A. Cox, in the Washington Mine, at Whiskey Diggings, Sierra Co., to deposit tailings in Fourth Ravine; and from Geo. W. Stone and Jas. J. Schenrich, in the Red Hill Gravel Mine, near Diamond Springs, El Dorado Co., to deposit tailings in a ravine and in Ringgold Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on September 4, 1899, at 1:30 P. M.

An Oil Proposition IN Southern California.

A guaranteed product of 5000 barrels per month, with two additional wells almost ready to begin pumping, which will without doubt increase the output to 6000 barrels monthly. Fully equipped with two good pumping plants—boilers, engines, derricks, tanks, etc., etc., with ample territory and a prompt sale for all oil at the wells at a good price. We offer this property for a short time at a price that will enable the product to pay for it within a year. For particulars, address THE O'BRIEN INVESTMENT CO., No. 218 So. Broadway, Los Angeles, Cal.

INVENTORS, Take Notice!

L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position: is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

Underground Foreman

WANTS WORK.

Practical, experienced, intelligent, and up-to-date working of gold, silver or copper mines, whether small or large. Moderate salary. Good references. Address

C. L. LANG, Sonora, Tuolumne Co., California.

COPPER MINE.

Partner wanted (miner preferred) who has $5000 to spend developing a mining property in Mexico, which has lately produced a considerable amount of ore.

Object, deeper development and ultimate placing the property on the market.

No attention given to brokers or middlemen.

Address G. PETERSON, Ahlborn House, San Francisco, Cal.

Hydraulic Mines for Sale in Similkameen District, British Columbia.

667 ACRES. 5000 INCHES WATER IN DRIEST PART OF SEASON.

Two years' working bond will be given on favorable terms, or lease with option.

HOPE, GRAVELEY & CO.,
536 Hastings Street, - Vancouver, B. C.

VALUABLE GRAVEL MINE FOR SALE.

Seven hundred acres of gold-bearing gravel in best mining county in State. All advantageously situated for good work. Splendid dumping facilities. Working not affected by debris law. In vicinity of very rich and paying mines. Also ditch, capacity 850 miner's inches. All the water of large creek. Covers and controls miles of unlocated ground. Also pipe, giants, sluices, tools, etc., enough to last for some time. Will be sold entire, or half interest. For further particulars, address V. B. E., this office.

F. B. COOK & CO., MINES AND MINING,

Atlas Block, Salt Lake City, Utah.

Properties reported on and development work superintended for investors.

NOTICE.

To Whom It May Concern:

The so-called Cammett Concentrator which is being advertised and offered for sale by the Denver Engineering Works Company of Denver, Colorado, is a palpable infringement upon claims covered and protected by United States Letters Patent granted for the Wilfley Concentrator, and all persons who purchase and put the same in use will be promptly proceeded against as the law provides.

WHITE, ROGERS & COMPANY,

Exclusive Licensees for Building and Sale of Wilfley Concentrators on Pacific Coast under U. S. Letters Patent Granted A. R. Wilfley.

306 Pine Street, - San Francisco, Cal.

FOR SALE.

New Mining Hoist.

New Hercules Gasoline Hoist, 35 H. P.

Will hoist 3500 lbs. at 700 feet per minute. Made in sections not exceeding 1000 lbs. each.....$1400

ONE 4 H. P. HERCULES GASOLINE ENGINE—Second Hand.

Guaranteed order.....$200

ONE 12 H. P. HERCULES GASOLINE ENGINE—Second Hand.

Guaranteed order.....$475

E. H. PALMER,

405 Sansome St.,.....San Francisco, Cal.

PACIFIC EXPLORATION COMPANY

Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

W. E. Holbrook, Pres't. L. F. Haskell, Sec'y.
29-30 Chronicle Building, S. F

GREAT STATE FAIR OF 1899

AT SACRAMENTO, CAL.

TWO WEEKS—September 4th to 16th, Inclusive.

AN AGRICULTURAL SHOW, RACE MEET, AND AMUSEMENT EXPOSITION.

Over $10,000 in Premiums For Farm Stock and Agricultural Products.

Beef and Dairy Cattle from the World's Fair, and the pick of American Herds. Sheep imported from England. Fancy Swine and Poultry.

Two Weeks' Racing—$40,000 To Be Competed For—World famous horses will race at the Fair.

The Great Exposition Brass Band will give daily concerts, day and evening, at the Park and Pavilion. Novel musical features and instrumental specialties.

Great Mechanical Display—Machinery, modern and novel, will be shown at work and in motion.

Pavilion Will Be Filled with Industrial, Agricultural, and Trade Displays artistically arranged, lighted by electricity, in bewildering variety and motion.

Fruit for the Great Paris World's Fair will be shown in fancy packages and crystal jars, before being transported to France.

FEATURES

A MODEL SILO AND CUTTING MACHINERY AT WORK.
A MODEL CREAMERY IN OPERATION. AN ART DISPLAY OF CHOICEST WORKS.
A CONVENTION OF THE CALIFORNIA DAIRY ASSOCIATION.
DAILY CELEBRATIONS BY VARIOUS BODIES AND ORGANIZATIONS.

Amusements in Variety for Every Day of the Fair.
Come to the Fair for Instruction and Amusement.

The Southern Pacific Company will carry exhibits to the Fair and return, free of charge. Excursion Rates to Visitors.

Write for Premium List or other particulars to—

PETER J. SHIELDS, Secretary. A. B. SPRECKELS, President.

ELECTRICAL ENGINEERING COMPANY,

MANUFACTURERS OF DIRECT CURRENT MACHINERY

For Power and Lighting Purposes.

SPECIALTY—

Direct Connected Electric Elevators.

Estimates Given on All Kinds of Mining Apparatus,

ALSO REPAIR AND JOB WORK OF ANY KIND.

Manufacturers of Fonts Patent Rotary Grip Wheel for Logging or Tramway Use.

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WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.



Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati Ohio.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

SAILOR CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 12th day of July, 1899, an assessment (No. 1) of eleven cents (11c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 318 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 21st day of August, 1899, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on MONDAY, the 18th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. C. LUND, Secretary.

Office—318 Front street, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 19th day of July, 1899, an assessment (No. 14) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 28th day of August, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of July, 1899, an assessment (No. 13) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

WM. A. M. VAN BOKKELEN, Secretary.

Office—Room 9, 320 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of July, 1899, an assessment (No. 12) of ten ($10) dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 29th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 20) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209-11 Claus Spreckels building, San Francisco, California.

NATIONAL CONS. MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1899, an assessment (No. 8) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of September, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of July, 1899, an assessment (No. 9, new series) of five (5c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. P. THURSTON, Secretary.

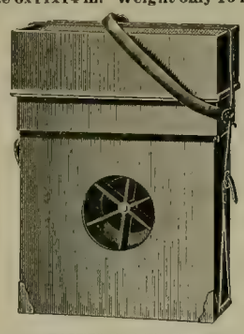
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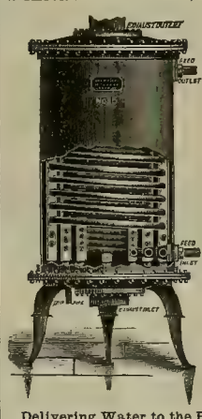
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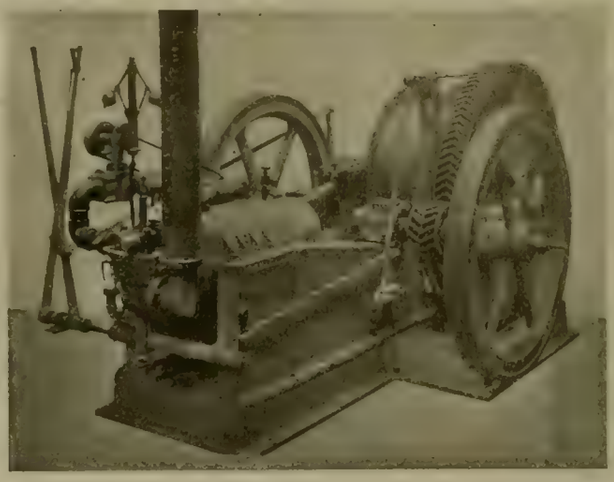
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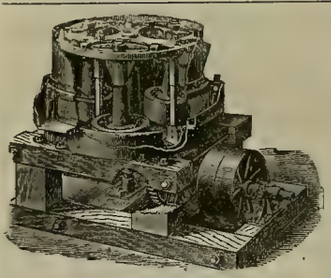
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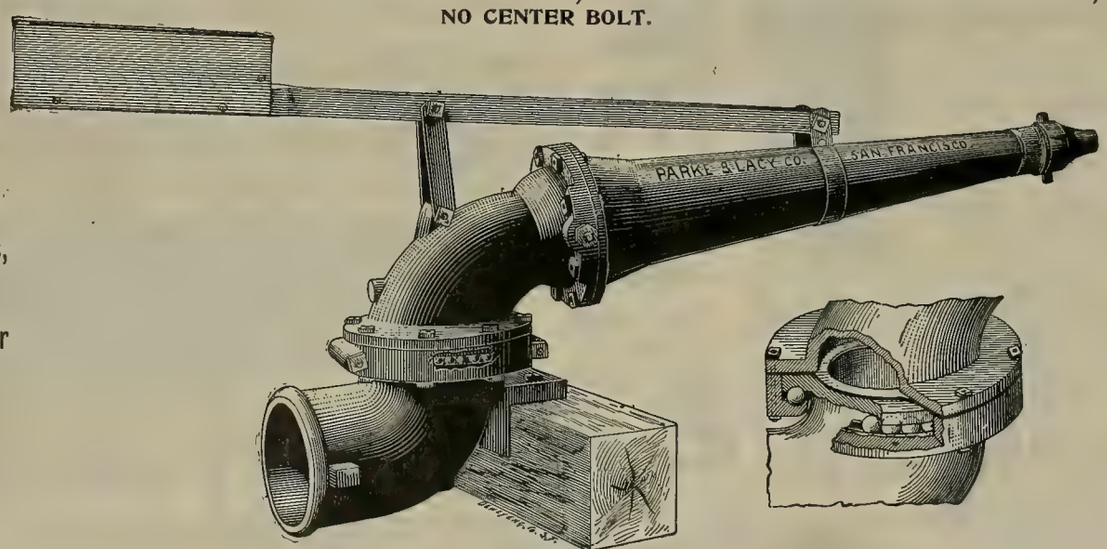
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No. 2042.—VOLUME LXXIX. Number 9. SAN FRANCISCO, SATURDAY, AUGUST 26, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Doratha Morton Mine.

The first cyanide plant installed in British Columbia is on Phillips Arm, 120 miles up the coast from Vancouver, in connection with the Doratha Morton mine, and is bonded to the Fairfax Exploration Syndicate of London, of which Mr. J. J. Lang of Vancouver is manager. An illustration on this page gives an outside view of the mill and leaching vats on the shores of Fanny bay, a branch of Phillips Arm. The mine is worked through crosscut tunnels and ore conveyed to the mill by wire tramway, where the ore is dumped onto a grizzly, the fines going to the bins and the coarse to the rock breaker and thence to the bins. The ore is crushed by stamps, from which it passes to the settling tanks (three in number) 20 feet in diameter and 7½ feet high. These tanks are provided with bottom discharge doors through which the ore is discharged into cars and conveyed to any of the treatment tanks (six in number) in which the ore is leached from six to eight days. The solution tanks are 20 feet in diameter and 10 feet deep.

The Van Anda mine is on Texada island, northwest of Vancouver. The ore bodies occur, according to the provincial mineralogist, in a limestone formation intersected by numerous felsitic dykes, the ore being intimately associated with the eruptives. The new shaft is down 230 feet. The view shown was taken at the 175 foot level. The shaft is in ore from top to bottom. The ore occurs scattered through the rock in irregular masses of bornite and chalcopyrite, carrying silver and gold. Much of it can be hand sorted for shipment.

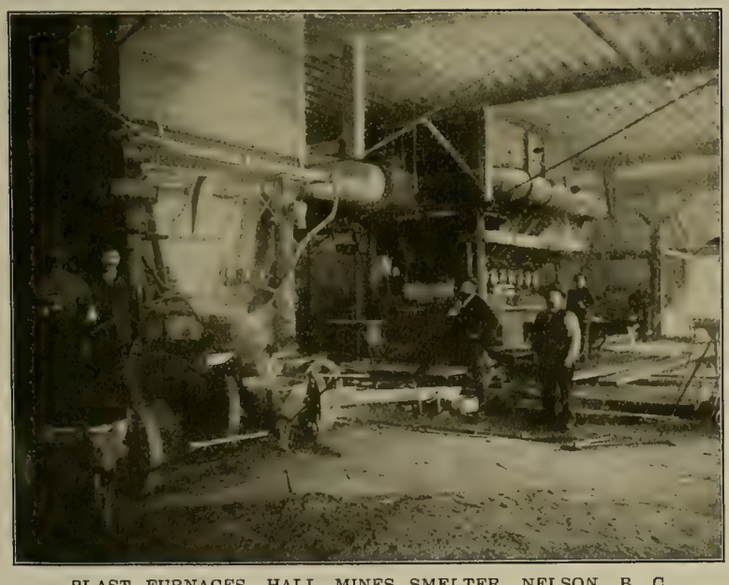
Two of the illustrations on this page are of interior views of the Hall Mines smelter at Nelson, B. C., and convey an idea of the appearance of a portion of a reduction plant and something of the character of the labor. The smelter is on the hillside back of Nelson, and was built to treat ores from the mines owned by that company. Ores of the Silver King, one of the group, proved remarkably regular in composition. Mr. Robt R Hedley, superintendent, has stated to the representative of the Minister of Mines that the ores averaged throughout several years 37% silica, 8% lime, 6% magnesia, 10% ferrous oxide, 10% manganese oxide, 3% copper and 3 3% sulphur. No preliminary roasting was necessary, owing to the self-fluxing properties of the ore. The first furnace had dimensions at the tuyeres of 40x100 inches, giving a capacity of 150 tons of charge daily. In '97 a larger furnace was built, in which the dimensions were 44x144 inches, giving a daily capacity of 280 to 300 tons. More recently a reverberatory plant has been built, and the practice is now to calcine about one-half of the matte produced, and charge to the reverberatory about 8000 pounds of raw with 8000 pounds of calcined matte, and 1200 to 1500 pounds of quartz or silicious material, which in twelve hours will form a good bed of white metal.



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TABLE OF CONTENTS.

ILLUSTRATIONS.—Doratha Morton Cyanide Plant, Fanny Bay Phillips Arm, B. C.; 175-foot Level in Van Anda Mine, Texada Island, B. C.; Blast Furnaces, Hall Mines Smelter, Nelson, B. C.; Ladling Anodes, Hall Mines Smelter, Nelson, B. C., 225. Debris in the Arangua, South Slope of the Caucasus, Europe; Middle Reaches of the Tirek, North Slope of the Caucasus, Europe; Upper Region of the Tirek and North Slope of the Caucasus, Europe; Track of Torrent Below Burned-Over Forest, Sierra Nevada, Cal., U. S. A.; Near Summit of Rocky Mountains, Wyoming, U. S. A.—Twice Burned Over; Portion of Denuded Area in Los Gatos Creek, Cal., U. S. A.—$1,000,000 Worth of Property Destroyed, 228. Latest Mining and Metallurgical Patents, 231. Triplex Single Acting Vertical Reidler Pump; Triplex Differential Reidler Pumping Engine, 232. A Burning Oil Well, Coalinga District, Cal, 236. Three Ribs from a Large Dinosaur; Dinoceras Mirabile; Megalneusaurus Rex; Titanotherium Robustum; Head of Triceratops Prorsus; Pelvic Region of Allosaurus, 237.

EDITORIAL.—The Doratha Morton Mine, 225. Another "Discovery;" Requisites in Mine Management; The Causes of Mine Accidents; Miscellaneous, 226.

MINING SUMMARY.—233-234-235.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 250.

MISCELLANEOUS.—Concentrates, 227. Forest Destruction and Torrent Ruin, 228. Occurrence of Mica in South Norway, 229. West Kootenay Ore Bodies, 230. Latest Mining and Metallurgical Patents; Maximum Possible Span for Overhead Wires, 231. Liquid Air; High-Lift Pumps; Exposure of Operations of a Mining Company at Leadville, Colo., 232. A Burning California Oil Well; Some Recent Additions to the Mineral Collection of the California State Mining Bureau; Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Obituary, 236. The Gigantic Fossils of Wyoming, 237.

IN the Missouri zinc fields the mine operators have formed an association for their mutual benefit. As a result, they have fixed a price on their product, which will be maintained for six months at least, and the smelters are buying, without protest, all that is being produced, at the miners' price. As another result of the co-operation of the miners, all night shifts have been discontinued for the time being, in order to regulate the output.

MINERS and prospectors should not allow themselves to be fooled by false newspaper "boom" stories and the ridiculous lies told by the transportation companies. On page 235 appears the truth concerning the Atlin district, written by an experienced miner and prospector. The statements of such a man, who knows what he is talking about and has no axe to grind, are to be believed rather than the extravagant assertions of those whose interests lie in luring away men with money to pay their expenses.

FROM necessity the prospector must be venturesome. Some of the richest mines known offered no great inducements on the surface, and some none at all, other than that there was a bare possibility that ore might be found by tunnelling or sinking. Capital seldom is willing to do much exploratory work without some previous showing, either upon the property they would explore or on adjoining territory. Capital is timid, sometimes too much so, but at other times it becomes too venturesome for the good of legitimate mining. Disaster to large capital in mining always has a reactionary effect. Many mines, abandoned by the original locators, are taken up by others, and in some instances there are several successive abandonments and relocations before the property shows value when it may eventually become a great mine. Such is the history of one of the most prominent mines of Butte, Montana. When a prospector does make a strike he usually either asks a price so great that he cannot dispose of his mine to a bona fide purchaser, or he sells at a price far below what it is really worth. The latter instance, however, is rare. The discoverers of one of Utah's greatest mines sold out for a moderate fortune and were secretly glad of the opportunity, admitting that they feared the deposit would not go down. The mine returned several millions in dividends to its purchasers.

Requisites of Mine Management.

The most essential requisite in a mine manager, aside from his ability to attend to the duties of today, is to anticipate the requirements of to-morrow and be prepared to meet them. To be successful the manager must understand his mine and have sufficient experience to foresee the necessities of the future. It is true that sometimes a man who, under more favorable circumstances, would perhaps prove a good manager is handicapped for lack of necessary funds to do that which he knows should be done. Timber is required, not only for the present season but for next season; transportation facilities must be improved, and everything must be done which will tend to reduce the expense of operation, even though at seemingly great cost for the present. When a successful mine manager called upon the directors of his company for a hoisting and pumping plant they inquired the cost. He said it should not be less than $80,000. After considerable discussion they wisely told him to put in whatever machinery he considered necessary, regardless of cost, but were somewhat surprised when the expense of the new installation was found to be $175,000. They thought it an unwarranted liberty, but were discreet enough not to say so. This plant has been in successful operation for years, and long ago demonstrated the wisdom of the superintendent who foresaw the need of it. A new and much larger plant is being installed at the same mine, at much greater cost, and nothing thought of it. The same manager built a railroad at great expense, but it paid for itself within five years. The mine manager is a busy man, but he must find time to read, for unless he does so his world is limited to what is going on about him—the creations of his own mind. He must also know what others in the same business are doing elsewhere, or he will soon be behind in the steadily onward march of the great industry. At no time were more rapid strides being made than now, and never before has there been so decided a tendency to break away from traditional methods and ideas; consequently the mine manager must read his technical paper and keep up with the progress of the day. He cannot afford to give too much attention to the small details of his business, but must exercise over all a general supervision. One of the distinguishing characteristics of a good manager is the care and judgment with which he selects men who are placed in charge of each department. The whole army of men is operated with almost military precision. He has a superintendent for each mine who is responsible to the manager; foremen who are responsible to the superintendent, and shift bosses who look to the foremen for instructions. In the mills or furnaces the same arrangement is to be found. Each man has duties to perform and he attends to them. It is the duty of the laborers to do the rough work, and that of the foremen or superintendents to give direction. When the $5 mechanic is seen packing lumber and the $2 man frequently fills his pipe, things about that mine are not well managed and there should be a change somewhere, and the general manager is the one who is responsible.

Another "Discovery."

August rarely passes without something that at least contributes to the gayety if not the lasting advantage of the mining world. The extraction of gold from sea water, the transmutation of silver into gold, and other pleasant pipe dreams of modern alchemists, this time receive the regular August contribution in the shape of a "discovery" by Mr. Theo. Olan, of Washington, D. C. Mr. Olan's "discovery" consists in finding "a new element which will soften steel, gold, silver and many other metals, making them soft, pliable and ductile as putty and as easily and safely handled." He has named the new chemical agent tauric acid, because it is obtained from tauric moss, a lichen, or fungus, which grows upon rocks and the roots of trees generally.

Mr. Olan puts "in a deep vessel a layer of chloride of lime, then a layer of tauric moss, to a depth of two inches, and then a layer of chloride of potash of about the same thickness. This is saturated with water until the lime is slacked away. After the fire has gone out of the lime the liquid is drawn off. After this, creosote of tar is added until a saturate solution results. The solution is precipitated with a solution of sulphuric acid, one part in ten. After precipitation the supernatent liquid is decanted, and the residue is found to consist of pure tauric acid."

The delight with which this knowledge will be received by metallurgists and metal workers is unhappily modified by the further statement that his new emollient "will not soften iron." This is indeed sad. But so long as steel, gold, etc., may now be "safely handled" by the aid of Mr. Olan's great discovery, the continued incorrigibility of iron in refusing to be similarly influenced can be borne with resignation.

The Causes of Mine Accidents.

Accidents in mines resulting in death have become so numerous of late that the inquiry whether something cannot be done to lessen these casualties is natural. In most cases it would appear that the trouble is in a great measure due to the carelessness of the injured men, though the safeguards in mines are not numerous. By daily familiarity with the workings miners become careless and subject themselves to danger where a strange miner or one wholly unfamiliar with mine workings would sustain no injury. Miners boldly work under ground known to be dangerous; they walk about on wet timbers far above the sill floor without the least concern, where any other person would cling timidly to a post for support; and in many other ways miners take what appear to the uninitiated to be desperate chances. Some of these elements of danger cannot easily be eliminated from the business of mining but others may to a great extent be guarded against. The injury which comes to men through carelessness in passing up or down a shaft on skips or cages may be avoided by employing enclosed cages for the men. Guard rails may be placed around shafts at stations; strict rules can be enforced concerning the keeping and handling of powder under ground, and various other provisions made to lessen the danger to men, but there is no way to wholly avoid the danger attending the catching up of a bad piece of ground, though it may be reduced to a minimum by taking the necessary precautions. Danger from blasting in the bottom of shafts may be avoided by the employment of the electric apparatus, but some mines do not even provide a ladder for the escape of men, depending solely upon the hoisting engine to raise them quickly from danger. While many of the accidents are due to neglect and parsimonious management, the greater number are due to the personal unconcern of the miners themselves, who when recognizing danger take no steps to have the condition bettered.

WITHIN a week two mining towns—Victor, Colo., and Placerville, Idaho—have been partially destroyed by fire, a fate which has fallen to the lot of almost every mining town of consequence in the Western United States. Leadville, Colo., is a notable exception. The highly inflammable material of which mining towns are usually constructed—pitch pine—is largely the cause of the destructive character of these numerous conflagrations. In a number of instances this, together with insufficient fire protection, has resulted in the complete destruction of a number of mining towns. Another element of extreme danger is the large amount of explosives kept within the town limits by dealers, as a matter of convenience. It has not infrequently occurred that it has been impossible to remove this powder to a place of safety, and the explosion which naturally followed has sent firebrands all over the burning town, rendering futile further effort to save what might have otherwise been spared.

COLORADO is once more mounting the wave of prosperity. After an idleness of several weeks, the smelters are again in blast, and the railroads are making strenuous efforts to relieve the congested condition of ore bins, dumps and loading platforms at mines and stations. Although the shut-down occurred at a most inopportune time, after an unusually long, severe and expensive winter, the mining men of that State hope to show by the end of the year no material falling off of the annual output. The smelter men wisely concluded to accept the offers made by the smelter owners, and all is now running smoothly.

Concentrates.

IN some districts galena is found in limestone which has not perceptibly altered.

MOLYBDENITE is not used on the Pacific coast. Concentrated, it is worth about $200 per ton.

A THIRD mining exchange is to be opened Sept. 1st at Colorado Springs, Colo., with reduced rates of commission.

A POWER OF ATTORNEY is an instrument authorizing a person to act as agent or attorney of the person granting it.

NO ONE method of mining iron ores is practiced in the United States. The conditions obtaining—character of the ore and form of deposit, etc.—usually determine the method of mining.

A PLACER CLAIM, the same as a quartz claim, may be patented in the same manner as a lode claim. Five hundred dollars worth of work must first be done, and then application for patent may be made at the United States Land Office for the district in which the mine is located.

VOLUME XXVI of the transactions of the American Institute of Mining Engineers, page 599, contains a comprehensive paper on the concentration of ores in the Butte district of Montana, by C. W. Goodale. A discussion of the foregoing paper appears in the same volume, page 1108.

THE law provides that the lateral extent of locations of veins or lodes shall not exceed 300 feet on each side of the middle of the vein at the surface, and no such surface right shall be limited by any mining regulation to less than 25 feet on each side of the middle of the vein at the surface.

THE highest price reached by quicksilver in the United States since 1850 was $118.55 per flask in '74–'75, and the lowest in '79, when it was $25.25 per flask. The largest amount ever output by any one mine in America was that of New Almaden, Cal., in '65, when the production reached 47,194 flasks.

IN the year 1883 but 83 pounds of aluminum were produced in the United States. In '84 the amount was 150 pounds and in '85 was 283 pounds. In '86 it was 3000 pounds. During the succeeding years the production increased rapidly. In '91 it had reached 150,000 pounds, in '95 it was 920,000 pounds, in '97 4,000,000 pounds, and 5,200,000 pounds in '98.

A FAULT in rock formations is a displacement which has taken place along a fracture. The movement ranges from a fraction of an inch to more than 20,000 feet. In many mining regions the faults play an important part in the economy of mining. This is particularly exemplified at Leadville and Aspen, Colo , where faults are numerous and often puzzling at first.

BEFORE driving a lengthy crosscut tunnel to exploit an ore body presumed to exist by reason of finding ore in shallow workings, it should be determined whether the ore will justify such expenditure. It may be that the ore does not go down, or, if it does, may not continue to carry sufficient value to warrant extraordinary expense. Such things are not without precedent. Better follow your ore.

SILVER occurs in ores native, as chloride or bromide, or more frequently in combination with other substances, as sulphur, arsenic, antimony, etc. Ores of this latter class usually require roasting before treatment. Chloride and bromo-chloride ores can be leached by solutions of hyposulphite of soda. Base ores may be subjected to chloridizing roasting, when the hyposulphite solutions may be successfully applied.

THE volumetric assay of copper ore is based upon the fact that, when dissolved in nitric acid, copper or any of its ores produces a clear green solution, which, upon the addition of an excess of ammonia, becomes blue; and upon the further fact that a solution of cyanide of potassium will discolor the blue solution of copper. The quantity of a standard cyanide solution required to effect this discoloration determines the percentage of copper.

MINING in Spain is heavily burdened. There is an annual royalty of 15 pesetas on minerals, a duty of 3% on the gross values of all ores extracted, an exportation tax, so much per ton on all ore shipped from Spanish ports, port dues, duty on explosives used in mines, an industrial tax on all mining apparatus, a stamp duty on each page of the required set of books used by mining companies, a 12% duty on the profits of railway transportation of ore, etc.

NO PLACER CLAIM made by a single individual can exceed twenty acres, and no local mining regulations can restrict a claim to less than twenty acres, though this is frequently done in new mining camps. A locator is not compelled to take as much as twenty acres, but may take that much regardless of local laws and agreements. It is presumed that local laws may determine the length which each claim shall have along the gulch or canyon; but where claims are short—300 feet—and the gulch narrow, the claims would necessarily extend high up on the hillsides.

TRAVELING REPRESENTATIVES of mining machinery houses traverse every part of the great mining region from Alaska to Central America. It is their universal testimony that wherever they go they find the MINING AND SCIENTIFIC PRESS. One of these gentleman writes that, when starting "on the road" some years ago, he regretfully discontinued his subscription, as from constant travel he feared he would be unable to get the paper with any degree of regularity, but finds it so universally taken in every place he visits that he is always able to read it every week as usual.

COMMERCIAL COPPER, as used for other than electrical purposes, is rarely pure. The effects of some of the common impurities, such as arsenic, nickel and silver, are supposed not to be detrimental; antimony is objectionable, and bismuth, even in small traces, prejudicial. The usual workshop test for the quality of copper is to cut off a portion of the pipe or sheet and anneal it, when it should stand bending close, without a sign of cracking. The edges also should stand thinning to a knife-edge without crack when hammered to a scarf-joint form with a lap of about three or four times the thickness of the copper.

THE principal ore of mercury is cinnabar (a sulphide); metacinnabarite also occurs, but more rarely. Mercury is employed in the manufacture of vermillion, which is either the natural or artificial sulphide in pulverulent form; in medicines, and the arts, but is principally used in the treatment of gold and silver ores in the process known as amalgamation. The greatest mines of cinnabar occur in sandstone, usually associated with serpentine. Its occurrence has been noted, however, in eruptive rocks in various places. These occurrences are not of commercial importance.

IT is usual in good practice to have wheels on lines of shafting close to brackets, to prevent the shafts springing and permitting a chattering action on the teeth. Such chattering induces breakage. The brackets should, if possible, be cast in one piece. The stress caused by the thrust of the wheels is thus resisted by the bracket. Trouble is otherwise apt to be caused by the brackets loosening on the foundations. This is especially the case if the wheels are slightly irregular through the distortion of a pattern or from some other cause. For the same reason brackets at the back of a pair of bevel wheels are bolted together or cast in one piece. They are then termed angle brackets.

A FAULT sometimes dislocates a vein in such a manner as to be very confusing to the prospector. If the fault occurs nearly at right angles to the course of the strike of the vein, and the "throw" is not too great, the prospector can readily understand what has taken place and knows how to proceed. Sometimes a fault occurs which nearly coincides with both dip and strike of the vein. The displacement may then result in doubling the vein, giving it twice its normal width, but a short distance away one side of it may be wholly lost, and the other side will flatten out and the vein present every appearance of playing out. By sinking and crosscutting one side may usually be found.

THE following is a suggestion for mounting plans on linen: Get a board or table sufficiently large to take the plan and tack the linen down with small tacks, of course minding that no creases occur in the linen. Get some common flour, to which add the proper proportion of water, and boil until the required thickness is obtained; with a smooth paint brush smear the linen evenly with the paste, taking care to leave no lumps on the surface; lay the plan to be mounted carefully on the linen, and with a handkerchief or soft cloth press the plan, making it tightly adhere. After this put the board aside for two days to dry, when the plan will be ready for trimming off with a sharp penknife.

ANTIMONY usually occurs as stibnite or sulphide of antimony, but is also occasionally found in the native state. Among its various compounds are berthierite (antimony, iron and sulphur) wolfsbergite (antimony, copper and sulphur), bleinierite (antimony, lead and sulphur). It also occurs associated with silver and sulphur and as antimonial (ruby) silver and as antimonial nickel. It is used chiefly as an alloy with other metals, and to a large extent with lead as type metal. It possesses the peculiarity of expanding at the moment of solidifying. Alloyed with aluminum it gives hardness and elasticity to that metal. It is injurious to copper, as a single part in 1000 destroys the good qualities of that metal.

WHERE narrow mortars in stamp mills show signs of wear, they may sometimes be lined with steel plates by resetting the stamps. Ordinarily stamps are set at 10 inches between centers, the stamp heads and shoes being 8½ inches in diameter. The space between the stamps is 1½ inches. This may be reduced by substituting a new set of guides, reducing the distance to 1 inch or even to ¾-inch, thus gaining from 1 to 1¼ inches at each end of the mortar—sufficient room for the insertion of substantial lining plates, which, by being replaced, will give a much longer life to the mortar. Mortars cast with the intention of being supplied with liners are somewhat longer and come fitted with liners on all sides when new.

WHEN one or more persons have made a location of 20, 40, 60 or more acres of placer land, in a single tract, they may elsewhere locate additional claims. The location of a placer claim requires a bona fide discovery, the same as a quartz location. If a location be made without such discovery it is not a valid location, and a second party later making a discovery can legally claim the land, and hold the same against the first locator. Placer locations may be made in subdivisions of ten acres each where land has been previously surveyed by the Government, and the locations must conform as nearly as possible to the surveyed lines of the land. It is not absolutely necessary to have a claim surveyed in order to determine the corner stakes.

IRON DOGS were originally used in placing shaft timbers, the plates being adjusted as nearly as possible and the posts put in place, the whole set being tightened with wedges. The use of hooked hanging bolts has superseded the dogs and are admirable for the purpose. They may be removed when the timbers are firmly wedged and reused below. Where the character of the ground is such that it may be necessary to allow the hanging bolts to remain permanently, a straight bar of the proper length, threaded at one end and provided with a washer and nut and turned at a right angle at the other end, may be employed, the angle being uppermost. Hooked bolts are most convenient for all purposes, but cost a little more.

IT is always best to avoid swelling ground when possible. It is cheaper to sink a shaft through ground of this character than in hard rock, but the expense of keeping the shaft open afterward is constant, and continues as long as the excavation remains in use. There are numerous instances in California mines where excavations made in swelling ground (foliated black slate) have been abandoned, and subsequently encountered by new workings. The only thing to denote that the ground had ever been open before was the rotten timbers found crushed and forced from their original position. When planning a shaft, if any condition indicates the existence of ground of this character it is cheaper and better to sink in either wall parallel with the vein, running crosscuts to it at regular intervals.

FIRE GILDING is done by rolling a strip of pure gold very thin and cutting it in very small pieces. These are placed in a crucible; mercury is added, the gold now being in solution. The work to be gilded is put through an acid dip to clean it, and is then placed in very dilute sulphuric acid. The solution of mercury containing the gold, and which is figured as a certain amount of gold to a pound of work, is then added. The mercury adheres to every part of the work and spreads the gold over the surface. The work is then placed in a cage resembling a peanut roaster, fitted to a furnace at red heat, where it is turned until all the mercury is burned off, leaving the gold it contained evenly spread over the surface of the work. The work is then scratch-brushed and shaded, to get the color, and finished by burnishing.

CINNABAR ORES are treated by roasting in furnaces of peculiar construction, the ore being subjected to high heat without coming in direct contact with the fuel. The mercury is volatilized and condensed in a chamber. The soot from the condensers contains a large quantity of mercury which cannot be squeezed out nor concentrated. It is placed in a cemented trough-like depression, mixed with the wood ashes from the furnaces and stirred with a hoe, which causes the quicksilver to run off from the soot in a stream. This process is discontinued when the quantity of mercury in the sooty material no longer justifies its manipulation. The ore is fed into the furnaces, after drying, at the top and descends to the bottom, where the useless waste is withdrawn, the quicksilver having been driven out. As the charge settles at the top, new ore is charged, making the process practically continuous.

WHERE a mine or other excavation is to be drained by means of a syphon the discharge end must be lower than the surface of the water at all times, for when the discharge end becomes level with the surface of the water the syphon ceases to operate. The syphon may be started by providing it with valves, one at the discharge end and one on the intake end, just below the surface of the water. At the highest point on the line a "T" should be inserted with a short standpipe, which is also provided with a straightway valve. Close both ends and fill the syphon by pouring water into the pipe at the straightway valve. When full close this valve, open that at the intake and then open that at the discharge end, and the water will flow and continue to flow until the weight of the column of water equalizes the atmospheric pressure. The amount of discharge is determined by the size of the pipe. Its highest efficiency would be probably about 25 feet, as above this height the flow would be slow.

IN California the right to the use of running water flowing in a river or stream down a canyon or ravine may be acquired by appropriation; but the appropriation must be for some useful or beneficial purpose; and when the appropriator or his successor in interest ceases to use it for such a purpose the right expires. The person entitled to the use may change the place of diversion if others are not injured by such change, and may extend the ditch, flume, pipe or aqueduct by which the diversion is made to places beyond that where the first use was made. The water appropriated may be turned into the channel of another stream, mingled with its waters and then reclaimed; but, in reclaiming it, the water appropriated by another must not be diminished. As between two appropriators, the first in time is first in right. A person desiring to appropriate water must post a notice in writing in a conspicuous place at the point of intended diversion, stating therein that he claims the water there flowing to the extent of the number of inches he intends to appropriate, measured under a 4-inch pressure, the purpose for which he claims it and the place of intended use.

THE "Washoe process" takes its name from its introduction and extensive use on the Comstock lode, Virginia City, Nevada. This region was originally called the Washoe. The process consists in crushing ore wet with stamps. The pulp is run into settling vats, from which it is shoveled out into grinding and amalgamating pans. In these the charge is heated by steam and bluestone (sulphate of copper), salt (sodium chloride) and quicksilver are added. When amalgamation is complete the pulp is discharged into settlers, where it is thinned by the addition of water and the amalgam settles to the bottom, while the pulp is kept in suspension by the rotation of agitators. Plate amalgamation inside the battery and on outside plates may or may not be practiced. There are several modifications of the process. It is expensive owing to the necessity of handling the material and to the amount of power required to drive the machinery. The "Boss process" is essentially a modification of the Washoe process, its chief feature being the discharge of the pulp from one amalgamating pan to the next throughout a series, forming practically continuous amalgamation.

PEACOCK ore and bornite are the same. Dana's "Mineralogy" gives the following: "Bornite—Purple copper ore; is also called variegated copper and erubescite; called by miners in Cornwall horseflesh ore. It is a sulphide of copper and iron, but varies in the proportion of these metals. The crystallized mineral agrees with Cu_3FeS_3 = sulphur 28.1, copper 55.5, iron 16.4 = 100. Analyses of massive varieties give from 50% to 70% copper and 15% to 6 5% iron; crystallization isometric; habit cubic, faces often rough or curved; massive structure, granular or compact. The fracture is small, conchoidal (shell-like), uneven; brittle; hardness, 3; gravity, 4.9—5.4; luster, metallic; color, between copper-red and brown on fresh fracture, but speedily tarnishes and becomes irridescent (peacock copper ore); streak, pale grayish black; opaque." Chalcopyrite—yellow copper ore—is also a sulphide of copper and iron, which often is tarnished on the outer surfaces, showing brilliant metallic shades of blue green and reddish brown, similar to those observed in peacocks' feathers; but chalcopyrite differs essentially from bornite and rarely contains more than 35% copper. It is the most common copper ore.

UNDER the United States placer mining laws one person may make a single location containing 20 acres of placer mining land, two persons may make a single location containing not more than 40 acres in a compact body, three may locate 60 acres, etc., but no single location, whether made by eight persons or more, can exceed 160 acres. It has been decided that a single location of placer mining ground may embrace 20, 40, 60, 80, 100, 120, 140 or 160 acres in a compact body, according to the number of locators. If eight persons should make eight separate locations of 20 acres each, and seven of the locators should convey their claims to the other, it would require annual assessment work of the value of $800 to maintain the possessory right to all of the claims; but, in the case of a single location, embracing 160 acres of placer mining land, the owner thereof, in order to maintain his possessory right thereto, would not be required to expend $100 worth of mining labor on 20 acres thereof, but his possessory right to the entire 160 acres might be maintained by performing thereon $100 worth of actual mining work designed in good faith for the improvement of the 160-acre location as a single mining claim.

Forest Destruction and Torrent Ruin.*

When man, actuated by greed or ignorance, or a combination of the two, destroys the protection which nature spreads over rolling and mountain areas, he turns loose agencies which soon pass beyond his control. The protecting agent is vegetation, and whether in the form of forests, brush or forage plants and grasses, the balance between it and denuding forests is easily tipped, when the inexorable law of gravity, unchecked by myriad blades of grass, by leaves, roots and vegetable mold, gullies the hillside, strips the mountain slope, converts the rivulet into the torrent, and causes the steady flow of the river to become alternately a devastating flood or a parched sand bed. When once this balance has been destroyed, man cannot turn back the torrent and bid it flow once more a living and life-giving stream.

It would seem that this lesson had been learned so thoroughly by the human race that there would be little use to lay its precepts before a civilized community. But when one goes out over this fair land of ours and marks the rate at which its forests are being destroyed, its mountain forage areas devastated, he is tempted to regret that civilization should be permitted to spread its blight over the temples in which the savage worshiped.

But it must be remembered that this destruction ceases in the judicious use of this wealth of forest and of mountain pasture, and that it is only indifference and incivism which permit greed and ignorance to go unrestrained until they destroy the balance—that man has it within his power to utilize to its fullest measure this wealth and to pass it down to future generations as a blessing, rather than as a blight and a curse—and that he can even aid nature by extending vegetation over barren areas. But this requires that the reckless destruction of forest and the wasteful and continuous devastation of pasture should be replaced by systematic utilization of these sources of wealth.

Probably no range of mountains has longer had civilized man around its base that the great Caucasus and its outliers. This range extends from the Straits of Kertch to the Caspian sea, a distance of over 900 miles. The culminating peak, Mount Elbruz, rises 3000 feet higher than the highest peaks in the United States, and the group is analagous to, but greater in all respects than, the Sierra Nevada. Its slopes drain either into the Caspian sea or into the Black sea and the Sea of Azov. The slope draining into the Black sea is subject to summer rains, and therefore more readily recovers from denuding agencies. The southern slope is broader and gentler than the northern, which is subject to a drier climate, and sparsely covered with both deciduous and coniferous growths. At all points where these mountains were observed man has wrought ruin since the dawn of history. Every stream, every slope, is marked with destruction. The great historic route up the Tirek, through the Darial pass, and down the Gudoor and Arangua to the plains of Asia Minor, is everywhere seamed with the ruin which the unrestrained hand of man has put in force.

In passing along the main drainage lines it is possible, with a little experience, to determine the comparative exposure of the tributary watersheds by the amounts of debris brought down. The illustrations on this page show the general appearance of the slopes and streams, the measures taken to restrain and divert the flow of debris from the roads, and to provide crossings where roads are buried and bridges swept out. Nothing which man can call to his aid can restore soil to these wasted slopes. Such is the penalty of unrestrained stripping of timber and forage plants.

Denudation in Southern France.—In parts of Europe the destruction has been as great. The literature on this subject is both voluminous and accessible. Enormous efforts have been put forth by the European governments to check the destructive force of torrents born upon the denuded slopes of the great chains of mountains throughout the continent. In no instance have these efforts been adequate, although much has been accomplished. Of



Debris in the Arangua, South Slope of the Caucasus, Europe.



Middle Reaches of the Tirek, North Slope of the Caucasus, Europe.



Upper Region of the Tirek and North Slope of the Caucasus, Europe.



Track of Torrent Below Burned-Over Forest, Sierra Nevada, Cal., U. S. A.



Near Summit of Rocky Mountains, Wyoming, U. S. A.—Twice Burned Over.



Portion of Denuded Area in Los Gatos Creek, Cal., U. S. A.—$1 000,000 Worth of Property Destroyed.

INSTANCES OF THE RESULTS OF FOREST DESTRUCTION IN EUROPE AND IN AMERICA.

*Condensed from Sierra Club Bulletin, by M. MANSON.

the deserts of southern France, S. Baring-Gould writes that "one hundred years has sufficed to sweep every particle of soil from the Causses, which it took countless ages to accumulate; and land that once maintained a well-to-do population is reduced to a desert."

In the Rocky Mountains.—In the Rocky mountains the work of devastation has been inaugurated on a scale calculated to dwarf anything done in Europe. Forest fires, the crowding of vast herds of sheep, the ax of the lumberman, followed by the fires of the sheep herder, have all been active agents in converting vast areas into deserts as barren as those of the Causses, the Atlas, or the Apennines. In portions of the Rocky mountains trees spring up rapidly after the first forest fires. Even when these fires have been so fierce as to absolutely destroy every vestige of timber, a second forest springs up with remarkable promptness and vigor; but when this is destroyed the next attempt to restore vegetation is slower and not effective. The cut on the opposite page shows the second year of absolute barrenness in the midst of summer. The areas had been twice swept by forest fires—the first burning off the original timber, the second, following a few years later, killing the sapling firs and pines. Although two summers had elapsed, not a sprig of vegetation had started to clothe for the third time the naked rocky "backone of our continent."

In the Sierra Nevada.—The Sierra Nevada has fared even worse. Around Lake Tahoe the timbered areas have been entirely swept off, with the exception of a few thousand acres around Tallac, and some at the north end, reserved by the owners for later use. The mountain sides around the Hot Springs, and nearly all of the moraines and flats around the south and east sides of the lake, have been denuded. These areas, bereft of timber, are now ready to be abandoned to the State, large tracts being for sale at 50 cents per acre. The railroads, which were constructed to carry logs to the lake, have been torn up, and the region, shorn of its wealth and beauty, has been partly browsed over to give a few sprouts to hungry hordes of sheep.

On the forks of Carson river there are several townships from which every vestige of timber has been stripped, first for mine timbers and later for wood. Then the area was burned over to afford tender shoots for spring pasturage. To-day it is only in rare little patches that young conifers are beginning to gain a foothold, and fires destroy many of these plantations. On the east fork in 1896, after heavy summer showers, the water sluiced off the ashes and soil to such an extent that tons of trout were killed. After the torrent subsided one could drive a four-horse wagon along the banks and fill it with trout. It is doubtful whether the stream can be restocked until the denuded slopes shall be afforested.

Prevalence of Forest Fires.—It is only necessary to read the accounts given in the daily press to partly measure the destruction by forest fires. The writer has personally traced these through every mountain county in California. Even of that area which has been sacredly set aside as the Yosemite reservation, the threat was openly made by the marauding sheep herders, who had devastated Spain and Portugal, that they "would burn the Government out"—referring to the cavalry sent up to prevent the illegal destruction of the vegetation protecting the headwaters of the Merced and Tuolumne. The overstocking of these mountain pastures is what is doing the greatest harm. The writer once asked an intelligent stockman how many sheep could be pastured on a given area in the Sierras, and he gave as his opinion that 8000 sheep could be pastured thereon without injury—that is, without destroying all seed of forage plants and grasses. But, upon naming over the owners and herds which he knew, there were 40,000 sheep accounted for in the area.

The photo-engraving upon another page was taken in the drainage basin of the Mokelumne, California. It shows the path of a so-called "cloudburst." This was nothing more than a heavy summer rain upon a burned-over district, concentrating rapidly in the steep gulches, and finally scouring away timbers, boulders and earth.

Cloudbursts.—In traveling thousands of miles in various ranges of mountains, on three continents, the writer has never seen the track of a cloudburst in a timbered country—always in the barren ranges from which timber was either naturally absent or had been destroyed by human agency. The reasons for this are twofold:

First—Heavy rainfall occurring in a well-timbered country is absorbed, even when the fall amounts to several inches in a short space of time. In a barren region this absorption does not take place; the rain rapidly collects in gulches and forms, in some instances, a veritable wall of water, soil, gravel and rocks, carrying everything before it.

Second—The layers of cold, dry air, and hot, moist air, can superimpose themselves in a treeless country in such a manner that when condensation is inaugurated it takes place with destructive violence. These conditions are modified, or even entirely prevented, by the effects of forests and vegetation; and hence those regions escape the most violent downpours. The rainfall in tropical regions is several times greater than any occurring upon the treeless regions subject to "cloudburts;" yet the destructive run-off from tropical forest areas does not occur, on account of the dense forests and undergrowth.

In Santa Clara county, Cal., the floods of Los Gatos creek have measurably increased in destructiveness. In one of the richest portions of the valley more than $1,000,000 worth of land has been recently destroyed. The engraving on another page shows a portion of this destruction and the feeble efforts of the adjacent land owners to stay the force of the torrential floods which, with increasing volumes, are eating away the alluvial lands, leaving in their stead the "barranca" forms of California.

[The above is from a notable paper by an eminent authority on the subject of forest destruction and its effects. The present wide attention is due to declaration and suggestion, continually urged for years, now impressing the importance of the matter upon the public mind. The agitation which commanded the attention of the Government and led to the establishment of forest reserves bears fruit now in popular attention and interest. No doubt the interest has been hastened and quickened by the recent years of drouth, which have caused a keener appreciation of the value of water supply, but in its present state the question is broader even than the irrigation aspect, as the whole is greater than any of its parts. We have all heard for years of the terrible effects of denudation of European water sheds, the destruction of fertile valleys, the ruin of production and trade and all the sad consequential evils of deforesting the sources of streams. The present presentation of the matter will bring to all a more realizing sense of the evil which has been done and the criminal folly of allowing its repetition in this west half of America. We have no doubt that this will be the conclusion of all our readers when they have studied these views and recalled many like them which they themselves have seen, and a resolution to do what is wise to forfend their recurrence.—ED. M. & S. P.]

Occurrence of Mica in South Norway.*

By J. F. WELLS.

Godfjeld mine is eight miles northwest of Kragero, on the southwest coast of Norway. It was originally worked for feldspar, and subsequently for mica. The rocks of the surrounding country are mica schists, gneisses, hornblende and tourmaline schists. These schists are much broken up by numerous intrusions of eruptive granite dykes of a class usually designated as pegmatite veins. Their strike is northwest and southeast, and they usually dip towards the south, but frequently are nearly vertical. These veins or dykes are of two distinct classes, viz., those which break through or cross the strike of the schists, and those which occur as veins or lenses between the foliations of the schists. The mineral constituents of both are similar, and are essentially the same as those that occur in the granite. Both soda and potash feldspars are present, and are easily distinguishable. The distribution of the minerals is very uneven. In places masses of orthoclase occur both as masses without definite shape and as huge crystals, and adjoining them is always found large quantities of quartz, but, as a whole, the veins are composed of pegmatite, with the pegmatite structure very highly developed. The only mineralogical difference between the two types of veins is the occurrence of many rare minerals in the first named, and their absence in the veins lying parallel with the schistose foliations. At Godfjeld the vein is a large one, varying from 14 to 27 feet in thickness, and having the usual strike and a dip of about 77° with the horizon. The outcrop, however, can only be traced for 200 yards, as at the south end it is covered over by schists, and at the north end it ends abruptly 180 feet above the lake at the foot of the hill.

On the other side of the lake, which is here 200 yards across, the vein reappears, but its character has altered considerably. When it reaches the top of the hill on this side of the lake it runs into a granite outcrop. The strike of the schists in the immediate neighborhood of the vein is at an angle to the strike of the vein, being approximately west northwest, and the dip northeast, but the strike, as a whole, is very variable. The chief mineral contents of the vein are orthoclase, a soda feldspar, quartz and muscovite. Accessory minerals are apatite, tourmaline, biotite, garnet, columbite, orangite, thorite, etc. On the hanging wall side of the vein there was a deposit of milky quartz, of a vitreous and somewhat glassy nature. This quartz did not extend to the hanging wall of the vein, as a whole, but was separated from it by a mixture of the main constituents of the vein, both potash and soda feldspars being present, chiefly the former. This quartz extended along the strike of the vein for a distance of 120 feet, and had the same dip as the vein, but dipped also south at about 45° with the horizon. The thickness varied from 2 to 12 feet. On the foot wall side of the quartz crystals of orthoclase occurred, subtranslucent, and of a pale brown color. The crystals were of a large size, some measuring as much as 4 feet across and 5 to 6 feet high, but this occurrence of feldspar was rather erratic. At times it was remarkably free from other minerals, but it often was full of small mica and blebs of amorphous quartz. As the foot wall was reached it gradually became of worse quality, and finally its place was taken by a soda feldspar pegmatite. This soda pegmatite gradually absorbed the whole vein, the north end of the vein being entirely composed of this pegmatite, which dipped south and finally made its appearance on the surface at the extreme south end of the outcrop. There was a very marked distinction between the two feldspars, not only from a crystallographic point of view, but also in that the two feldspars never seemed to merge into each other, there being not only a difference in color, but often the boundary between the two would be the face of an orthoclase crystal. The cleavage of the soda feldspar was not always apparent. Often it seemed to be in a semi-amorphous condition, enclosing blebs of non-crystalline quartz. The mica (muscovite) which formed a lens or shoot lying between the quartz and the feldspar, or wholly in the quartz, occurred as large crystals, varying in size from a few pounds in weight up to 400 or 500 pounds. This shoot varied in dimensions. At times it extended almost across the vein, but was, as a whole, either between the feldspar and the quartz or entirely in the quartz, and its color was green, but the greater part of the mica had a brown color, due to the numerous stains, rutile enclosures or growths in the crystals. The size of the plates obtainable varied from small pieces up to sheets measuring 2 feet by 1 foot.

Near the surface the mica was much stained, but it improved in depth down to about 50 feet. Very frequently much disappointment was caused by the outside appearance of the crystals, as on splitting them it would be found that they were valueless owing to enclosed garnets, tourmaline and numerous secondary growths of mica. The tourmaline crystals generally were found lying between the cleavage of plates, yet often they penetrated the crystals parallel with the vertical axis. The secondary growths of mica, though usually crystalline, had no definite position of their axes in regard to those of the older crystals. The large crystals of mica had a very interesting but at the same time objectionable peculiarity. The two basal planes were never parallel to each other, and, consequently, the majority of plates split out of the mother crystal were thicker at one end than at the other. At a depth of about 60 feet the character of the mica began to change considerably. Athough there still were crystals which yielded a small quota of plates, the greater part of them were either rotten or so intergrown that they would not cleave, but broke up into flakes. Further, a good many crystals had undergone an entire change, and a greenish, steatitic substance took the place of the mica. This substance gave reactions for alumina, magnesia, potash and silica. In places it was compact, in other places it became earthy, or occasionally fibrous and silky in nature. Shortly after exposure to the air it hardened. This substance did not contain either garnets or tourmaline, though the adjoining mica was full of small garnets. At the lowest place in the workings, a little below the 100-foot level, there was still mica, but it was very rotten and practically of no commercial value. The mica when first taken from the mine was very soft, but after a few months the mica loses this property to some extent and becomes much harder and less pliant.

A few particulars of the other minerals occurring in the vein may be of interest. Apatite in hexagonal crystals occurred here and there. They were often of considerable size, 4 and 5 inches across, and as much as 2 feet in length. They occurred either in the quartz or in the potash feldspar. Tourmaline occurred in all parts of the vein, but never of a quality good enough to be cut into gems. Orangite and thorite (thorium silicate) occurred on the foot wall side of the vein in patches, and these patches usually contained parts of all the heavier minerals occurring. Tourmaline was always present. Traces of copper pyrites were occasionally met with, and the schists in the neighborhood of the mine often carried traces of copper pyrites.

[The above description of a mica mine in Norway is interesting particularly in showing the remarkably coarse crystallization of some of the minerals. In this respect, and also to some extent mineralogically, these veins or intrusions of pegmatite resemble those occurring near Custer City, in South Dakota, where some of these veins have also been worked for mica.—ED. M. & S. P.]

*Condensed from a paper read before the Institution of Mining and Metallurgy.

West Kootenay Ore Bodies.*

NUMBER II.—CONCLUDED.

By R. W. BROCK, Ottawa, Canada.

Natural processes are rarely simple, and the slow process of vein formation is no exception. While replacement of the country rock seems to have been the chief mode, it is highly improbable that there has not been to a certain extent deposition in open spaces—in fact, there is evidence to indicate that this did occur, to a limited degree. In certain parts of some deposits there is a distinct crustification. Now, while it is true that a banding may be and is produced by slight alterations in the conditions during the progress of slow metasomatic change, it may be doubted if a deposit in clear-cut, distinct crusts is ever so produced; so that it is probable that such portions of a deposit have been produced in cavities. Dissolution sometimes may have proceeded in advance of deposition, and thus the space would be produced. But in some cases the ore is found between slickensided walls, sometimes with selvage. This indicates that movement has taken place. As the deposit itself shows no signs of it, it must have preceded the vein formation. It may be that the slickensided walls do not belong to the same fissure, but to two parallel ones, and that the intervening rock has been replaced. But, still, any movement of the walls of an irregular fissure, such as these are, would open up spaces—which might, of course, be partially filled with triturated rock. It is thus altogether probable that some open spaces along the fracture did exist, to be filled by the mineralizing solutions. But in the formation of these ore deposits the process of space-filling seems to be entirely subordinate to the replacement of the country rock.

From the nature of the minerals formed, and from the composition of known thermal springs, one is justified in assuming that the mineralizing solutions contained hydrogen sulphide, carbonic acid, and sometimes, perhaps, sulphates, in addition to their metallic contents. These reagents would account for all the chemical changes involved in the replacement of the country rock and the deposition of the minerals and ores.

The mineralizing solutions, following lines of easiest penetration and substitution, used to a large extent the lines of fracture and crushed zones of the country rock as highways, and as starting points in the formation of the deposit.

Coming from a region of higher temperature and pressure, and charged with the metallic sulphides and active chemical reagents, the solutions would readily attack the crushed and triturated material in these fractures. With chemical activity thus set up, and the nucleus of a deposit thus formed, with a constantly renewed supply of material and reagents from the circulation of the mineralizing solutions, metasomatic action could rapidly proceed.

There should be no prejudice against deposits formed in this way. There is no reason why they should not be as extensive, as valuable, and as permanent as bodies formed in large open fault fissures. Indeed, the history of mining has shown that these great fissures are not as a rule the great producers. To any who may have misgivings about this class of deposit it may be comforting to know that many of the best deposits, especially in western United States, are quite similar in mode of formation to these of West Kootenay.

Thus there is no reason why the ore bodies of West Kootenay should not display permanence in depth. The developmedts in the Whitewater Deep, Payne and Le Roi have shown that the ore shoots here have a considerable vertical dimension. The valleys appear to have been largely sculped after the formation of the ore bodies. Now extensive ore bodies have been found in the deep valleys, thousands of feet below the highest mines, as well as at high altitudes. The surface which existed at the time of formation would be still higher, so that ore was deposited in quantity at great depths below that surface and below most of the present mines. That more mines have not been opened up in the deep valleys is easily accounted for by the difficulty of prospecting owing to the covering of drift and vegetation.

The best and largest ore bodies in any particular district are found in the rocks which are most fractured, as the greater facilities offered by crushed and fractured zones more than compensated for any chemical advantage a rock might possess. As before stated, this might take place in any kind of country rock where the physical conditions were favorable.

Owing to the mode of formation, by replacement following lines of fissured and crushed zones, the forms of the bodies may be very numerous and irregular. In general, they may be said to possess a degree of irregularity corresponding to the degree of complexity of the preceding dynamical effects. To begin with, minor fissures or fractures are usually very irregular. They are usually numerous and coordinated. They may be reticulating; they may be parallel, so that the country rock is sheeted, with or without connecting cross fractures, and perhaps groups of these may be separated by bands of unbroken country rock. But the ore deposition may have been even more irregular. The ore-bearing solution may have followed one fracture for some distance and then have crossed to another, and so on, or it may have followed several parallel ones, and the resulting deposits may or may not be connected with stringers forming what the Germans call "stocke." The ore itself may be found only in certain places in the form of shoots. To further complicate matters, the replacement of the rock along the fractures and crushed zones may not have been uniform. Sometimes, when three or more fissures intersect, the enclosed rock only may be replaced, forming a chimney deposit. Examples of all the foregoing might be given from the Kootenay ore bodies, and if time permitted various other possibilities might be considered. But enough has probably been stated to suggest some practical considerations. It must be evident that no weight can be attached to either the presence or absence of walls. The absence of one or both walls is to be accounted for by the manner in which the rock has been replaced. The presence of apparently well-defined walls may seriously mislead if they are considered as proof that the ore deposition has been confined within their limits, since, however well defined they may appear to be, a crosscut may reveal an adjoining parallel ore body. As an example, reference might be made to an important West Kootenay mine, where the mine manager took great pride in his walls. I tried to show the possibility of there being ore beyond, and the wisdom of judicious crosscutting, and received unexpected support. A shot near one of the walls where it was best defined did greater execution than had been intended, bringing out a large fragment of the wall. This revealed a large parallel ore body apparently equal to or better than the original.

So that in the development of the ore bodies all the attention should not be bestowed on sinking and drifting; judicious crosscutting may sometimes be advisable. At Butte and in many other mining districts in western United States, where similarly formed deposits occur, this principle of crosscutting even where there are apparently good walls is practiced often with great success.

Further, should a good ore body apparently discontinue in depth, it may be that a little exploiting might reveal its downward continuance along another plane. Another point which is apparent is the advisability of following ore. In a highly mineralized locality even little stringers may lead to bonanzas.

In addition to the dynamic activity prior to the vein formation, which resulted in the complex fracturing of the country rock, and which prepared the ground for the mineralizing solutions, there have been subsequent movements which have caused minor displacements, both normal and reversed.

Since the ore bodies show great complexity, but are dependent more or less upon the fracturing of the country, and since matters are further complicated by subsequent faulting, it is evident how important it is that the mining engineer should make a careful study of the structural geology of his district, for by this means alone can a correct notion be obtained of the mode of fracturing of the country which prevails, of the ore body, and of the character and extent of the faulting. In the study of the latter he will find the dykes of great assistance, as they are numerous, clean cut and easily recognized, and, as many are as old as the deposits, these must have undergone the same displacements. He will also find that the smaller veinlets will often afford the key to the solution of problems which his larger, intricate ore body will not disclose.

On a prospect where the trend of an ore body is not definitely proved it is obviously dangerous, instead of following the lead, to spend money on work which will be of value only if the ore body happens to follow a particular direction. To point to the number of shafts and tunnels on prospects in the Kootenay which have eaten up the prospector's capital, while proving absolutely nothing regarding the deposits, is all the comment that is needed on this point.

The light porphyry dykes, to which attention was called while speaking of the rocks, appear to be closely related to the ore deposits. They are abundant in richly mineralized portions of the district, and are conspicuously absent in such portions of the district as on parts of Midge, Cultus and Summit creeks, where no deposits of value have as yet been found. That the dykes and ore bodies should be so associated appears to be more than a mere coincidence.

In the portion of the district in which I was working last summer between Slocan and Arrow lakes, I found that almost without a single exception, wherever a deposit of mineral was observed, it was in the immediate vicinity of a dyke, frequently along the contact, or, if not, in fractured country rock close by. Later on in the season, when on the North Fork of the Salmon, near the head of Burnt creek, it was found that the claims ranged along a dyke. The prospectors inquired about the influence of the white dykes, stating that wherever mineral was found in that portion of the district, it was in the neighborhood of the dykes.

I had no time to verify this statement except at the one point. Before the season closed a visit was paid to the mines around Sandon.

Here, as elsewhere, the same relationship between the dykes and ore bodies appeared to exist. A habit was formed of asking for the white dykes on a claim, as naturally as for the lead. I think in every mine visited were not only dykes seen in the vicinity, but one or more could be found in the workings themselves. Most of the observant managers considered the white dykes to form part of the deposit. One or two claimed that proximity to the dykes influenced the tenor of the ore. Even if the dykes could not be observed in or near every mine, this would not necessarily disprove the relationship, as they might be close at hand, yet not exposed at the surface or in the workings.

It is quite probable that the volcanic activity which resulted in the injection of the white dykes may have been the cause of much of the fracturing or fissuring of the country rock, and thus of the production of the highways for the mineralizers. The white dykes themselves do not show this shattering. It is now generally accepted that eruptive rocks, especially acid eruptives, thermal springs and ore deposits, are intimately related in their origin. It is an observed fact that the closing stages of a period of volcanic activity are marked by solfataric action, the emission of thermal mineral-bearing waters. Now, as before stated, the West Kootenay deposits were formed by the direct agency of such hot mineral-bearing solutions. It is not improbable, therefore, that these were connected with some eruptive. If this were the case, it would be with the porphyries, as these mark the last period of volcanic activity which preceded the formation of the deposits. Moreover, the dykes themselves show evidence of sofataric action in the alteration they have often undergone. The feldspars are altered and calcified, so that it is sometimes difficult to make out the structure of the rock. Pyrite has been formed—often probably at the expense of what colored constituents the rock possessed. An interesting point with regard to these dykes is that they are to some extent auriferous. Profs. Nicol and Miller, of the School of Mining, kindly assayed three samples. They were small samples selected as rock specimens, one from a dyke in the Last Chance mine, Sandon, one from the North Fork of the Salmon, and one collected by Mr. McConnell from the Antelope claim. The last proved barren, but the Last Chance and North Fork rocks yielded distinct colors of gold. Considering the small quantity taken for assay—two assay tons—the result is very interesting.

From the evidence so far available, I am inclined to favor the view that the solutions mark the solfataric stage in the period of vulcanism, during which were erupted the white dykes. On the other hand, it might be claimed that the solutions came from depth and merely used as highways lines of weakness often occupied by the dykes; or mineralization might be considered by some to be due merely to the increase in physical and chemical activity in the existing circulating currents, caused by the heat of the eruptive.

But such speculations as to the precise way in which the dykes and ore bodies may have been related, while extremely interesting, are not of direct economic importance, and need not be here further discussed. The point of practical value to be established is that the relationship does obtain. If this can be done, the value of such well defined and striking bodies as these dykes as guides in prospecting and developing would be inestimable. While the observations made last summer, particularly in the mines, were not sufficiently extensive to warrant one in definitely asserting that such a relationship obtains throughout the entire district, yet they covered a comparatively wide field, and in many cases were of so positive a nature as to justify the conclusion that, in those particular instances, at least, the dykes and the ore bodies were related. But the strongest evidence probably is the fact, to which attention has already been called, that the districts rich in dykes are rich in ore bodies, and those barren of dykes appear to be barren of ore.

The attention of mining engineers is called to the matter in hope that they will test the point in various parts of the field, for it is only when supported by observations in the mines and prospects of the entire district that it can be considered definitely established for the West Kootenay district.

In a great many mining districts throughout the world such a connection between dykes and ore deposits has been observed. At Pontgibaud, in Auvergne, silver-lead occurs in gneiss and mica schist dyked by porphyry; the lodes generally follow the dykes and are productive only when so associated. In the silver-lead deposits of Eureka, Nev., the ore-bearing solutions were almost entirely due to solfataric action arising from the eruption of rhyolite, which dykes all the formations. The rhyolite dykes show every evidence of solfataric decomposition. Hague, in speaking of the same district, states that after a careful study he is forced to the conclusion

* Condensed from Transactions Canadian Mining Institute.

that there exists the closest relationship between the rhyolite and the formation of the ore deposits.

In speaking of the relationship between the deposits and the eruptives in the Mercur district, S. F. Emmons says that in searching for gold in that district the first thing to do is to learn to recognize in the field the porphyry in its many forms of alteration, and then gives rules to be observed in prospecting, based upon the relationship which exists between the ore bodies and the eruptive.

Blow, in a paper on Iron Hill, Leadville, Colo., states that, as a guide to future developments on Iron Hill, it may well be noted that wherever a dyke (of porphyry) of considerable size has been hitherto disclosed, an ore body of proportionate size has been encountered following it.

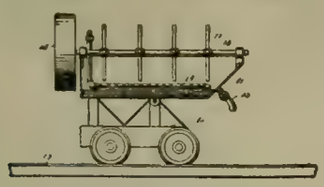
It will be seen that the West Kootenay ore bodies bear a strong resemblance to many in the western United States.

Latest Mining and Metallurgical Patents.

Patents Issued Aug. 15, 1899.

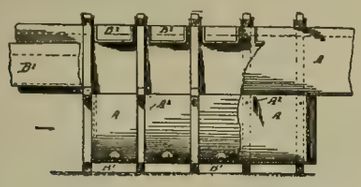
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PROCESS OF SEPARATING PRECIOUS METALS FROM ORES.—No. 630,842; W. H. Baker, Deadwood, S. D.



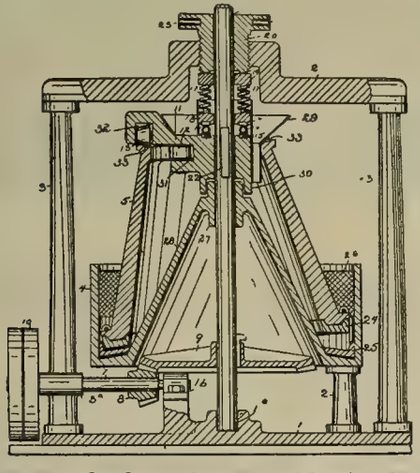
A process of separating precious metals from ores, consisting in subjecting the ore to the action of a cyanide of potassium solution, admitting steam to the mass to bring it to the boiling point, agitating the same, separating the solution, adding water to the tailings, utilizing the resultant solution for the generation of steam to heat the cyanide of potassium solution, subjecting the tailings to which water has been added to the action of heat while being agitated, separating the solution, adding more water to the tailings and then separating the resultant solution and utilizing the same in the treatment of a fresh supply of ore.

SLUICE, RUNWAY, OR FLUME.—No. 630,971; P. S. Buckminster, San Francisco, Cal.



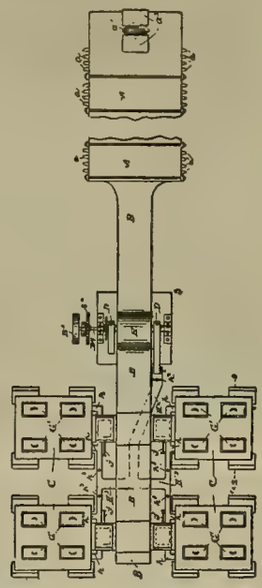
The combination with a sluice, runway, or flume having a portion of its bottom removed, of a V-shaped receiving or settling chamber arranged longitudinally below the sluice, runway, or flume at the point where bottom is removed, a series of transverse pieces in receiving or settling chamber for checking the current and preventing an undercurrent, a controlled discharge opening in receiving or settling chamber, an auxiliary flume arranged beside the main flume, and a discharge from the upper part of the main flume to the auxiliary flume.

ORE PULVERIZER.—No. 631,236; H. M. Williamson, Denver, Colo.



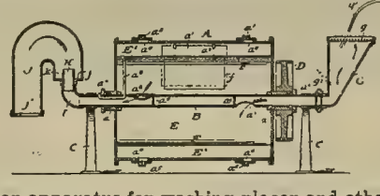
A pressure head carrying an anti-friction device which bears on the top of the grinding muller or shell and also carrying means, horizontally in contact with the muller adapted to give the latter a gyral motion as the head rotates, in combination with the muller, the pan in which it works to grind the ore, the shaft on which the head is slidingly feathered, and means for forcing the pressure head downwardly by yielding pressure applied thereto vertically. In combination with a pan and a grinding muller operating therein, a shaft extending from the bottom to the top of the machine, a pressure head attached to the shaft and rotating therewith, horizontal and vertical rollers journaled in and carried around by the pressure head and arranged to give the muller a gyral motion, and springs arranged about the shaft and bearing vertically on pressure head at points on opposite sides of the shaft. A pressure head 11 provided with recesses 31 and recess 32 in the under side of one end, and bored and grooved vertically, in combination with a shaft having splines or feathers fitting in the grooves of the bore, springs which bear on the pressure head to force it downward, vertical and horizontal rollers turning in the recesses, a grinding shell having its upper end arranged for contact with the vertical and horizontal rollers, and a pan in which the grinding shell operates on the ore or other material as it is gyrated by the rollers.

GAS PRODUCER FOR METALLURGICAL PLANTS.—No. 630,885; E. C. Hegeler, La Salle, Ill.



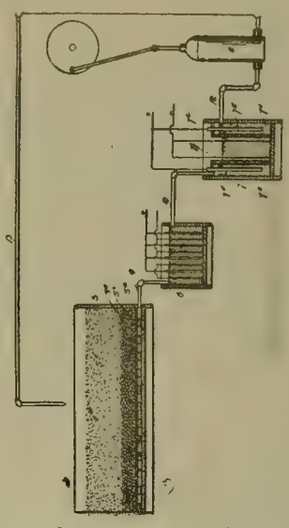
A metallurgical plant comprising a combustion chamber having a gas escape opening at one end and means for varying the size of the opening whereby to regulate and fix the pressure in the chamber, a gas producer having feeding and stoking openings and means for closing the same, and draft openings beneath the fire box with means for regulating the draft thereto, thereby to establish and maintain an equilibrium of pressure of the gas in the producer with the outer atmosphere at the feeding and stoking openings and to deliver gas under pressure at the same, a flue directly connecting the combustion chamber and the producer, and a blower in the flue intermediate of the combustion chamber and the producer for drawing gas from the producer and forcing it uncooled and under pressure into the combustion chamber, also retarding or promoting movement in the producer according as there is tendency to produce more or less than the required amount of gas, and, further, simultaneously operating upon the draft in the producer both above and beneath the fire and at points in opposite directions from the feeding and stoking openings.

APPARATUS FOR WASHING PLACER SOIL.—No. 631,020; S. M. Lissau, Philadelphia, Pa.



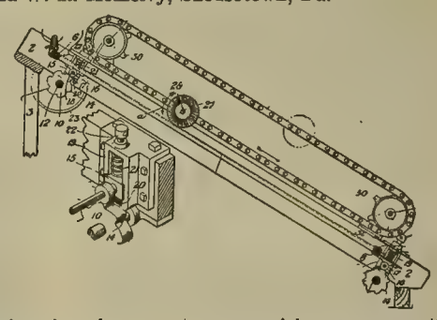
In an apparatus for washing placer and other soil, a rotatable drum, a cylindric diaphragm of foraminous material in drum, normally closed openings in the drum and in the diaphragm in line with each other, a hollow shaft upon which drum is mounted, a plug or stoppage in the central portion of shaft, a lateral screen-provided opening in shaft on the discharge side of stoppage or plug, means for supplying the water to one end of shaft, a vertical extension in communication with the other end of shaft, a goose-neck formed of pipe of greater diameter than vertical extension, and one end of which incloses the upper end of vertical extension to form a settling chamber, a hopper the discharge end of which leads into axle, and an air vent pipe one end of which opens within the cylinder, the other end of which opens outside the cylinder and the intermediate portion of which extends within the hollow axle.

PROCESS OF EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 631,040; J. E. Greenawalt, Denver, Colo.



A process for the treatment of gold and silver ores which consists, first, in properly roasting the pulverized ore; second, in placing the ore in a filtering vat; third, in passing through the ore an electrolyzed solution consisting of a solution of chlorides, chiefly sodium and ferric chlorides, and small quantities of chlorine and hypochlorous acid, with such other compounds as result from the electrolysis of a chloride solution; fourth, passing the solution after it leaves the ore through a precipitating tank; fifth, passing the solution after it leaves the precipitating tank, through the positive or anode compartment of an electrolytic cell keeping the solution separate and distinct from the solution in the negative or cathode compartment in the cell; and sixth, returning the solution from the regenerating cell to the ore in the vat, and passing it again to the precipitating tank, again to the regenerating cell, and again to the ore as often as may be required to effect the necessary saving of the values.

MINERAL SEPARATOR.—No. 630,926; W. E. Porter and W. R. McKelvy, Shousetown, Pa.



A mineral separator comprising a supporting framework set at an angle, cross-shafts mounted therein, cams secured on shafts, a screen mounted on cross-shafts having sliding bearings in the frame provided with elastic cushions and rollers on the cross-shafts adapted to be engaged by the cams; the cross-shafts driven at different speeds, cams secured on shafts, a screen mounted on cross-shafts having sliding bearings in the frame provided with elastic cushions and rollers on the cross-shafts adapted to be engaged by the cams.

WET PROCESS OF EXTRACTING SILVER FROM ITS HALOID SALTS.—No. 630,951; L. Vanino, Munich, Germany.

The wet process of extracting silver from its insoluble haloid salts which consists in mixing haloid salts with a watery solution of alkaline agents and adding formic aldehyde in the cold.

PROF. JUELLIG, on the maximum possible spans for overhead wires of various materials, bases his calculations on a factor of safety of four. With wire drawn from cast steel, he found it possible to use a span of nearly 3½ miles, while with silicon-bronze the maximum span varied from 1½ to 2 miles, according to the composition of the alloy. With wrought iron wires the maximum span was just over a mile, while with soft copper wire half a mile is the limit.

THE last five of the twenty new open-hearth furnaces erected as an addition to the Carnegie Steel Works at Homestead, Pa., were blown in Aug. 10th. Four additional furnaces are being built.

Liquid Air.

Of what use is liquid air likely to be? This is a proper question, and yet, if scientific workers always stopped to ask it, and would not work unless they could find a favorable answer, progress would be much slower than it is. Most great practical discoveries have necessarily passed through the plaything stage. Some of the most important discoveries have not even furnished playthings, and have found no practical applications as this expression is commonly understood. But the production of liquid air, while furnishing mankind with a beautiful and instructive plaything, seems likely to find practical applications. We may look for these in four directions:

First, as a cooling agent. Low temperature is marketable. To be sure, the demand for the extremely low temperature that can be produced by liquid air does not exist to-day, but this concentrated low temperature can be diluted to suit conditions. The only question to be answered in this connection is, then, What is the cost of cold produced by liquid air? It is impossible for anyone to answer this question satisfactorily at present. It can only be said that this is what experimenters are trying to find out. It appears, however, that they are on the way to cheap liquid air, and that as the processes are improved the price will become lower.

Second, for the construction of motors. There is no doubt that liquid air with its power of expansion can be used as a source of motive power just as compressed air is. In the case of steam it is necessary to heat water in order to convert it into steam, and to heat the steam to give it the power of expansion. The cost is, in the first instance, that of the fuel. Given a certain amount of heat, and a certain amount of work is obtained. If liquid air is used, the problem is much the same. Engines must be run in order to compress the air which is to be liquefied. Every gallon of liquid air has been produced at the expense of work of some kind. The question is, What proportion of the work that was put in that gallon of liquid air in its production can be gotten out of it again? It is certain that all of it cannot unless all that we have ever learned about such matters goes for nothing. In dealing with the problem of the application of liquid air as a source of motive power we are, therefore, doubly handicapped. We do not know the cost of the liquid when produced on a large scale, and we do not know the probable efficiency of a liquid air motor. Perhaps Mr. Tripler and the others engaged in the experiments on this subject know approximately. We certainly cannot blame them for not telling us all they know. It is unfortunate, however, that such a statement as was recently published in a popular magazine should be allowed to gain currency—apparently with the sanction of Mr. Tripler—to the effect that ten gallons of liquid air have been made by the use of three gallons of liquid air in the engine. If that means that ten gallons of liquid air are made from air at the ordinary pressure, the statement is in direct conflict with well-established principles. If it means that the ten gallons of liquid air are made from air that has already been partly compressed, we must know how much work has been done before the liquid air engine began. Leaving out of consideration the question of cost, it may be pointed out that liquid air engines would have the advantage of compactness, though they would necessarily be heavy, as they would have to be strong enough to stand the great pressure to which they would be subjected.

The third application of liquid air that has been suggested is in the preparation of an explosive. In fact, an explosive has been made and used for some time in which liquid air is one of the constituents. When the liquid air from which a part of the nitrogen has been boiled off is mixed with powdered charcoal, the mixture burns with great rapidity and great explosive force. To make this explosive, Dr. Linde pours the liquid containing 40% or 50% of oxygen on fragments of wood charcoal, two or four cubic millimeters in size. These are kept from scattering by mixing them into a sort of sponge with about one-third of their weight of cotton wool. Of course, this explosive must be made near the place where it is used. It has been used in the way of a test in a coal mine at Pensburg, near Munich. The chief advantage of the explosive is its cheapness, and the fact that it soon loses its power of exploding.

The fourth application of liquid air is for the purpose of getting oxygen from the air. This can be accomplished by chemical means, but the chemical method is expensive. Oxygen has commercial value, and cheap oxygen would be a decided advantage in a number of branches of industry. It will be observed that it is the liquid oxygen that makes possible the preparation of the explosive described in the last paragraph. Oxygen as such in the form of gas is of value in Deacon's process for the manufacture of chlorine. In this process air and hydrochloric acid are caused to act upon each other so as to form water and chlorine. The nitrogen takes no part in the act, and it would be an advantage if it could be left out. It is only the oxygen that is wanted.—Popular Science Monthly.

High-Lift Pumps.

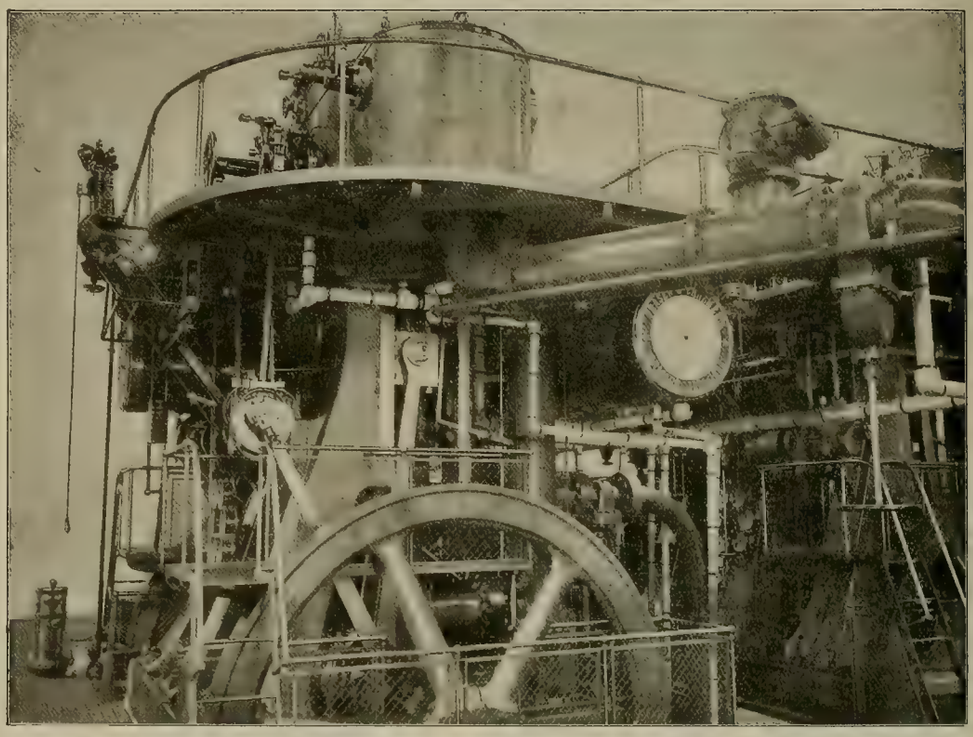
To the Editor:—Permit me to cite a few cases where pumps are lifting large volumes of water to great height:

At the Mansfield copper mines, in Europe, three pumps have a capacity of 17,000,000 gallons or more in twenty-four hours, lifting water 950 to 1000 feet. A large pump at Felsenkirchen, Germany, has a lift of 2000 feet, and three at Kladno, Austria, have lifts of 1600 to 1700 feet.

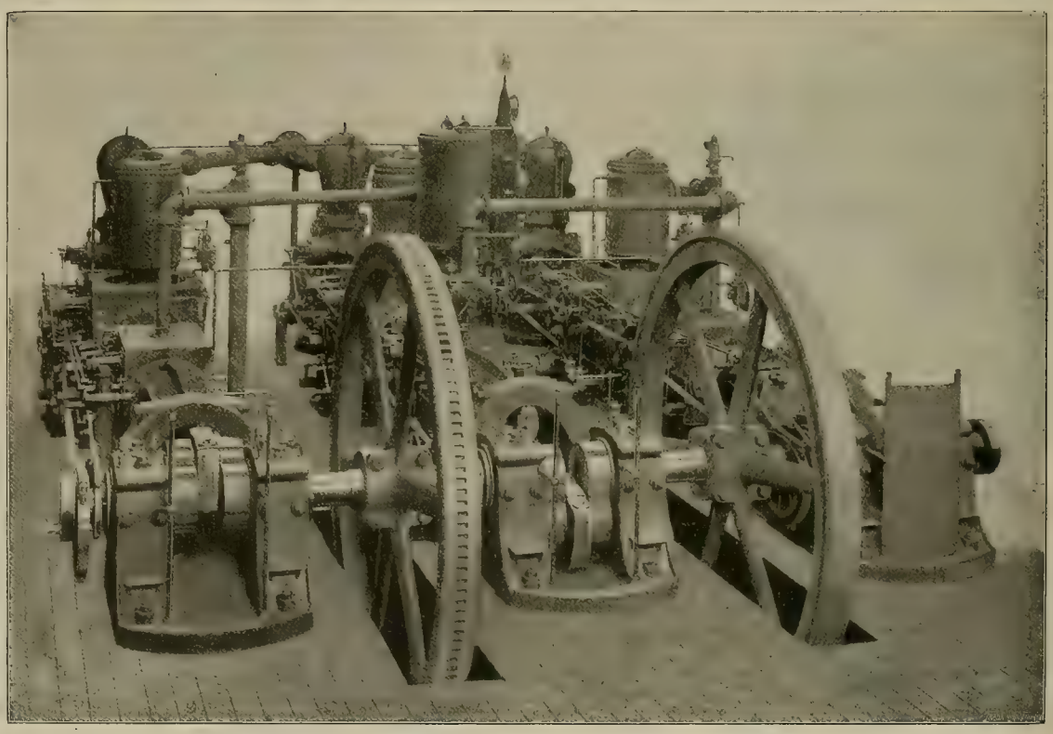
The most remarkable pump in the world is at the works of the Bethlehem Steel Co., South Bethlehem, Pa. This pump has been in service many years. It will pump more than 1,300,000 gallons a day against 7000 pounds pressure per square inch, being used in connection with their armor-plate press. Of course, head or pressure is the chief consideration, volume being at most merely a matter of duplication; this pump not only has a large capacity, but lifts against a pressure equivalent to a head of over 16,000 feet, say, three miles, which dwarfs the 900 feet proposed for the Rand. C. P. Coleman, purchasing agent for the Bethlehem Co., says: "The pump is the most powerful engine on land in the world, and is working every day. It has given very satisfactory service."

At the works of the Pope Mfg. Co., Hartford, Conn., are two pumps having a capacity of over 1,500,000 gallons against a pressure equivalent to 2760 feet head. At the Chapin iron mine are pumps built to lift 3,168,000 gallons a day against 1700 feet head. These two last mentioned were built by Fraser & Chalmers of Chicago, Ill., and the accompanying illustrations of them are of interest.

Oak Park, Ill., July 31st, '99. C. H. Fitch.



TRIPLEX SINGLE ACTING VERTICAL RIEDLER PUMP.



TRIPLEX DIFFERENTIAL RIEDLER PUMPING ENGINE.

Leadville, Colorado, papers are devoting considerable space to the exposure of the operations of an alleged mining company, the High Five, supposed to own and work mines on Breece hill in that camp. They say that the most persistent search and inquiry have failed to locate the High Five, which is a dividend payer. The natural assumption is that Eastern people who are buying stock are being swindled. It is the duty of newspapers and of citizens, whether in office or out, to expose frauds of this character as fast as they appear.

Mining Summary.

ARIZONA.

GRAHAM COUNTY.

The Detroit Copper M. Co. will build a narrow gauge railroad from Morenci to connect with the Arizona & New Mexico Railroad at Guthrie, twelve miles below Clifton. The road will be eighteen miles long and will be extended from Morenci to the concentrator, now under construction by the Detroit C. M. Co. near Morenci.

Tombstone *Prospector*: Work has been resumed on the Tranquility mine and the twenty-five miners are again employed.——The King of Arizona mine was started last week, but compelled to shut down for a few days owing to some difficulty with the pump in the deep well.

YAVAPAI COUNTY.

(Special Correspondence).—In the Jerome district the most important deal of the last week was the bonding of the Farwell and Divide mines, owned by C. Harryhouser, to J. M. Evans, purchase price to be $24,000, bond to expire Jan. 1, 1900. Eight hundred dollars was paid down. The mines are north of the United Verde smelter, and, while not claimed to be an extension, are believed to contain good ore.

J. W. Dean, Mgr. of the United Verde Jr. Copper Co., has returned to Jerome and announces that he will remain and push development work, with the aid of Supt. Wallace. A new road has been made into their property, which is intersected by another new road to the mines of the Decatur Co. The Decatur people are active and are stimulated by the visit of C. W. Devore, chief of the fire department of Decatur, Ill., who is a large owner in the enterprise. Most of the stock in this company is held by Illinois people.

The Ellnor Gayle spring, near Equator hill, the property of H. J. Allen, is being developed and the water will be piped to the United Verde smelter. Nine miles of 6-inch iron riveted pipe, costing over $25,000 when delivered, has been ordered for the purpose.

The News mine operated by H. E. Owen, formerly of Los Angeles, has added another large boiler to the plant.

The United Verde Extension (G. W. Hull) has removed the water from the shaft and drift of the 1888 and is sinking on the Jerome claim of the same group. The hoisting machinery is on the ground. The shaft is being retimbered.

Supt. Hendy at the Copper Chief is sinking his shaft. It is down 140 feet and is in sulphides.

On the Iron King (also Equator hill) a road is being built to connect the new tunnel with the main roadway. A compressor to be run by water power will be put in and the tunnel will be driven to the ledge.

The Equator litigation, which has continued for ten years, is about to be settled. A compromise was effected some months ago and the papers are to be signed this week. W. A. Clark of Montana, John Duke, J. L. H Hendy, Farrell and others were parties involved. By the agreement Clark takes the Iron King and a few other claims and half the water of Silver spring, while his opponents take the Copper Chief and other claims and the other half of the Silver spring flow. One party calls their group the Copper Chief and the other the Iron King. Experts have testified in court that $30,000,000 worth of copper is in sight in this property. HERBERT ALLAIRE.

Jerome, Aug. 17th, '99.

A prospector who has been at work on English gulch, three miles south of Prescott, from which a large amount of placer gold was obtained in early days, has found a small vein near the head of the gulch which is rich in gold, and it is thought may be the principal source of the gold in the gulch, no other vein having ever been found. He will crush the rock in an arrastra.

The Vulture mine, fourteen miles southwest of Wickenburg, is being operated by the New Vulture M. Co. A 100-ton cyanide plant has been in operation for three years on tailings, during which time three acres have been worked. The tailings cover forty acres to a depth of 15 feet. The mine is being reopened and furnished water for cyaniding operations. The mine has an 80-stamp mill. In new workings in the west end of the property sulphide ores are found, a portion of which is shipped to the El Paso smelter. G. Saunders is Supt.

The Garcia mine, near Wickenburg, is being reopened by the Garcia G. M. Co., a Canadian corporation. The mine has a 5-stamp mill.

At the Gold Bug, east of Wickenburg, a crosscut tunnel 100 feet has reached the vein and a drift run 130 feet in the foot wall at the side of a vein 3 feet wide. A winze has been sunk below the tunnel level in ore. A raise will be made to the surface, and this will then become the main working shaft; a hoist will be put on. W. H. Stevens is the owner.

A. O. Brodie, Supt. Crown Point mine, twenty-two miles east of Wickenburg, will put a gas or oil hoist on that property. The ore will be hauled to the summit of a ridge near the railroad and piped from a tank located there to the mine.

The Trilby mine, east of Wickenburg, is down 250 feet, and a new shaft has been sunk 60 feet and sinking. The ore carries free gold and auriferous sulphides. The latter are concentrated and shipped.

The Congress mine is working and the 40-stamp mill running. Some new work is being started, which is reported to have developed rich ore. The cyanide plant is treating old tailings and also those coming from the mill.

Nine miles east of Wickenburg, the old Oriole mine, which was formerly worked by Mexicans, who crushed the ore in arrastras, is now being worked by F. White and is known as the Ardath. He has a 5-stamp mill, with an extension for five more. Water is being developed in a well near the mine.

YUMA COUNTY.

It is reported that the Harqua Hala mine, bought last week by the former owner, Mr. Hubbard of Redlands, Cal., is to resume operations with C. Pickenbeck in charge.

The breaking of the pump at the King of Arizona has caused that mine to shut down. The mine depends for water supply on the pump, which is at the wells several miles from the mine.

CALIFORNIA.

Amador.

There is a report that the McIntyre and South Spring Hill mines, south of Amador City, are to be consolidated.

Jackson *Dispatch*: A test crushing of 186 tons of ore taken from the Central Eureka mine, near Sutter Creek, made at the Zella mill, yielded $13,466.93 free gold. Of the rock crushed 146 tons were from the shaft, which is down 1500 feet, and 40 tons were from other parts of the mine. There are four and one-half tons of sulphurets which will yield $200 to the ton. The Central Eureka is south of the Eureka or Hayward mine and the character of the rock is much the same. W. R. Thomas is Supt.——The East or new shaft of the Kennedy is down over 500 feet and is sinking 20 to 25 feet a week. Twenty-five men and four power drills are working in the shaft. At the old works rock is hoisted from both shafts and the 40-stamp mill is running.——At the Argonaut ore is being hoisted from every level from the 800 to the 1500-foot, and the 40-stamp mill is steadily crushing pay rock.——W. A. Cole, Supt. of the Sunny South mine, near Volcano, reports the shaft on his mine is down 75 feet and prospects good.——Mr. Joyce of the Defender mine, adjoining, is sinking. The shaft is down 130 fee', with good ore in the bottom.——Mrs. A. Boro has commenced action against T. Chichizola in the Superior Court to compel defendant to execute and deliver a certificate of redemption for the Gover mine, north of Amador City, plaintiff having offered defendant $2800, which he refused. The Gover is one of the largest mines in the county, but is low grade.

Calaveras.

The work of pumping the water out of the Lockwood mine, two and a half miles southeast of West Point, will be commenced in a few days. The mine has been bonded to San Francisco parties, who are at the mine with all necessary supplies. The Lockwood was formerly a producer. The vein occurs in grano-diorite and is typical of mines in granite in California.

Mokelumne Hill *Chronicle*: The Empire copper mine at Copperopolis, owned by C. Braids, has been transferred to the Ames estate of Boston, owners of the Union mines. The Empire is one of the principal mines of the group. C. D. Fontana and M Ross, agent for the Ames people, made the deal. The Empire mine carried with it nineteen and three-quarter acres in Copperopolis. The price paid by the company was $60,000. Braids got $27,500 and the difference was made by Fontana and others.——The Gladiator mine on the Mokelumne river has been sold to Mr. Posey, a Colorado capitalist and owner of the Tom Boy mine.

San Andreas *Citizen*: It is locally reported that the Ford mine at San Andreas is to be started up by the middle of September. The mine is down 700 feet with levels at 300, 400 and 700 feet. While these are being exploited the main shaft will be sunk below 1000.——C. Nuland, of El Dorado, has sold his quarter interest in the Good Hope, north of the Gwin mine, to J. Raggio.——The Fellowcraft, at San Andreas, which has of late been worked by the Veritas M. Co., has been shut down, and the miners given time checks for a portion of the money due them.——At Campo Seco the copper mines are being reopened after a long idleness. One furnace is in operation and machinery is going into that section.——D. Bailey, of Camanche, is developing the Chris Anderson gravel mine.——A Fresno corporation, known as the Cherokee M. Co., has been organized to work the Cherokee mine at Altaville, held under a bond from B. R. Prince. The mine is to be reopened.——The Lucky Boy quartz mine, located four miles south of San Andreas on the Copperopolis road, has been sold by J. Waters to a Boston syndicate for $10,000; $1000 was paid down. The negotiations were made through U. J. Hussey and F. J. Eastman of Boston. The new owners will put on a steam hoist to sink 500 feet. Work is to begin within thirty days.

Del Norte.

Crescent City *Record*: Crawford & McGowan in two weeks have taken out, sampled, sacked and shipped 110 sacks of high-grade copper ore from their mine on Myrtle Creek hill. Shipments of ore are being made weekly from the several mines and all are producing results.

El Dorado.

The Cambrian mine, which has been shut down for several weeks for the purpose of adding more stamps to the mill, has resumed work.

Placerville *Nugget*: A light fall of snow is reported on the summit of the Sierras.——The Colorado Con. and Baltic mines in Sly Park have started up.

Democrat: From a twenty days' run with an arrastra on his mine near Fairplay, W. F. Lupold cleaned up over $200.

Georgetown *Gazette*: It is reported that the hoisting works at the Esperanza, Garden Valley district, will be removed to the Big Chunk mine, Kelsey district.——A cave 40 feet square occurred recently in the road near the mill at the Taylor mine.——Development at the St. Clair mine, Kelsey district, is progressing. The shaft is down 80 feet. Six men are employed.——A mill test of fifty tons of rock from the Little Gem mine, near Josephine, is being made at the Esperanza. The ledge of ribbon rock averages 20 inches, and gold can be seen in the rock. Ten men are employed. If the mill test proves satisfactory a mill will be built on the property.

Fresno.

A strike is reported on Big creek, forty miles from Fresno, by M. G. York. The place had been prospected before, but only surface work done. York went down to bedrock.

The S. P. Placer M. Co. has been incorporated by R. S. Bodman, W. Hamilton, F. and J. M. Coburn of Los Angeles; J. S. Carroll, H. Russell, W. and E. Fletcher of Fresno; J. Massie and G. Fillmore of Oakland; capital $200,000.

Kern.

J. G. Stahl of Ross Station has contracted with F. M. Smith of Oakland to haul 250 tons of borax from near Frazier mountain in this county to Lancaster, on the Southern Pacific. The borax deposit is said to be extensive. The exact location is southwest of Frazier mountain. It lies in dry lakes and ledges.

In the Randsburg district much of the richest ore in other camps would be considered valueless, judging from its physical appearance. The ore is the result of alteration of the original country rock along the plane of a fissure or zone of fissure planes. The rock has been crushed and altered, but in many instances still retains the original crystalline structure of the rock from which it is altered, although containing much silica. The ore is a light gray tinged with yellow. Some of the best ore from such mines as the Butte and Wedge shows no gold, but, upon being pulverized and washed, shows a quantity of coarse gold.

Randsburg *Miner*: The Yellow Aster Co. have put men to work at the wells to develop more water. The water supply is plentiful for present needs; but if a sufficient quantity can be developed, more stamps will be added to the mill. The machinery is on the ground for the machine shops. H. J. Woollacott, Treas. Butte Lode M. Co.; A. Jacoby, Vice-Pres.; C. F. Howland, Sec'y; Dr. C. B. Dickson, director, all of Los Angeles, have been visiting the mine. A cleanup of thirty tons of ore from the Butte mine at the Red Dog mill returned $1000. They will add hoisting machinery and erect a mill at the mine as soon as development justifies it.

Bakersfield *Echo*: At the Warrington mine, near Havilah, a strike is reported and the vein is proving rich. The mine is employing twenty men and will add fifteen. The company's mill is soon to be increased to fifteen stamps. They have 30,000 tons of low-grade ore on the dumps that will run $4.50 to $7 a ton. They also have a cyanide plant. Other mines around Havilah are looking well. The Warrington is being operated by an Eastern company.

Los Angeles.

There are veins of lead-silver ore and of dry silicious silver ore on Santa Catalina island, off the coast of California. The lead-silver veins were worked in a small way years ago by a man named Gardener. It is said some of the ore shipped from the veins at the isthmus on the island assayed $100 per ton. There is also steatite of commercial value on the island.

Madera.

The copper belt which extends through this county in a northwesterly direction from its southern borders is presumably on the same belt as the copper mines in Fresno county. The belt is found among the low hills three miles west of Raymond station, skirting along the east side of the plains of the San Joaquin valley, through the old camp at Buchanan and into Mariposa county, where it rises on the slopes of Green mountain. The formation is mostly mica schist, and the ore deposits occur as impregnations near the surface. Carbonates and oxides are found, which in depth become sulphide (chalcopyrite) with iron sulphide. Copper is also found in the North Fork district near the head of the San Joaquin river.

Mono.

Inyo *Register*: The Lee Bros. of Dove Springs, Kern county, made a discovery in Huntoon valley, there being nine ledges of an average width of 11 to 28 inches, striking northeast and southwest, dipping southeast 70°. The ledges stand one above another, outcropping 6 or 8 feet at many points. The discoverers are now working the second ledge where it dips 30°. They have sacked up twenty tons of rock. In the drift below large masses of porphyry and iron quartz are mixed with slate and volcanic debris. The ledges crop out for 600 feet southwest, up to apex of hill, and carry pay that distance. On the east end they run into the porphyry, but the lower three pass it and continue southeast to the desert, being there covered. Some of the ore is rich and will go $10,000 to $15,000 a ton. Much of the gold is coarse. It is the biggest thing found on the east side since Bodie.

Nevada.

Grass Valley *Union*: The ledge at the Central shaft, near Grass Valley, has been located and is from 1 foot to 1⅔ feet wide. The ledge was cut in the bottom of the shaft at a vertical depth of 800 feet. There are twenty men working at the Central. An engine is being put on the New York Hill to help handle the water in the Central.——It is reported that Dr. Pusheck took $30,000 from the Pierce quartz claim, near You Bet station, the last year. He is adding ten stamps, fifteen men being employed.——At the California mine, near Washington, Supt. D. Harmon, by running a tunnel 2000 feet in length, cut the vein 800 feet deep. Twenty stamps have been dropping day and night for two years. In the tunnel there is a hoist, with which a shaft has been sunk 100 feet.

Placer.

(Special Correspondence).—L. D. Butt, on his Pennsylvania claim, has struck fine ore, running $20 to $50 in gold per ton and more in sulphurets. Messrs. Bruner & Fitch are improving their tramway preparatory to shipping a carload of ore daily to Selby.

Cisco, Aug. 21st, '99.

Colfax *Sentinel*: The owners of the Bellevue mine, near Auburn, have incorporated under the name of the Bellevue Con. G. M. Co. Stock to the amount of 100,000 shares, of the par value of $1 per share, has been issued. The company has secured a new bond on the Bullion Nos. 1 and 2 and the Smith Extension, making 5000 feet on the ledge. The main working shaft will be sunk on the Bullion. Compressed air will be used to run machine drills in sinking the shaft. A 10-stamp mill will be built; but five stamps will be put in place on the start. C. A. Reed of Ophir will be Supt. The cleanup of a crushing of 110 tons before the incorporation amounted to $2400. The total output of the mine since prospecting commenced has been $29,000.——The Jupiter gravel mine, near Iowa Hill, is said to have very rich gravel. A cleanup recently of fifteen cars of gravel containing a large amount of waste rock returned fifteen ounces in gold.

Riverside.

Several veins of white foliated talc have been discovered and opened to a limited extent three miles southwest of Winchester.

Miller, Norton, Case & Frey will develop the mines owned by them twenty-eight miles southeast of Winchester. The ore assays well. There is a large body of it, mainly free-milling. Wood is growing on the section of land owned by the company and a good stream of water runs down the canyon close to the mines.

San Bernardino *Sun*: In the Virginia Dale district the Ferguson brothers have been crushing White Star rock in their 5-stamp mill. The ores of this district are quartz and in normal condition contain sulphides of iron, lead, zinc and copper. The surface ores are oxidized, consisting of quartz with considerable limonite and occasionally copper carbonate. The ores usually amalgamate when carefully handled to about 60% of their assay value, the remainder being obtained by treatment by the cyanide process. There are also some rich chloride silver ores in the district.

San Bernardino.

The Providence mountains, north of Fenner Station, were at one time the scene of active mining operations when the Bonanza King was the leading producer of the district, being a silver mine. In more recent years, however, a number of small but very rich gold veins have been discovered at various points in the range and near it, and this fact leads to the belief that more thorough research may result in the discovery of valuable gold mines. The rocks of the range include limestone, quartzite and schistose rocks (metamorphics) and numerous eruptive dykes.

San Diego.

The salary of the receiver of the Golden Cross mine has been cut from $1000 to $250 per month.

The lithia mine, near Pala, is the subject of present litigation.

The Gold King mill and millsite, Julian, has been sold by F. Ganahl to N. D. Jones, for $5000.

There are in this county some remnants of ancient gravel channels which are gold-bearing, that near Ballena postoffice being a noted instance. The "wash" of this channel system has attracted the attention of several geologists, as it is composed largely of material entirely foreign to the neighborhood, consisting of fragments of quartz porphyry, rhyolite and other acid eruptives. There are no such rocks anywhere known between the Cuyamaca range and the Pacific, and the reasonable conclusion is that they were derived from some locality beyond the mountains in the Colorado desert. Some of the gulches which head into the gravel deposits have been worked by Mexicans for the gold contained, but, so far as known, never yielded more than a nominal sum.

San Diego *Union*: G. S. Andrews has taken a three years' lease on a large tract of land along the coast at Del Mar and will commence boring for oil.

D. Clark, who has had a bond on the Dewey mine, in Grapevine district, near the Warner ranch, has given up his option and discontinued work. The price named was $200,000, which Clark considers too high. Since he took the bond two months ago, Mr. Clark has expended $4000 in development, sinking the shaft from 60 to 100 feet and crosscutting the pay shoot at the bottom, besides drifting a long distance.

Santa Barbara.

One-half of the interest of the Dorothy oil claim, on the beach near Santa Barbara, belonging to the Castle Rock M. Co., has been deeded to J. H. Lundberg of Sacramento for $1000. Their claims, which extend from Castle Rock to the light, a distance of three miles, have not yet been prospected.

G. Wucherer has discovered a gold vein in the mountains back of El Montecito.

Shasta.

The Electric Iron & Steel Manufacturing Co. has incorporated under the laws of Arizona to develop deposits of iron ore on the north bank of Pit river, north of the mouth of the McCloud river. S. G. Smyth, San Francisco, is the Sec'y.

Sierra.

C. B. Wingate, Mgr. Thistle Shaft property, is boring a series of experimental holes on the channel. One hole is down about 500 feet and another between 300 and 400. The result of these borings has not been made public as yet.

The mill at the Triple Pocket mine continues to run, but Supt. Copeland reports that the water is getting short.

C. C. Weisenberger is at the Plumbago mine, two and one-half miles south of Alleghany City, where he will erect a sawmill and a 20-stamp mill on the river below the mine. The sawmill will be completed first to

furnish lumber for other buildings. Ore from the lower tunnel will be crushed. A tramway 1500 feet in length will be built. Mr. Mather is Supt.

The Philadelphus M. Co. has been incorporated by W. W. Treat, W. L. Ducey, G. R. and L. F. Tuttle and P. S. Keefer of San Francisco. This company owns and will operate the Mammoth Springs mine near Forest.

Siskiyou.

N. Cameron, who has recently visited the Little Tiger mine, reports over 1100 feet in tunneling and drifting has been done. The veins recently found are fissures. With the new claims acquired the company owns 110 acres.

Yreka *Journal*: The Gold Star M. Co., working the old Spencer mine on Humbug, has levied an assessment, which is to raise funds to put up a mill. Since reaching the old works with the lower tunnel, good prospects have been found.——The Greenhorn Blue Gravel mine continues to pay on the school house ground, and a new shaft may be sunk to further develop the southern portion of this mine. The reported yield last month was $5000 over expenses.——The Siskiyou M. Co., owner of the Mabel quartz mine, between Oak Bar and Scott Bar, and several claims on McKinney creek, has an engine and boiler, and has ordered a quartz mill from San Francisco.

Trinity.

(Special Correspondence). — A. Miller of Washington, D. C., has bonded the Boulder mine.

The Golden Jubilee mine made a good clean-up last month. In addition to the mill, they have a two-ton cyanide plant and are also shipping ore.

The McDonald Bros. have let a contract to furnish 300,000 feet of lumber to build flumes and for other improvements on the Lykes placer. Night operations will be conducted by electric light.

G. L. Carr is shipping gold ore said to run $300 per sack from the Yellow Rose of Texas on Union creek.

Mr. Hunter has discovered a rich vein on Union creek, 3 feet wide.

Bruner & Cooper are building a cyanide plant on Coffee creek.

P. A. Wagner & Son are running their 12-stamp mill with good results. They are putting in an electrical process to work sulphide ore on the 200 level of the Wagner mine.

The Misses Ryder, owners of a half interest in the Yellow Rose of Texas, have bonded the north extension of that mine.

G. G. Culbertson has four men working on a ledge 3 feet wide near the Wagner mine.

Supt. Walden of the Black Eagle mines reports having crosscut the ledge 70 feet, the ore averaging $6 per ton.

A number of copper prospects are being opened around Carrville.

Strode Bros. have closed down the Oro Grande mine for the season.

Trinity Center, Aug. 18th, '99.

Redding *Searchlight*: The Boulders M. Co. has been organized by G. L. Carr of Carrville. Three of the members of the company are prominent railroad officials of the East. The property to be worked is the Boulders, twelve miles west of Castella. The purchase price was $75,000. The Boulders consists of nine claims, comprising 180 acres. Its ore consists of boulders of various sizes scattered over the property. Three years ago the Boulders was purchased by Mr. Carr, who has since run three tunnels aggregating 1500 feet.

Redding *Free Press*: Development work on the Keating mine, in Hardscrable district, is progressing satisfactorily. Work in the upper tunnel has been suspended owing to the large flow of water, causing dangerous sides. A new tunnel, 50 feet below the old one, is being run, which will tap the ledge 500 feet below the surface.——Work is progressing at the Burgess mine, on Hickey creek, a tributary to Coffee. Last spring a 100-foot tunnel, crosscutting the ledge, was run, which tapped it 60 feet below the surface. The width of the ledge is 16 feet; the ore assays $10 to the ton. It is the intention of the company to put up a mill.——Pitts & Manning of Oro Fino have a good prospect on Coffee creek. They are getting out ore which runs $16.——At the Nash mine the big race is finished. It will connect the tunnel running through the mountain with the shooter at the junction of Union and Coffee creeks, 500 yards above the mine. Preparations to build a new flume and to open up above the shooter are being made.——A power drill will be put in True, Norton & Co.'s Morning Star mine.

Tuolumne.

The superintendent of the Boston & Tuolumne G. M. Co. reports that the Longfellow mine, which adjoins the Tuolumne, has struck a shoot of ore on the 300-foot level, some of which shows $7000 a ton. The ore is being sacked and shipped. At their mill, after a week's run, they cleaned up $12,800.

Sonora *Union-Democrat*: The Leechman Prospecting Co., Ltd., has sued Sheriff Price for $10,000 damages, together with costs and $5000 additional for rents and being deprived of the possession and profits which might come from the Keltz mine, ten miles north of Soulsbyville. Sheriff Price seized the property, together with the mill and other improvements, at a time when it was under attachment.

Sonora *Union-Democrat*: At the Black Oak sinking is in progress in the main shaft, now down 850 feet. The greater portion of the ore at present comes from the north drift of the 800, though much milling quartz is sent out from levels above. A new two-compartment shaft has been started on the Live Oak, an extension of the Black Oak, south, which is down 10 feet. As in the case of the main shaft, the vein is being followed.——The Longfellow mine, near Groveland, continues rich. Preparations are also being made to sink the main shaft, now down 350 feet, 600 feet deeper.——It is reported that miners in the main shaft of the Providence mine, near Carters, found a body of rich ore last Monday. It is said that the rock is heavily impregnated with gold.——The Bonanza at Sonora has closed down temporarily owing to a lack of water to run the mill and compressors. Twenty men are out of employment.——At the Goldwin the winze from the tunnel has been driven to a depth of 110 feet, with farther sinking going on, and the bottom showing a 3-foot ledge of quartz. The winze is now a working shaft, as from it an upraise was driven through the old stopes to the surface, 95 feet. W. H. McClintock is Supt.

COLORADO.

CLEAR CREEK COUNTY.

Denver *Post*: Mining is on the increase in the upper end of this county, several old properties having recently been started up. The Progressive Eight M. Co. has filed articles of incorporation for 500,000 shares, the company being Pueblo men, and their property on Griffith mountain, above the Griffith mine.—— On the Pueblo lode is a 250-foot tunnel from which ore is being taken from an 8-inch streak. The ore runs in copper, lead and gold.——McLaughlin & Co. have struck the junction of the Emma and Rogers lodes at a distance of 2500 feet in the Mathews tunnel on Democrat mountain and are taking out ore that will run from 300 to 700 ounces silver per ton.——While mining for zinc on the Burleigh tunnel, the Humphrey Zinc Co. struck ore running 900 ounces per ton in silver.——The Maxwell concentrator, now being built at the Mendota mine, will treat the entire dump.——The reported strike on Chicago creek, three miles east of Georgetown, is now said to amount to nothing. A number of men from Georgetown went over to investigate the rumor, but could find nothing of the reported strike.

Silver Plume *Standard*: A gasoline engine will be put in at the Illinois tunnel of the Pelican property.

DOLORES COUNTY.

Rico *Sun*: P. T. Nixon and S. E. Custis are shipping ore to Durango from the Montezuma vein, where they are leasing.——An assay made from ore taken out of the Hiawatha vein of the Enterprise group recently returned 3900 ounces silver and 10 ounces gold per ton.

GILPIN COUNTY.

The Pratte G. M. Co. of West Virginia have bought some of the best claims in the Yankee Hill district, besides taking a lease and bond on others. The company have decided to put up a mill and also an air compressor plant. The mill is to be a combination concentrating and amalgamating mill. When completed it will cost in the neighborhood of $50,000. The company will extend the '94 tunnel to cut the Stonewall, Texas, Whale, Storm and Howell claims, all of which are large veins and show good bodies of milling ore. The Stonewall is equipped with a 60 H. P. boiler and engine. The vein will be tapped 200 feet deeper than the present bottom of the shaft. The Texas has been developed by a shaft 160 feet deep and is equipped with machinery. A continuous body of ore has been opened up. The Whale shows a large vein of low-grade ore and has a shaft 60 feet. A sawmill has been built at the mouth of the tunnel to cut timbers for mine work, and a head house 36x40 feet has been built at the mouth of the tunnel, in which will be placed the air compressor plant. An assay office and several dwellings have been erected.

GUNNISON COUNTY.

Denver *Post*: The Crystal River M. Co., recently freed of litigation, is owner of the Black Queen, Fargo and other silver and copper mines on Sheep mountain, and has sold out to a New York syndicate for $500,000. The Black Queen has been producing for years, the ore running 100 to 110 ounces of silver to the ton, with copper values, though the operators have only recently discovered this. The Fargo, adjoining the Black Queen and on the same contact, runs $42 a ton in lead and copper. Twelve other claims belong to the group.

Pitkin *Miner*: J. J. Huddart of Denver, lessee of the Mono mill, has leased the Jersey Blue mill, in the Gold Brick district, of R. R. Williams. The Jersey Blue is a 10-stamp mill and the lessee will put in six 12-ton tanks. A combination process similar to cyanide will be used at both mills.

LAKE COUNTY.

C. E. Potter, Sec'y Fairmount Zinc Co. of Fairmount, Indiana, is inquiring into conditions at Leadville as to character and quantity of zinc ores available, with a view to the establishment of a zinc smelter at the mines.

The Coronado shaft on East Seventh street, Leadville, is shipping five loads of iron daily to the Arkansas Valley Smelter. The Bon Air workings have been put in shape, new ground is being opened and the mine is on a shipping basis. The Yankee lease of the Orion is also sending ore to the Arkansas Valley Smelter.

The Little Johnny, it is reported, last year produced 100,000 tons of ore. It employs 500 men. The ore bodies carry chiefly gold and copper. The M. A. W. Co. is putting down a shaft to a depth of 1500 feet. The down-town mines are all working again after $100,000 had been expended in unwatering them.

J. McAllister is shipping from the Mike and Starr. Before closing down on account of the smelter shutdown, Mr. McAllister was opening a rich ore body. He will ship from the iron-sulphide body, which has already been proven for a thickness of over 40 feet.

F. Schmidt, having purchased the S. Small mill site, has started up the old Hibschle shaft on that territory and is working at the 300 level.

In the Evans gulch section a new three-compartment shaft is to be started by the Resurrection G. M. Co. between the Dollie B and Diamond shafts. This company owns 364 acres. Its ore body is tapped by the New Years and Little Ellen inclines and the 950-foot shaft on the Kokomo claim. This shaft will open new territory and should catch the extension of the ore channel from the Dollie B.

Leadville *Miner*: The Theodolite group, in Lackawanna gulch, is owned by J. T. Peters and T. S. Wood. A. Hartwick, the lessee, has a six-ton shipment now in Leadville which, judging from assays, will mill fourteen ounces in gold. S. Yankee and associates have found a vein above timber line in Echo canyon, near the Thomas Anthony mine. It can be traced 3000 feet and the ore will average $20 per ton.

MINERAL COUNTY.

At Creede the Commodore has commenced shipment of three cars per day to the Bimetallic at Leadville, and other properties have increased their daily output.

The Last Chance, which has been closed for two months, has put a number of men at work and is getting out ore.

The Ridge has increased its working force in the past three weeks and is working nearly full shifts in all portions of the mill and mine. Large quantities of zinc and lead concentrates have been shipped from this property in the past few months, much of this going to Weir, Kan. Large quantities of this high-grade blend are still in the bunkers.

Ore shipments from Creede during the week aggregated 1600 tons. Among the mines that will resume when notice is received from the Pueblo smelting plants are the Amethyst, Last Chance, Bachelor No. 2 and Commodore. With these properties in working condition, the output of the camp is predicted at about 10,000 tons weekly. Within two weeks, shipments are expected to reach 5000 tons.

MONTROSE COUNTY.

G. Kimball has sold his uranium property in the La Sals to French capitalists.

The La Sal Copper M. Co. have closed down their mines and are putting in a reduction plant for the treatment of the low-grade ores of the Angell and Red Chief mines.

OURAY COUNTY.

Ouray *Herald*: A rich vein of ore has been cut in the second level of the Newsboy. For several months Shue, Du Praw and Stalford have been working this portion of the Newsboy under lease. The Newsboy adjoins the Slide property and is entered through the tunnel of that mine. They have extended the Slide tunnel 120 feet into the Newsboy property, where the strike was made. The vein cut was found in quartzite and is 30 inches wide.——D. Wood is equipping the Black Lightning in Poughkeepsie gulch, upon which he has a bond and lease.

SAN JUAN COUNTY.

Silverton *Standard*: The San Juan Mining Association have decided to work their mines with eight-hour shifts, and the Iowa, Tiger, Sunnyside, Gold King and Sampson are at work. During the shutdown repairs and cleaning up have been going on.

SAN MIGUEL COUNTY.

Ophir *Mail*: The Mountain Key has been put in shape and is working again. The copper vein uncovered a few weeks ago is being opened and a carload is to be shipped.——The Butterfly mine is working forty men on the eight-hour system.

TELLER COUNTY.

A strike of rich ore is reported in the Doctor mine on Raven hill, discovered by crosscutting, which was done by leasers, the owners having neglected this important matter and leasing the mine when the amount of ore in sight was nil.

Fire destroyed the business portion of the city of Victor on the 21st, causing a loss estimated at $2,500,000. The town had been built in the early days of the district, and was of pine timber, which burned rapidly. Efforts were made to stop the progress of the flames by blowing up buildings in their path with dynamite, and all afternoon the hills roared with the explosions, but to no effect. All the buildings burned are a total loss, with practically all their contents, for the flames were so rapid that nothing could be saved. The scenes of the great Cripple Creek conflagration were duplicated. A special train was placed at the command of Victor by the Florence & Cripple Creek Railroad, and three companies of firemen, with apparatus, rushed over and worked all the afternoon in a vain endeavor to stay the march of the flames. The first house was built in Victor in October, 1893. In July of the following year the city was incorporated, and six years later it contained 12,000 people. The total number of buildings destroyed is estimated at 800. Fourteen blocks, comprising almost the entire business section of the town, are in ashes. Insurance, from $400,000 to $800,000. The most valuable buildings destroyed were the Gold Coin mine shaft houses, the loss on which is $100,000. Victor is the metropolis of the southern end of the Cripple Creek district and will be quickly rebuilt in more substantial manner than before.

Cripple Creek *Times*: In a crosscut from the Blickenstaff shaft on the Specimen, run at 275 feet to cut the Lafayette vein, 10 inches of ore was broken into in what is supposed to be a new vein. Assays run 102 ounces.——In the Pinto of the Free Coinage Co. what is said to be a new vein has been cut. Pay is 2 feet wide, and some of the rock assays $5 a pound.——Blickenstaff and associates, on the Lucky Guss, have stopped work in the shaft and started a crosscut for the rich shoot that comes into the property from the Lafayette ground. The average grade of the rock they are breaking is five ounces.——Mgr. Davenport has received returns from two lots of ore. One shipment of eleven tons was settled for at 32.95 ounces, and the other lot of seventy-three tons brought 14 ounces per ton.——It is stated that the Isabella is again in rich ore, and that the rich shoot was cut in an upraise from the tenth level. It is reported that the Isabella Co. intend to resume sinking the main working shaft, now 730 feet deep.—— The Modoc has ready for shipment two carloads of ore that will average 200 ounces per ton, and ten cars of rock from five to seven ounces. This ore comes from the east vein, which has been opened in all the levels of the mine down to 700. This fissure is supposed to be the extension of the Lafayette vein.

IDAHO.

BOISE COUNTY.

The town of Placerville was totally destroyed by fire on the night of Aug. 17, with a loss of $70,000.

Idaho City *World*: Fulk, Whaley and Blois have located four quartz claims twelve miles below Silver Mountain on the north fork of Boise river. Two of the claims are on a ledge 12 feet wide and are 600 feet apart. The ore assayed 2.7% copper, $12 in gold and from five to six ounces silver. The ledges crop in places for 4000 feet and show copper for that distance.

OWYHEE COUNTY.

Silver City *Avalanche*: The Cumberland mine on War Eagle mountain was recently sold to a Montreal syndicate. It was owned by I. & T. Shaw and has been developed while under bond to Sonnemann & Branscombe of Spokane. The resident Mgr. is Francis Jenkins. Work is confined to the 200 and 300 levels, where they are driving north and south, opening new stoping ground. A winze is being sunk at the 200 level to connect with the 300 level, in which they have encountered 1 foot of ore, coming in from the hanging wall, rich in gold. Orders have been placed with Fraser & Chalmers of Chicago for a 10-stamp combination mill, a 10-drill air compressor and a steam hoist to work to 1500 feet.

SHOSHONE COUNTY.

Spokesman-Review: A great deal of work is being done at Buffalo now that the weather is good. On the Dewey they are crosscutting. This lead lies along a small water course, and the footwall being soft has been worn away by errosion, and exposed the quartz for a distance of 1000 feet to a depth of from 1 to 6 feet. The crosscuts show the vein to be 6 to 10 feet in width. Just above the Dewey on the same lead is the Sacramento, which lies higher than the bed of the stream, and the owners are ground sluicing to uncover the lead. Above this claim on the Grubstake the same thing is being done. Men are at work on the St. Paul, but have abandoned the first crosscut tunnel, and are opening the lead in another place. A shoot in the vein 2½ feet wide assays $200 to the ton, and free gold is visible. Norman & Cameron are at work on the Monte Cristo, with four men. Owing to water in the shaft they have gone down the hill to run a crosscut and will tap the lead. They also have men on the Fortune. It is reported that Clark & Sweeny have obtained control in the Big Buffalo. The snow is practically all gone from the camp. Only drifts remain in sheltered places. The nights are cool, and frequent frosts appear. On the morning of August 2d ice was formed on still water one-eighth of an inch thick.

MICHIGAN.

HOUGHTON COUNTY.

At the annual meeting of the Calumet & Hecla M. Co. the following directors were elected: A. Agassiz, F. W. Hunnewell, Q. A. Shaw, Jr., J. N. Wright and F. L. Higginson, the latter succeeding H. L. Higginson. With the opening of shafts Nos. 16 and 17, on the Osceola amygdaloid, the Calumet & Hecla Co. will have five shafts on the line of the amygdaloid. Of the shafts now connected, it has a total length of nearly 5000 feet on the lode. When 16 and 17 are opened, the company will have a total length of 11,000 feet on the lode. It will cost the company $1,000,000 to complete shafts 13, 14 and 15, with hoisting plants, which will be done by the fall of 1901. Pres. Agassiz says the showing at the Red Jacket shaft is the best in the mine, although it is the deepest part of the mine.

In Tamarack Shaft No. 3 thirty-five drills are running and sending out more ore than any other shaft.

It is reported that at the Franklin 400 to 450 tons of ore are stamped per head daily.

MISSOURI.

JASPER COUNTY.

The total zinc production last week was 11,500,600 pounds; total lead production, 1,028,000, both having a total value of $356,668.

Joplin *Herald*: On the Chitwood Hollow claim of the United Zinc & Lead Co. eleven new shafts are in process of sinking. The Chitwood Hollow tract has been more thoroughly prospected with a drill than any other land known. The drill in one of Adam Scott's holes went into 40 feet of good ore at 168 feet. Of the Houk shafts the one now in use was sunk on one of the poorest drill holes, and it has been a big producer from the beginning. ——The Conqueror mill is producing thirty tons weekly.

MONTANA.

JEFFERSON COUNTY.

Butte *Inter-Mountain*: E. R. Holden & Co. of New York have secured control of the Hope mine at Basin. It is proposed to build a new concentrator and start up the mine, which has been closed down for some time on account of a fire which destroyed the shaft and killed several men. The mine has yielded $700,000. The Basin G. & C. Co. is the name of the new company, organized under Montana laws, with R. B. Smith, Governor of Montana, as president. The company is capitalized at $2,500,000, with 500,000 shares. Besides the Hope the new company owns fourteen patented claims in Basin. The main shaft on the Hope is down 600 feet and it is alleged that there are several thousand tons of ore in sight.

NEVADA.

The pumping operations at the C. & C. shaft, Comstock lode, continue without interruption and the water is slowly going down. The slow progress indicates that large

excavations are being drained. These passed, better headway may be anticipated. Manager Ross has sent the following telegram:

VIRGINIA, NEV., Aug. 24, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: — At 6:30 this morning the water was 31 feet 6 inches below the 1050-foot level. No. 1 elevator has been running continuously.

WHITE PINE COUNTY.

White Pine *News*: The Chainman mill has been rearranged and is at work cyaniding the tailings which have accumulated. Besides its cyaniding plant, the company has a complete 10-stamp amalgamating and concentrating mill. There is ore in the mine blocked out to keep the mill running two years.

EUREKA COUNTY.

Eureka *Sentinel*: G. L. Bemis and R. A. Campbell of Bingham, Utah, have been visiting the Ruby Hill and Adams Hill mines. Mr. Bemis also made a trip, in company with H. Kind and T. Dixon, to the Dimick mines at Tybo. The object of the examinations is to ascertain the character of the ores and the possibility of concentrating and cyaniding them, should they be found to be in sufficient quantity and value to justify the establishment of a plant for the purpose.

LINCOLN COUNTY.

The cyanide plant in El Dorado canyon is running successfully on a large dump of tailings, and it is stated that two new quartz mills are to be erected in that district.

NEW MEXICO.

GRANT COUNTY.

A. W. Tennant, representing the Hanover Copper Co., has bought from J. H. Bragaw, J. A. Potter and A. Johnson the fourteen claims of the Modoc group for $140,000, of which $10,000 was paid in cash.

The Pinos Altos G. M. Co. is pushing work on the reservoirs and dams.

At the Gillett shaft the new shaft house is being framed. A 100-ton concentrator will be built at the Gillett shaft. B. B. Thayer is Mgr.

OREGON.

GRANT COUNTY.

The Great Northern M. Co., near Canyon City, has started up its new mill. The plant has a capacity of twenty tons daily. The milling ores show an average of $15 per ton in gold, while pockets are encountered. These latter have yielded over $5000 in the past few months, one pot recently turning out $1500.

LANE COUNTY.

(Special Correspondence). — The Bohemia mining district is in the Calapooia mountains, a spur on the west side of the Cascades, thirty-five miles east from Cottage Grove and forty miles from Eugene, the county seat of Lane county. It is at the upper end of the Willamette valley. The district is at 5000 to 7000 feet above sea level and covers an area of forty square miles. It is in line with the mineral belt which extends through northern California, Oregon, Washington and into British Columbia. The formation is of volcanic origin with andesite and porphyry. The tops of some of the peaks are covered with decomposed bleached lava. There are two trends of fissure veins, one of which runs parallel with the Cascade range and the other runs east 20° south. A few properties have been worked since '92 and have paid from the grass roots. One is down 250 feet, another 350 feet and still another 450 feet. All have shown increase in size and retain their values with depth.

The Musick started with five stamps of 750 pounds each and a 10-foot prospect hole. In thirty-six months run it paid over $100,000 from free gold and $30,000 from concentrates. J. W. Cook, the main owner and manager of the property, certifies to this statement. This year ten stamps are being operated, a new mill having been recently put in.

Among other properties that have been operated are the Noonday with twenty stamps; Fairview, five stamps; Johnson, two stamps; Champion, ten stamps. The returns from these properties are reported satisfactory.

The many prospects upon which development has been done by sinking or tunneling have shown improvement, and some of the prospects have by assay shown rich ore bodies at a depth of 50 feet. The surface ore of the Musick mine averaged $5 to $20 per ton, the vein being 18 inches wide. At a depth of 75 feet the best of the ore, 4 feet wide, assayed $40 to $200 per ton, and at 125 feet the vein was 8 feet wide.

The surface ore of the Helena ran from 50 cents to $2.65 gold per ton. At 30 feet depth by a drift 75 feet on the ledge the ore assayed $25 to $30,000 gold to the ton, the pay streak being 6 feet wide with 1 foot showing free gold; and the tunnel, when continued 90 feet farther, showed free gold the entire distance.

Eugene, Aug. 18th, '99.

SOUTH DAKOTA.

There are several belts or zones of copper-bearing ores in the Black Hills. The ore deposits occur at intervals along the line of large reefs of quartzite which extend for many miles in a northwest and southeast direction. When the shoots of ore occur, the quartzite is found jasperized and the croppings are often over 100 feet in width. The slate rocks accompanying are often found to contain copper in payable quantity, but in depth the ore is usually found confined to one wall of the main quartzite belt. The surface ores are carbonates (malachite and azurite) and black and red oxides. In depth these give place to sulphides of iron and copper. In places the surface deposits are very rich, and copper can readily be smelted from the ores in a cupola.

LAWRENCE COUNTY.

It is reported at Deadwood that the Hearst interest (one-third) of the Homestake consolidation is to be sold next month in London. The Homestake was originally incorporated in '77 for $10,000,000. Several years later it absorbed adjoining property and the capitalization was increased to $12,500,000. Recently the Deadwood-Terra and the Highland Companies' holdings, together with the Black Hills & Fort Pierre Railroad and the Black Hills Canal & Water Co., have been consolidated with the Homestake with a capitalization of $21,000,000. The entire interests of this concern are under the direction of Mr. T. J. Grier, who has been identified with the company since '78, and who succeeded S. McMaster as Gen. Supt. at the time of his death.

UTAH.

The incorporated mines of Utah during the first half of August paid $147,000 in dividends.

Salt Lake *Mining Review*: During August numerous important strikes have been reported. Among them are the following: In the Cedar Valley in Peepstone district, Bunker Hill mine at Stockton, Woodlawn mine in Big Cottonwood, Chicago mine at Bingham, Dalton & Lark mine at Bingham, Star Con. mine in Tintic district, Mammoth mine in Tintic district, Tetro mine in Tintic district, Utonia mine in Death canyon, Massachusetts mine at Park City, New State mine at Little Cottonwood, Tesora mine at Tintic.

JUAB COUNTY.

Salt Lake *Tribune*: Diamond, in Tintic district, will have a custom plant for milling its ores before winter. The movement is headed by Roi Bemis.——The Bowers is jigging its milling ores, and the management of the Shoebridge will erect a plant as soon as the water level is reached, and the Tesora will follow. Mr. Bemis' plan is to relieve these companies and others by whom jigging plants are being projected of the outlay that will be entailed by establishing a custom plant at a central portion of the camp, and if he can close his contracts for the ores in question will place his orders for machinery before the end of the month.

SALT LAKE COUNTY.

New strikes in hitherto unexplored ground are of frequent occurrence in the property of the United States M. Co. at Bingham. The recent strike below the Confab stope has developed into 26 feet of ore. A discovery has been made in Old Telegraph ground, 8000 feet east of the strike in the Confab shoot, where Supt. Turner has uncovered 13 feet of ore that shows high-grade copper, eleven ounces silver and $1.60 gold per ton.

New work in the old Bowden stope, in Old Telegraph ground, from which the highest grade copper ore ever shipped out of Bingham was taken, has also shown new ore bodies, which assay 13% copper, 11.8 ounces silver and $1.20 gold per ton, with 31.2% iron and 8% silica.

Recent work, directed by Mr. Neill, has resulted in opening up the old Lion's Den stope, from which $960,000 was taken.

TOOELE COUNTY.

The Golden Gate mill, at Mercur, which for a long time has been shipping auro-cyanides, will again commence the reduction of the precipitate at the works. Supt. Jackling has been perfecting the methods, with such results that it has been decided to start up the plant again. The output has been increasing for some time and the value of it is estimated between $150,000 and $200,000 per month.

WASHINGTON.

STEVENS COUNTY.

In the Princess Maud, at Republic, the winze is down 20 feet, with 3 feet of quartz in the bottom. A foot of it is rich, the rest carries good values. There is a large percentage of silver in the ore. Two assays gave $267.22 and $229.49.

The Georgie Reed group is south of Republic, at the forks of the San Poil. It is under development by a Spokane company. T. E. Dexter is Supt. The crosscut tunnel running to tap the Georgie Reed vein has cut a blind lead. The vein was opened in diorite and showed quartz of greater hardness than that in the main vein. Mr. Dexter reported an assay across the face of the tunnel which had not crossed the vein, running $21 gold and $17 silver.

Spokesman-Review: The drifts on the 150-foot level of the Tom Thumb are showing up a fine body of high-grade ore.——Supt. Coy reports that good progress is being made on the Golden Lily shaft.——R. L. Barbee and associates have taken a contract to sink a 50-foot shaft on the Vulcan No. 1. It is down 25 feet. The ledge is 8 feet wide. There is one fine stratum of ore next to the hanging wall. Near the surface the rock assayed $1.89. At the bottom of the shaft the average is $7.80. The property lies 300 feet southwest from the Mountain Lion ground. The claim is owned by G. W. Dickinson and associates of Seattle.

WYOMING.

CARBON COUNTY.

E. H. Haggerty has taken a working bond on the A. Bragg property at Battle Lake for $25,000, with four months' time. A 35-foot shaft has been sunk through copper-stained quartzite and a short crosscut run to cut the lead.

A company has been organized for the development of Grand Encampment mines. The incorporators are N. H. Withee and E. Peck, capitalists of La Crosse, Wis. The company has bought a group of four claims, six miles from Grand Encampment. The company has let a contract for a shaft to be sunk 100 feet on a lead 12 inches wide at the surface which assays 9½% copper and $2.10 gold.

FOREIGN.

AUSTRALIA.

Melbourne *Standard*: The Mount Gunson copper field is ninety miles northwest of Port Augusta. It is reported that the ore covers acres of ground and the total quantity of ore in sight is estimated at 200,000 tons, allowing a depth of 6 feet on one claim. No lode has been found or determined. In Mr. Brennan's mine, known as the C. Mavis B, the workings are a large open cut 18 feet deep, surrounded on all sides by copper ore of an average of 9%. Several bags of rich copper ore from the Moortonton Estate, Millbrook, the property of J. Tippett, have been forwarded to Adelaide. The samples comprise grey and black ore, through which malleable copper is disseminated, red oxide and green and blue carbonate of copper. There are five distinct lodes on the estate.

BRITISH COLUMBIA.

(Special Atlin Correspondence).—The Pine creek discovery of gold, reported at Lake Bennett in July, 1898, was known to prospectors about six years previously, but the prospects were not such as to induce them to bring in supplies at that time. But the rush of '98 boomed it as it never could have boomed on merit. It is a region of low, rounded mountains, partly of eruptive origin.

The formation is irregular, consisting of diorite, rhyolite, serpentine, granite and schist, with inclusions of quartzite, marble, slate, porphyry and other rocks. Many of the high summits are covered with fragmentary rocks.

Erosion, to which the placer mines owe their existence, appears to have been limited to local glacial action, with little evidence of pre-glacial streams.

The glacial moraines on the sides of the mountains indicate that the ice had a depth on Pine creek of 1000 feet, with the source five to thirty miles distant; yet the cutting and filling effect has been less than one would expect. Since the glacial action ceased, water has cut out canyons.

As to the character and source of the gold and the value of the mines, the gold will assay $17 to $18 per ounce, but contains much quartz, reducing the average value to about $16; and wherever the diggings pay wages the gold is coarse, two-bit colors being common and ounce nuggets not rare.

A little fine gold may be found anywhere in the glacial drift, but it is very fine and the total amount small, so it can not be considered a source of pay, although it has led to the staking and recording of several thousand claims, of which few will ever yield net profits, and not one in twenty will return the recording fees.

The dirt that will pay for working by pick and shovel method is, so far as known, confined to two miles of Pine creek, one mile of Wright creek, one mile of Spruce creek, and fifty claims on Boulder, Birch and McKee creeks (Willow creek is a branch of Pine), and within these limits are many claims that will not pay wages, as the bedrock is very irregular and the pay spotted. There is a total of 100 claims, each 100 feet wide, that will, if worked to advantage, yield a profit, though there is not what an old-timer would call a rich mine in the whole district, six ounces per day to the man for shoveling on bedrock being the best shown to date.

There were 6000 to 7000 men in the district when navigation opened this spring.

The gold found in the pay dirt appears to have been derived from the cutting down in the locality of the rhyolite and serpentine, which contain seams and pockets of gold-bearing material. Recently a kidney of quartz and porphyry, showing "pinhead" gold, was found below water level on Pine creek by men cutting a drain at the mouth of Willow creek. There are no ancient channels here.

Of quartz mines, forty or more locations have been made, five or six of which possess doubtful value. The remainder are valueless.

The kidney of quartz mentioned is yellow, 18 inches wide, accompanied by a fine-grained yellow and red porphyry. If it were a continuous vein it would make a valuable mine.

Some miles to the northeastward a 30-inch vein of milk-white quartz crops 200 feet. A prospect hole 12 feet deep showed streaks of galena, zinc blende, black sulphurets of silver and flakes of gold telluride; walls dark schist, carrying pyrite.

The sources of gold are in the gulches, or at the base of the mountains, the summits showing nothing of value whatever.

Hydraulic mining has not been successful yet, although parties are reported to have brought in outfits more or less adapted to the circumstances. Very little of the ground is in possession of miners of previous experience, however, and such are not buying any of it.

It is the opinion of competent miners that there is enough of fairly good ground in the district to keep six or eight companies of Chinamen employed for several years—say four miles of channels and eighty or a hundred acres of bench ground in all. The total output of the district to date would be a difficult thing to estimate. PHILIP MINOR.

Pine City, Aug. 7th, '99.

A number of the miners imported from Sudbury to work on the Ymir mine were induced to quit work in consequence of the representations of the local miners' union. These men had signed a contract in Ontario to work for six months at $3 per ten-hour shift. After working a few days, they quit work and demanded their wages. The Ymir Co. refused to pay, in consequence of the breach of contract in which six months' work was contracted for. The men have gone to Nelson to sue J. R. Robertson, the managing director.

A strike of nickel ore is reported from Fort Steele district of East Kootenay. The claim is the Grace Dore and was discovered by Robert Dore, the Wild Horse prospector. The claim is four miles from Fort Steele on Wild Horse creek, near where Brewery creek empties. There are 4 feet of ore, with 1 foot of solid mineral, and assays show values of 12% to 15% nickel.

Mgr. Ward of the Ward M. Co. of Horsefly is getting out $2000 to $3000 daily.

Spokesman-Review: Another find in Summit camp is reported at Grand Forks. Men doing assessment work on the Senator discovered iron in the rock clinging to the roots of an upturned tree. They excavated a pit and at a depth of 2 feet uncovered a rich ledge. On No. 37, an adjoining claim, owned by J. B. Henderson, miners cut an open pit near the boundaries between the two claims and found the same lead. The ledge is 80 feet wide and there is shipping ore mixed with gangue 3 feet from the surface. This is the fourth ledge uncovered on that property.——A strike has been made on the Morrison mine. At the depth of 230 feet a body of 20 feet of solid ore has been encountered, yielding $13 to $33 in gold and some copper.

CANADA.

In northwestern Ontario there are eighteen stamp mills; number of stamps, 257. There are already employed 3082 miners, receiving $1,000,000 a year in wages. The gold production for that section for '99 is estimated at $600,000.

Work is under way, after a cessation of six years, at the silver mines of the Thunder Bay region on the north shore of Lake Superior. Four mines on Silver mountain have produced 800,000 ounces. Concentrates of the lower grades are shipped, valued at $600 to the ton.

NEW ZEALAND.

Melbourne *Standard*: The Waihi Co., during last month, treated 7715 tons for a return of bullion worth £22,444.——The Talisman lately crushed 883 tons of ore for a return of 4100 oz. 11 dwt. of bullion, valued at £3214 3s 6d, a fraction over £3 12s 9½d per ton.——Ore from the Golden Belt mine, Neavesville, was treated recently at the Thames School of Mines experimental plant; 850 lbs. were treated by the cyanide process, which gave an extraction of 75.4%.——A parcel of 800 lbs. from the Venus was treated by pan amalgamation at the Thames School of Mines, and the tailings ground, for a return equal to 79.5% of its value. A portion of the same ore was treated by cyanide in the laboratory for an extraction equal to 91.9% of its value.

THE YUKON.

The British America Corporation of Vancouver, B. C., an English company, will commence development work on a copper mine four miles inland from White Horse rapids. A tram line is to be built from the mine to the river.

Some Recent Additions to the Mineral Collection of the California State Mining Bureau.

Copper ore, chalcopyrite and bornite, carrying gold and silver; Van Anda mine, Texada island, B. C.; J. Arnheim.

Bismuth-gold; 60% gold, 40% bismuth; first occurrence of this mineral noted in California; Coon Hollow mine, near Placerville, El Dorado Co., Cal.; G. E. Kastengren.

Gold quartz, 1200 feet wide and hanging wall rock of same; Picacho district, San Diego Co., Cal.; P. C. Du Bois.

Phosphate rock from Tennessee and from the Gulf of California; T. J. Wrampelmier.

Gold quartz, Francis mine, Mariposa, Cal.; Waggoner & Maddern.

Gold quartz from the new ledge recently found in the Gwin mine, Calaveras Co., Cal.; J. J. Crawford.

Oil sands and petroleum shale from the southern oil fields.

Fossil horse hoof from Sepulveda station, Los Angeles, Co., Cal., and on the same Jay one from 27 feet depth under gravel on Dominion creek, Klondike gold field; E. Landegren.

Copper ores from Marin Co. and Siskiyou Co., Cal., and Butte, Montana.

Native silver, stephanite, corvellite, hubnerite, tetradymite, pyrargyrite, bismuthinite, corundum and other minerals from Montana; F. W. Traphagen.

Corundum in feldspar, margarite and diaspore from a large ledge in Plumas Co., Cal.; J. A. Edman; first noted occurrence of this useful mineral in place in California.

Native copper from the conglomerate at the 3500 level of the Calumet & Hecla mine, Michigan, and auriferous pyrite carrying $200 to $400 gold per ton; R. L. Hornbrook.

Coal briquette, made in Germany from crushed lignite by pressure only, no binding material being used.

Massive talc of good quality, now being marketed; from the "Talc" mine, Ventura Co., Cal.; S. S. Simon.

Fossil bison horn of new species, horse teeth, etc., from the southern oil fields.

And several others.

HENRY S. DURDEN, Curator.

Recently Declared Mining Dividends.

Wolverine M. Co., Michigan, dividend No. 3, $2 per share, which is an advance of 50c per share; payable Oct. 2. Total, $270,000.

Breece M. Co., Colorado, 5 cents per share; payable Sept. 1.

Gold Coin, Cripple Creek, Colo., No. 22, $10,000; Aug. 15.

National Lead Co., quarterly dividend, 1¾% on preferred stock; payable Sept. 15.

Homestake M. Co., Lead City, South Dakota, regular quarterly dividend, 25c and extra 25c per share, $105,000; Aug. 15. This is under the new plan of organization, with 210,000 shares, the former capitalization being $12,500,000, divided into $100 shares.

Mammoth, Utah, 15c per share, $60,000; payable Sept. 1. Total, $1,530,000.

Standard Con., Bodie, Cal., 10c per share; Aug. 24.

Grand Central, Utah, $37,500; Aug. 11.

Swansea, Utah, $5000; Aug. 11.

Silver King, Park City, Utah, $50,000; Aug. 11.

Bullion-Beck, Utah, $10,000; Aug. 20.

Industrial Notes.

—The War Department will soon buy 40,000 horses.

—Las Vegas, N. M., will build municipal water works.

—Pomeroy, Wash., proposes to put $18,000 into an electric plant.

—There is a present demand for labor in every part of the country.

—The region on the west side of Cook Inlet, Alaska, is being prospected for oil.

—Long Beach, Cal., reports a daily catch of 200 sharks, which furnish "cod liver" oil.

—In the Lake Superior iron mines 19,000 men are employed and many more are needed.

—The receipts of the San Francisco post-office for the year ending June 30th, '99, were $1,002,056.

—From London to Dawson in seventeen days is the latest quick time record made by a mining engineer.

—Preliminary surveys are being made for the entrance of the Sierra Valley Railroad into Reno, Nevada.

—Austin Corbin Jr. is credited with having made $1,000,000 since July 1st, '98, in zinc mining at Joplin, Mo.

—A railroad is to be built from Monclova to Mazatlan, Mexico, 1265 kilometers. The cost will be $12,000,000 silver.

—The San Joaquin, Cal., Electric Co. has been sued by the N. Y. Mercantile Trust Co. for overdue interest on its bonds.

—Colorado justly proposes setting aside sufficient state school lands to insure necessary income for the Colorado State school mines.

—An authority estimates that the output of pig iron in the United States in 1899 will be 13,250,000 tons and in 1900 will reach 14,500,000 tons.

—All the mining counties of California show an increase in the 1899 assessment; nearly all the agricultural counties exhibit a corresponding decrease.

—The Santa Fe shops at Albuquerque, N. M., are to be increased in size so as to give employment to several hundred additional men.

—Denver, Colorado, is considering the question of buying the Denver Water Co.'s property, or putting $5,000,000 into an independent municipal water supply.

—The close of the Colorado smelter strike makes business boom in the Centennial State, and everyone there is determined to see that the '99 record is even ahead of that of '98.

—The Mexican Government has awarded a contract for laying a cable from Altata, State of Sinaloa, Mexico, to Lapaz, Lower California, 114 miles, to be completed within six months.

—New locomotives are necessary for the increasing traffic over the Arizona & New Mexico Railway, connecting Clifton and Lordsburg, and the one between Clifton and Morenci; the latter is a 20-inch gauge.

—The Mexican Central management is building a new line south from the Guadalajara division to Zamona and points farther south; surveys for the proposed line from Ameca to the Pacific coast are being pushed.

—San Francisco has raised $55,000 to celebrate the return of the First California regiment from the Philippines. Three former employes of the MINING AND SCIENTIFIC PRESS, one of them now a captain, return with their regiment.

—On the Northern Pacific Railroad rails made by the basic open-hearth process have been put down experimentally, in which the phosphorus was limited to 0.05%, the carbon running up to 0.70%. So far the rails are reported to have done well.

—On the 19th inst. at Goldfield, Colo., the electrical power plant of the La Belle Mill, Water & Power Co. began. It will be used to operate the Florence & Cripple Creek and Golden Circle railroads and to supply power, water and light to the mines, mills and samplers of Cripple Creek district.

—The Arizona & Utah Railroad, a notice of the completion of which to Chloride, Arizona, appeared in this column last week, will continue on. In 100 days it will be to White Hills, fifty miles north of Kingman, will then cross the Colorado, proceeding along the Rio Virgin to St. Thomas, the ultimate intent being to connect with the Utah & Pacific R. R.

—The Southern California Power Co., Pasadena Electric Light & Power Co. and the Edison Electric Co. of Los Angeles, Cal., have consolidated. The Edison General Electric Company of Los Angeles is the name of the new company; capital stock, $1,250,000; 5% bonds to that amount will be issued. The new company has a three years' contract for lighting Pomona and will build a transmission line to Anaheim, Fullerton, Orange and Santa Ana.

—At Houghton, Mich., copper production is decreasing, though 5000 more men are employed than one year ago. Opening of new mines in Arizona draws workmen from the older properties. The product of unsmelted copper of the Quincy mine was less than 700 tons in July (an average of 800 tons had been maintained for a year previous), due to inability to find miners to get out the rock. With a total force of 1250 employes, the Quincy has at present less than 400 miners.

—Consul Macrum of Pretoria, South Africa, writes: "Referring to my report of June 13, 1899, in regard to the reconstruction of the Rustenburg and the Lydenburg Railways, I have to state that a notice has been published extending the time for the sending in of tenders on the construction of the Rustenburg line until Thursday, Oct. 12th next, at noon. This is done for the purpose of allowing foreign contractors time to bid and makes the time on both the Pretoria-Rustenburg and the Belfast-Lydenburg lines the same."

—California leather is in demand from Japan for harness and heavy work. There has been a steady importation there of horses to do heavy draft work. There is a scarcity of hides at present and California is importing from Australia. On the coast and in the Northwest the demand is mostly for fine-grained hides, but the transpacific trade calls for heavier, coarser goods. No hides come from South America, as these are all shipped down the rivers to the Atlantic and to New York and Boston or across the water. The Pacific coast line of South America does nothing much in cattle. California leather dealers do not handle horse hides, though parts of them make good shoe leather.

—The Comstock, Nev., Pumping Association have concluded that it would be unwise for the Comstock mining companies to attempt the erection of an electric power plant, and will close with the Truckee River Co. on the basis already outlined herein. The association has given the Risdon Iron Works of San Francisco a check for $5000, the fourth installment on their pumping contract: a total of $20,000 paid on the agreed sum of $30,000. This fourth payment of $5000 became due when the water in the C. & C. shaft had been lowered 250 feet below the Sutro Tunnel level, which distance was reached when the water stood at a point 29 feet below the 1950-foot level of the shaft. The water is now 35 feet below that level and still going down.



A BURNING OIL WELL, COALINGA DISTRICT, CAL.

A Burning California Oil Well.

The accompanying engraving is from a photograph kindly furnished by Mr. E. M. Hoagland of San Mateo, Cal. It graphically represents Home Oil Co.'s Well No. 4, Coalinga district, Fresno Co., Cal., as it appeared while on fire Aug. 1st, '99, and is believed to be the first picture of a burning California oil well ever published.

Personal.

RICHARD U. GOODE of the U. S. Geological Survey is in San Francisco.

JOS. CUMMING has been elected Mgr. Mechanics' Institute Fair at San Francisco.

JOHN LAWLER of Prescott, Ariz., owner of the Hillside mines, has gone to Florida for the summer.

H. W. STEVENS, a mine operator of Wickenburg, Arizona, is in San Francisco, Cal., on business.

JAS. ARGALL, formerly Supt. McCracken, Arizona, mine, is Mgr. Mexican mine, Groveland, Cal.

JOHN H. GARRETT, of Graham, Garrett & Co., is in Republic, Wash., examining mining property.

FRED WARD has been engaged as local manager of the Baltimore mine on Ni Wot Hill at Ward, Colo.

W. B. HANCOCK has gone to the Seven Devils, Idaho, district to begin work on the South Peacock mine.

JOS. LEITER of Chicago has dropped wheat, and, with a coterie of mining engineers, is looking at mines in southern Utah.

A. A. BLOW, who has been spending some time in the United States mining districts, is preparing to return to the Transvaal.

W. W. FISK, a Boston mining engineer, who has charge of a hydraulic mine in Sinaloa, Mexico, is in San Francisco to buy machinery therefor.

F. S. ROBBINS, E. M., in charge of McKenzie & Mann's interests in British Columbia, has returned to Greenwood, B. C., from an Eastern business trip.

H. DEAKYNE, First Lieutenant Corps United States Engineers, has been inspecting the debris dam built at the Red Hill hydraulic mine, El Dorado Co., Cal.

W. L. FISK, Major U. S. Engineer Corps, has been transferred to Portsmouth, N. H., from Portland, Or., relieving Col. C. R. Suter at the former place. He will be succeeded by Capt. Langfitt at the latter station.

H. J. REILING, president of the Pacific Dredging Co., was "held up" in a stage coach at Horseshoe Bend, Idaho, on the 21st inst., and robbed of $5000 in gold dust, the proceeds of a partial cleanup of the dredger work.

AT the annual meeting of the California Association of Civil Engineers in an Francisco this week, the following officers were elected: Pres., M. M. O'Shaughnessy; Vice-Pres., T. W. Morgan; directors—L. Bridges, F. T. Newbery, S. H. Smith, C. E. Moore, W. K. Miller; Sec., O. von Geldern; Treas., F. T. Newbery.

A. EKMAN of Oroville, Cal., has been appointed by the California World's Fair Commissioners to collect, install, maintain and manage the exhibit of California minerals at the Paris Exposition in 1900. Mr. Ekman had charge of the collection of minerals which Butte county, Cal., displayed at the Columbian World's Fair at Chicago and at the Midwinter Fair and Mining Jubilee, San Francisco. He is now securing mineral exhibits to be sent to Chicago, there to be classified and packed for export to Paris.

Commercial Paragraphs.

THE Colorado Iron Works of Denver, Colo., are building a 100-ton copper matte smelter for Cherry creek, Arizona.

LACY MANUFACTURING CO. of Los Angeles, Cal., are erecting a 35,000-barrel oil tank for the Coalinga Oil Co., Coalinga, Cal.

FRASER & CHALMERS have established sales offices at 1426-1429 Marquette Bldg., Adams and Dearborn Sts., Chicago, Ill. Their main offices will be located at their new works, Twelfth St. and Washtenaw Ave., Chicago.

IN addition to being sole Pacific Coast agents and builders of the Wilfley concentrator, the firm of White, Rogers & Co., 306 Pine St., San Francisco, Cal., supply and put in place modern mining machinery of all kinds.

MESSRS. HEWITT & REARDON, the Compressed Air Machinery Co., 11 and 13 First St., San Francisco, Cal., have a flexible metal hose, copper or steel, any required dimension, that should be of practical value to anyone using hose or tubing.

A CATALOGUE upon underground electric haulage has been issued jointly by the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Co. Electric mine locomotives produced by such eminent manufacturers cannot fail to interest all mine proprietors who study economy in operating expenses. The catalogue illustrates and describes the locomotives and contains tables of dimensions and of the hauling capacity upon various grades.

THE Keystone Driller Co. of Beaver Falls, Pa., have shipped two of their placer testing machines to the Feather River district, Cal., one for a Philadelphia company and one for the New England Exploration Co. of Boston. They are shipping two more to the same general neighborhood for other parties; also, one to Ortiz, Sonora, Mexico. A machine was lately put to work for the Taylor Park M. Co. of Tin Cup, Colo. With their placer testing machines the Keystone Driller Co. are furnishing a new device for drawing the 6-inch pipe after the tests are completed. A dredger pump has recently been brought out by the Keystone Driller Co., which will take up the liquid mercury or amalgam from the bottom of a test well. It is automatic in operation, being lowered into the test well by means of a rope. It is used in connection with the placer testing machinery made by this company.

THE expanding commercial interests of Los Angeles, Cal., are typified in a factory such as that conducted by the Ready Rock Roofing Co., which produces a roofing not affected by sun heat, which can be laid at any pitch, and which will hold the gravel surface indefinitely. Mr. G. W. Ludlow is president of the company. The backing of this roofing is a piece of wool felt thoroughly saturated in asphalt. The asphalt used throughout the process is rock asphalt, produced by the Alcatraz Asphalt Co. Six or eight tons are treated at a time. The second layer of the roofing consists of burlap, which is immersed in the asphalt at 300° F., until every fiber is saturated. The felt and burlap are timed in their progress through the machine, so that the asphalt surface receives the gravel coating at the proper temperature. Later it reaches a set of rollers, the upper of steel and the under of rubber, adjusted to give the degree of pressure necessary to imbed the gravel evenly and firmly in the asphalt. The gravel used is a natural quartz gravel, which Mr. Ludlow states he has so far found nowhere except in Los Angeles. This fact, with the nearness to the asphalt mines, were the principal factors in locating the factory in Los Angeles. The use of this gravel obviates possibility of cutting the fiber of the burlap. The capacity of the present plant is sufficient to turn out a 40-foot roll, 2¼ feet wide, every two minutes. Several shipments have been made to Honolulu. The United Verde Copper Co. of Jerome, Ariz., have recently used a large quantity of it. Smith & Young handle it in San Francisco.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LIQUID RUDDER BALANCE.—J. Christensen, San Francisco, Cal. No. 620,973. Dated August 15, 1899. This invention relates to a governor for ships' rudders. It consists essentially in a novel arrangement of a cylinder or cylinders with piston movable with relation thereto, a piston rod connecting the main cylinder with a lever fixed to and movable with the rudder stock, and a means for transferring liquid from one side to the other of the piston within the main cylinder, and means for compensating for the difference between the two ends of the cylinder by reason of the space occupied by the piston rod upon one side of the piston. It also comprises means for replenishing the loss of liquid within the cylinders from time to time. With a device of this character connected with the stock of the rudder, the shocks caused by the action of the sea in heavy weather are prevented from being communicated through the steering gear on account of the resistance of the liquid moving through the small communicating passages, and while these passages do not prevent the slow movements from side to side when operated by the steering gear, they prevent its being suddenly dashed to one side or the other. The details or compensating for the different amounts of liquid required to fill the opposite ends of the cylinder and the means for supplying any waste make a very effective operating device.

CAN SOLDERING APPARATUS.—W. S. Case, San Jose, Cal. No. 630,591. Dated Aug. 8, 1899. This invention relates to an apparatus by which square cans are delivered into holders and caused to traverse a solder bath with means for rotating the cans at stated intervals so as to present each of the edges to be soldered while the can is passing through the bath. It consists of a trough for melted solder, a framework fixed diagonally with relation to the trough having a support in which the sides of the cans rest and a second support against which the bottom of the can rests so that the angular edges will be submerged in the solder. A device is employed for moving and turning the cans consisting of an endless traveling chain, shafts journaled transversely of the chain and in line with the axis of the can, arms fixed to the upper ends of the shafts and fixed stationary lugs with which the arms engage successively as the chains travel, thus turning the shaft at intervals to submerge the new edge of the can in the solder bath. A transversely slotted disk is fixed to the lower end of each shaft and a carrier head is loosely attached to the disk and movable radially with relation to it. Arms project from this head and are adapted to clasp the end of the can so that the movements of the head will allow the angular can to turn as it moves through the bath.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING AUGUST 15, 1899.

631,060.—PRINTER'S RULE—I.W. Allspaugh, Stockton, Cal.
630,839.—LOCK—J. F. Anderson, Paso Robles, Cal.
630,971.—SLUICE—P. S. Buckminster, S. F.
630,973.—RUDDER BRAKE—J. Christensen, S. F.
630,153.—SAW—M. J. Clark, Chaparral, A. T.
631,155.—TYPEWRITER—J. M. Cramer, Santa Margarita, Cal.
631,005.—APRON FASTENER—H. K. Custer, Norwalk, Cal.
631,065.—AWNING—J. Delorieux, S. F.
630,975.—GAS GENERATOR—G. Dawson, S. F.
630,868.—SPLIT PULLEY—J. A. Dorman, Woolley, Wash.
631,068.—BOTTLE STOPPER—J. P. Erie, Los Angeles, Cal.
631,009.—SICKLE BAR—J. Hahn, Colegrove, Cal.
631,021.—CHOPPING KNIFE—J. W. Lohr, Lamanda, Cal.
631,261.—WATER HEATER—T. Pattison, San Luis Obispo, Cal.
630,924.—TROWEL HANDLE—W. D. Pickens, Bull Run, Ogn.
631,178.—WAVE POWER—T. Redding, Seattle, Wash.
630,932.—ROTARY PUMP.—A. Rock, S. F.
630,990.—SOUND INDICATOR—C. Salmond, S. F.
630,964.—POSTAL MACHINE—Wright & Griffith, Portland, Or.

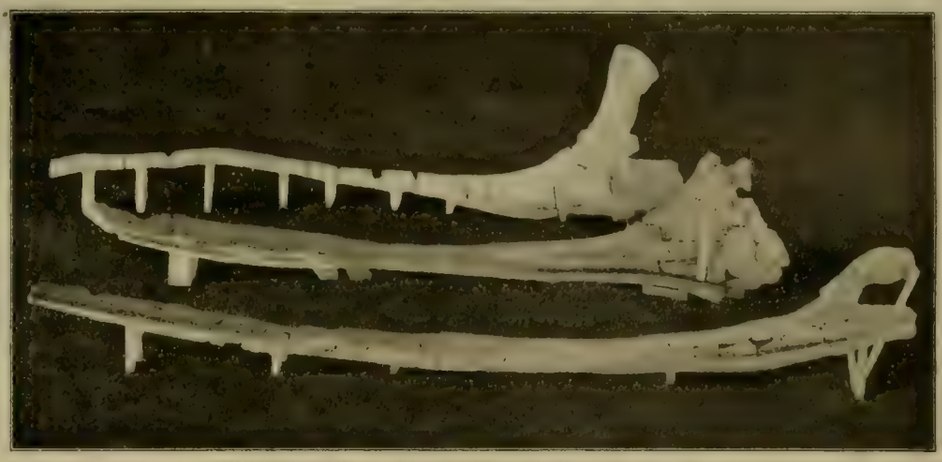
NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Obituary.

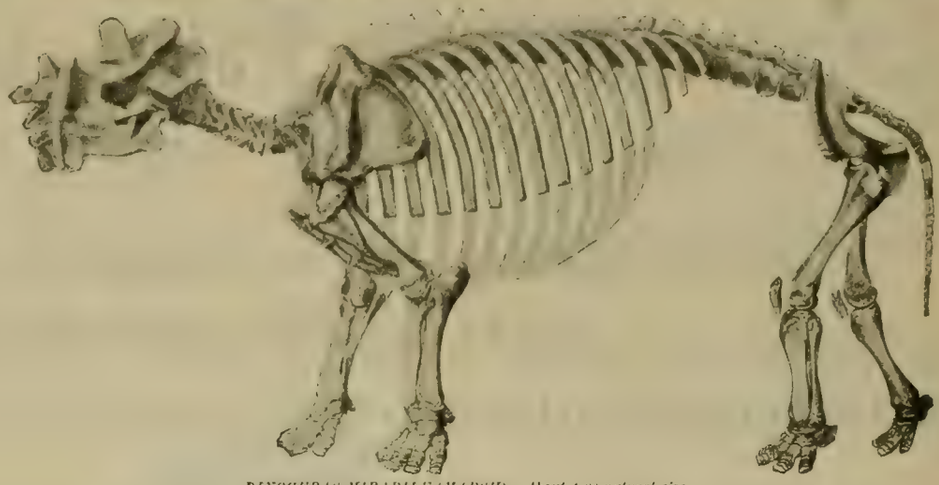
ON the 19th inst. John R. Thom, Supt. Los Angeles mine, Bull Hill, Cripple Creek, Colo., fell from the fourth level to the bottom of the shaft, 200 feet, and was instantly killed. There were no chains, bars nor lights at the mouth of the drift, and their absence caused his death.

The Gigantic Fossils of Wyoming.

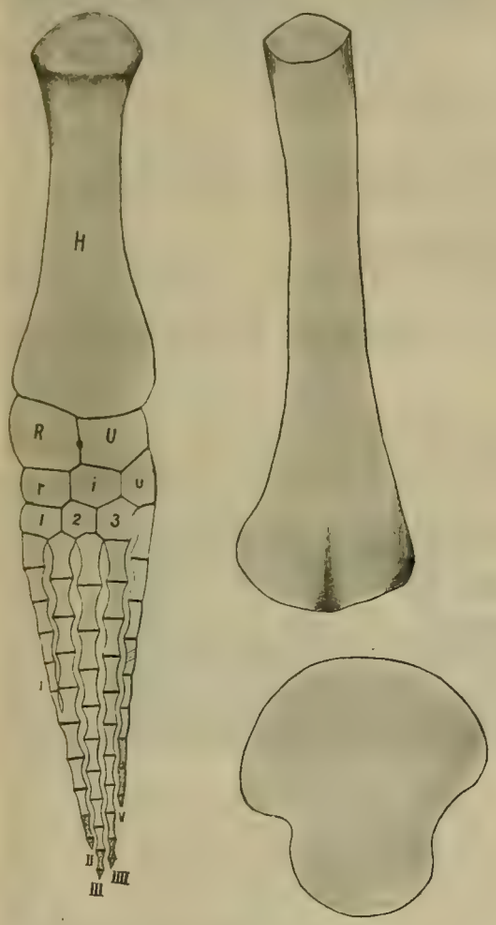
The extinct animals being found under the plains of Wyoming do not cease to be a wonder. Other lands have produced huge mammals and strange reptiles, but none ever previously discovered can equal or approach those of the Cretaceous and Tertiary beds of southeastern and central Wyoming. Under the auspices of the Union Pacific Railroad a large party of men from numerous colleges and universities, headed by Prof. Wilbur C. Knight of the Wyoming University, is now delving into the sandstone and clays for the fossil remains of these immense animals long since extinct. Herewith are illustrated two of these monsters with the individual bones of several others. At one time Wyoming had numerous fresh water lakes and a semi-tropical climate, at which time these animals appear to have dwelt in the swamps and lakes in great numbers. Dying, they sank in the mud flats, and accumulating deposits covered the remains, the bony parts of which were turned to stone. These are called fossils. Birds, fish, trees, leaves and other forms of organic life have been preserved in like manner. The tracks made by animals in the soft mud are also often found and ripple marks of waves and even the imprint of rain drops can sometimes be seen with wonderful distinctness.



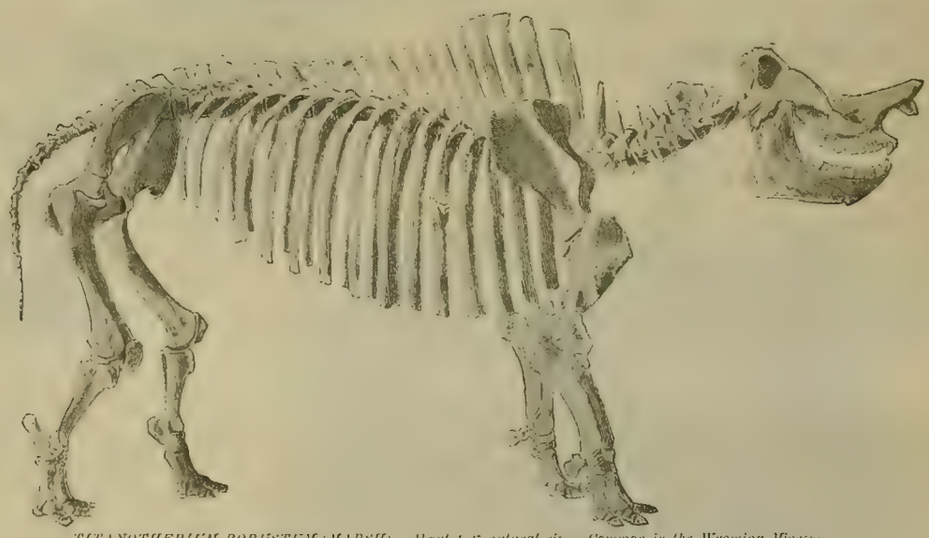
THREE RIBS FROM A LARGE DINOSAUR.—Longest rib over 6 feet.



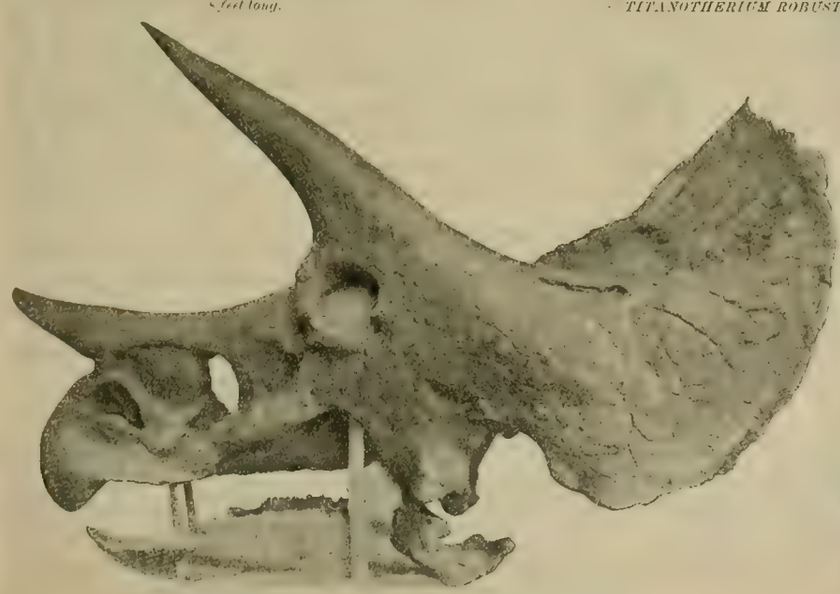
DINOCERAS MIRABILE (MARSH).—About 1-20 natural size.



MEGALNEUSAURUS REX (KNIGHT).—Front limb nearly 5 feet long.



TITANOTHERIUM ROBUSTUM (MARSH).—About 1-27 natural size. Common in the Wyoming Miocene.



HEAD OF TRICERATOPS PRORSUS (MARSH).—About 1-12 natural size.



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COPPER AND LEAD-SILVER SMELTING PLANTS,

Latest Improved Water Jacket Furnaces,

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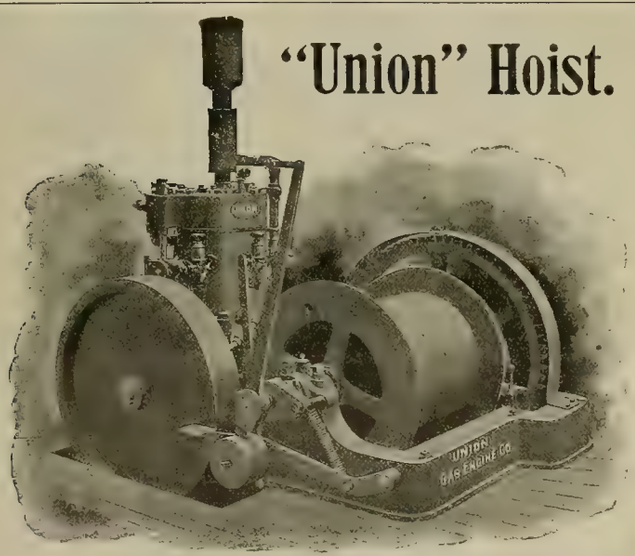
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Stamp Mills and Concentrating Plants,

HIGH GRADE ENGINES AND BOILERS.

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The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
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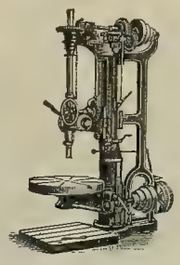
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Engine Lathes, Pulley Turning Lathes, Iron Planers
Slotters, Upright Drilling Machines,
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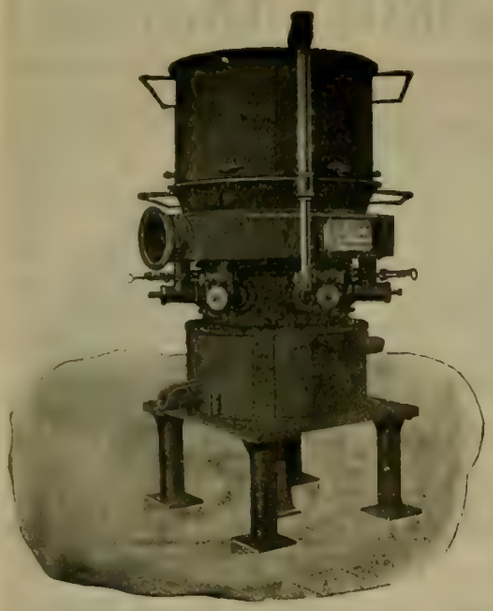
THE BUCYRUS COMPANY,

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A MODERN COPPER SMELTER (ROUND FORM).

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MANUFACTURERS OF

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For the Treatment of

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THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 245.)

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DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

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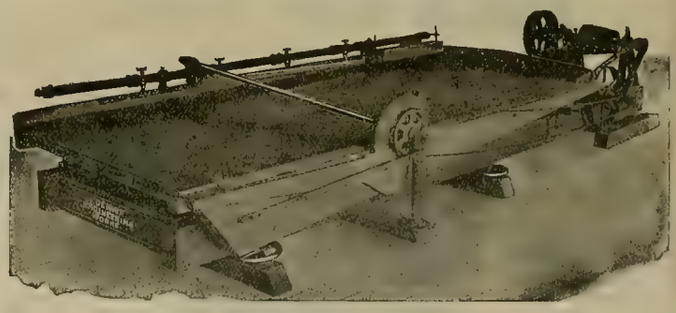
BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

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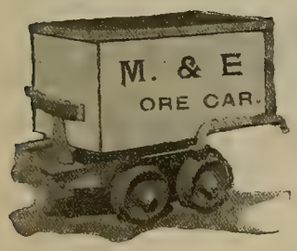
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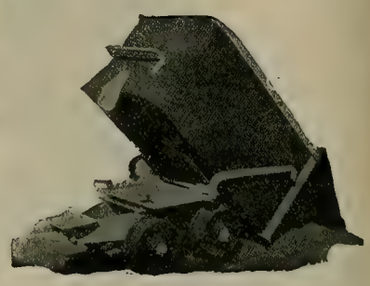
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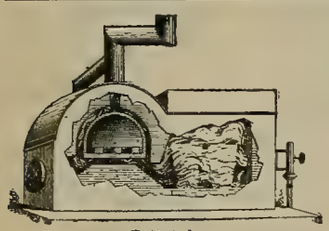

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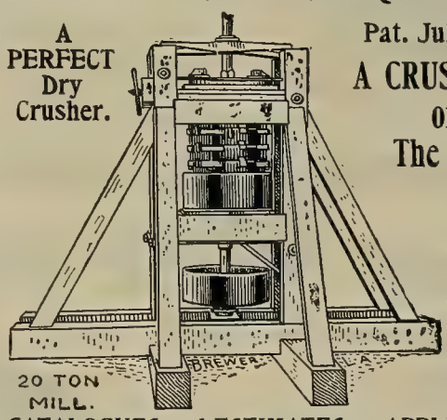
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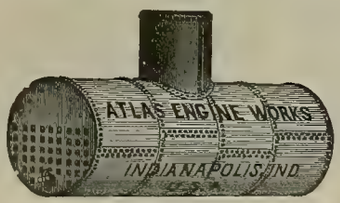
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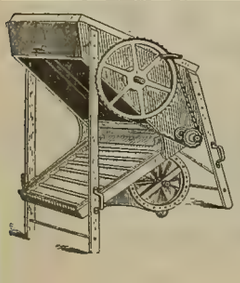
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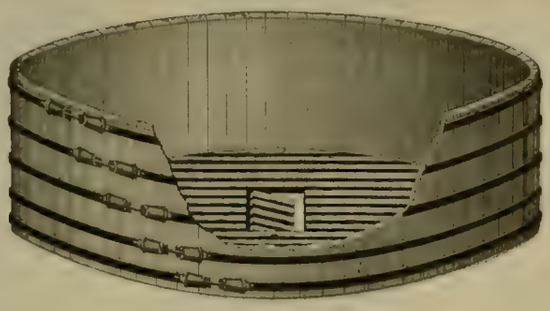
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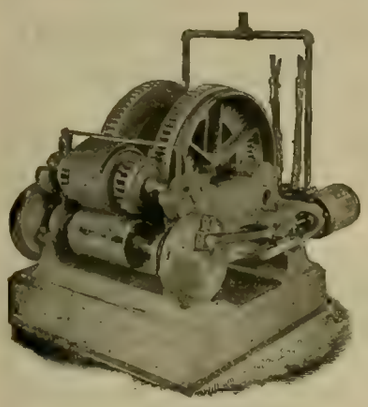
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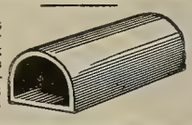
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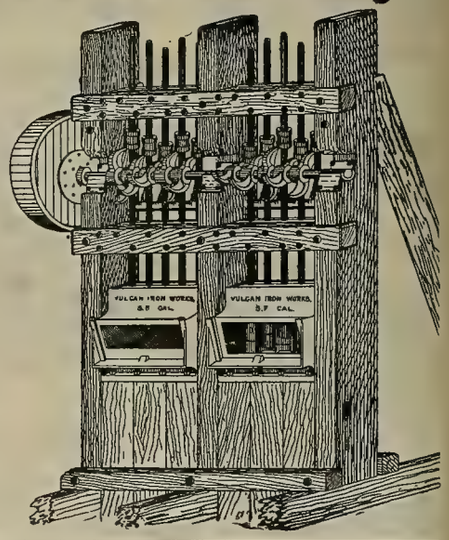
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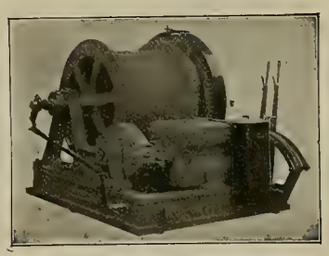
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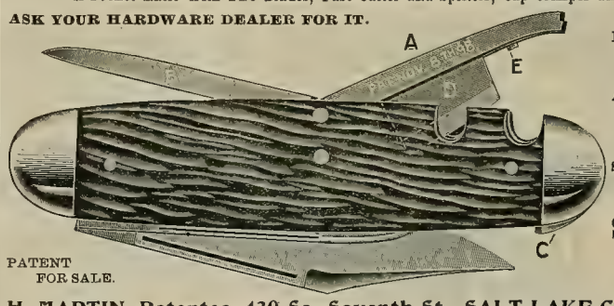
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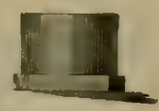


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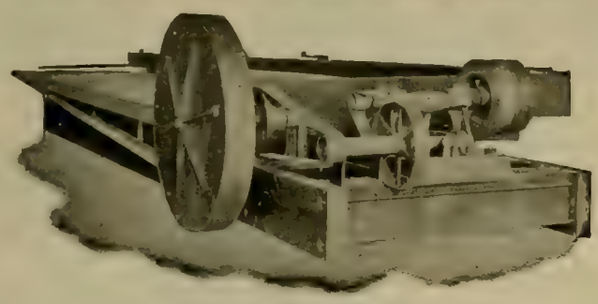
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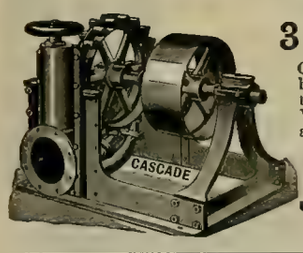
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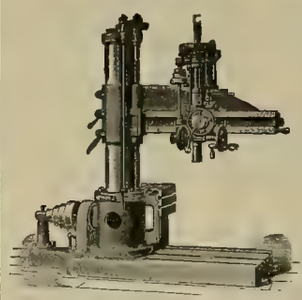


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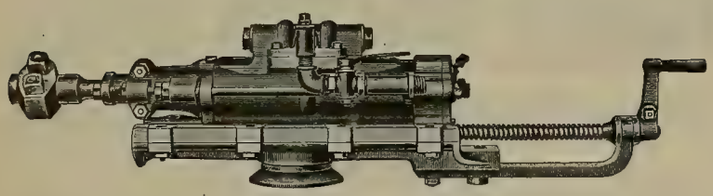
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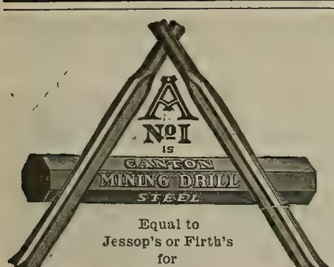
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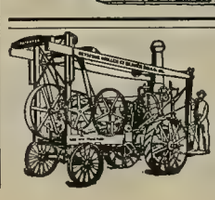


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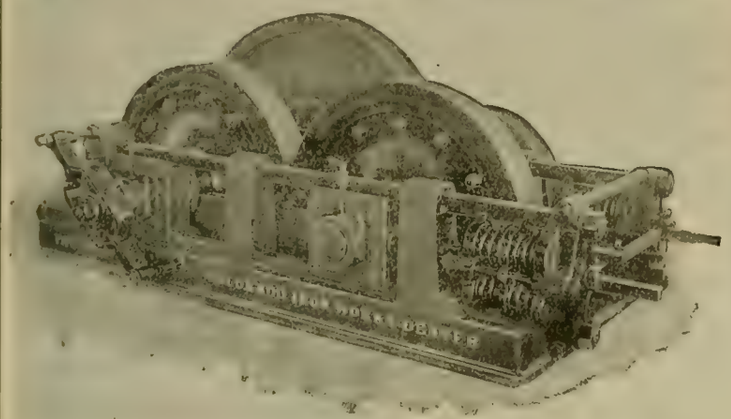
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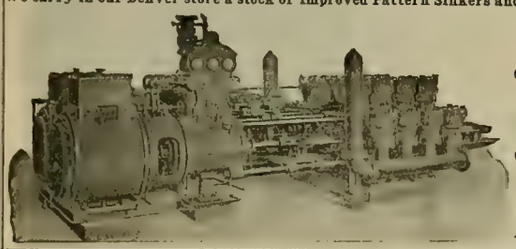
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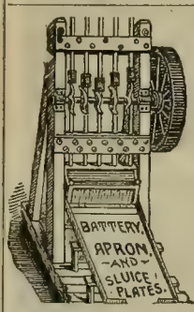
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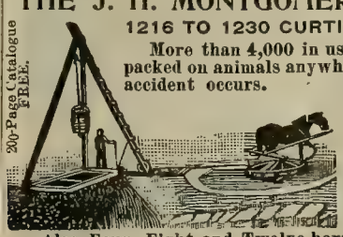
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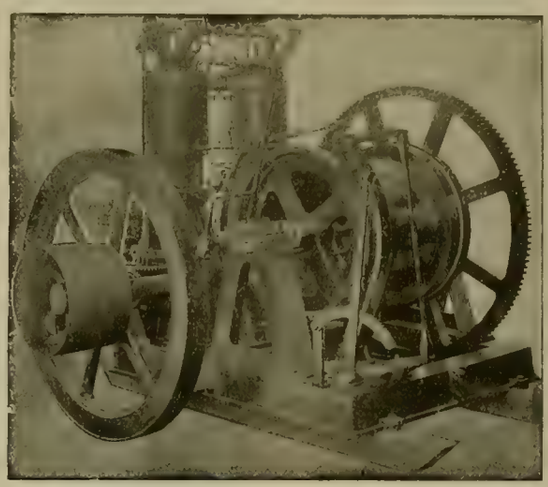
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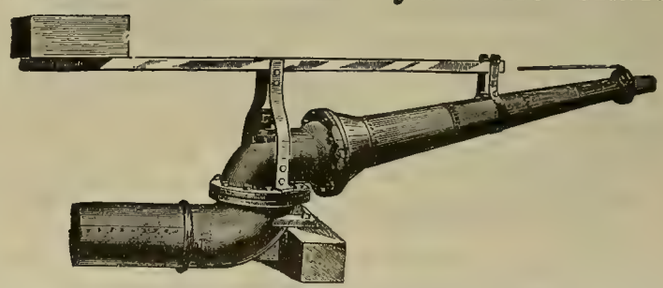
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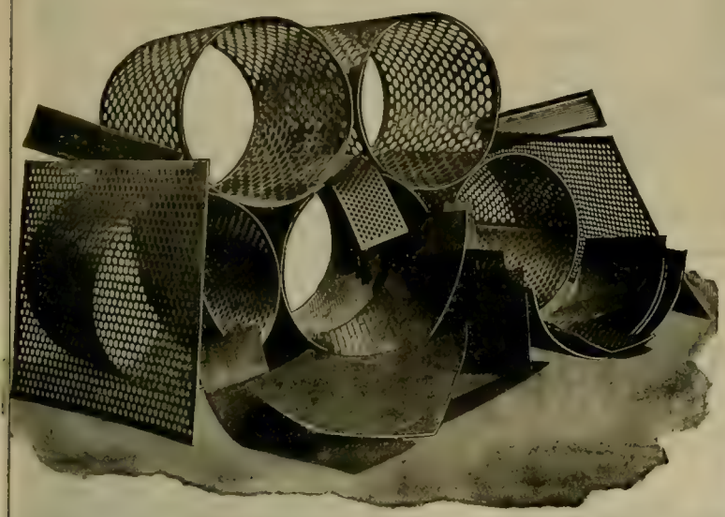

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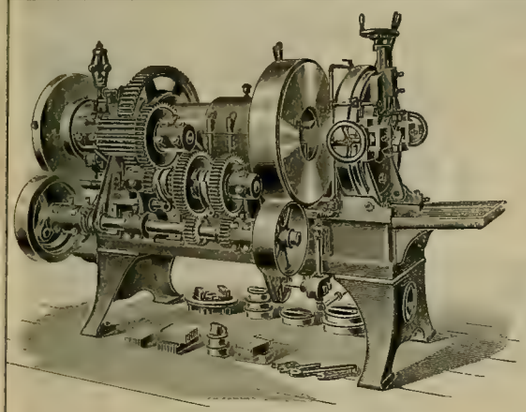
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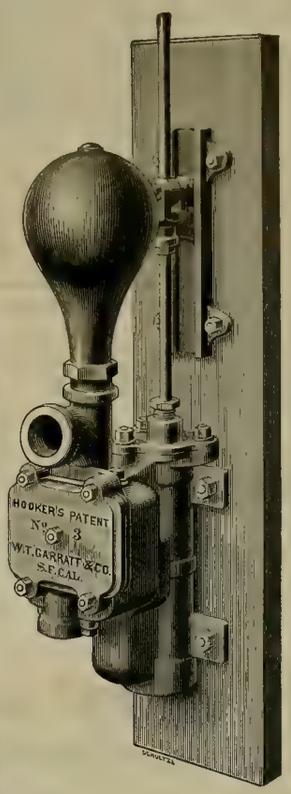
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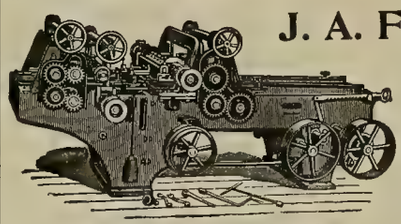
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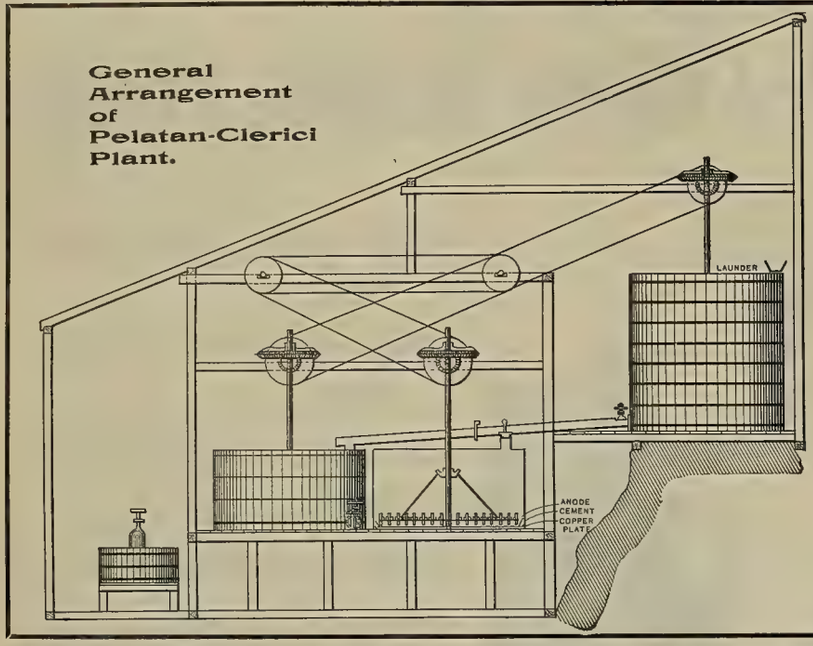
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Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898.
In Canada: June 21, 1898.

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We make all kinds of Cars, Skips and Charging Carts for the Mine, Mill and Smelter.
SEND FOR PAMPHLET.
Dealers Wanted in Mining Sections to Handle the Truax Ore Cars.



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The "Pelatan-Clerici" Process

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Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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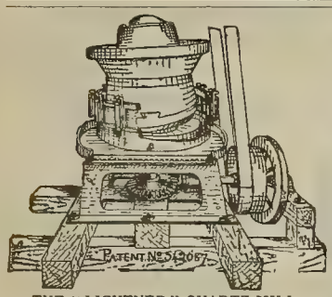
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The result of ten years' solid work. Success at last. What we wanted, and the public demanded, was a Gates Gyratory Rock and Ore Breaker (always adjustable and indestructible) so modified in design as to make one-half-inch product from three-inch sizes, rapidly and cheaply. The H Fine Crusher will do this work. It takes the place of expensive big rolls and often prepares ore, without further crushing, fine enough for coarse concentration or cyaniding. In any event, it is the greatest and best intermediate machine between the coarse breaker and the pulverizer.

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THE "LIGHTNER" QUARTZ MILL.

W. H. Birch & Co.

No. 127 to 135 First St., San Francisco, Ca'.

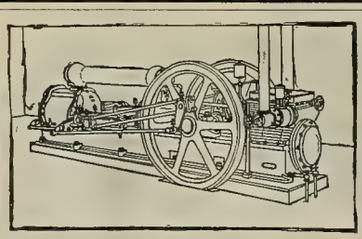
— BUILDERS OF —

LIGHTNER QUARTZ MILLS.

			Price.
No. 1 works 3	tons per day with	1½ H. P.,	$225
No. 2 " 4 to 7	" "	2½ "	$425
No. 3 " 10 to 15	" "	3½ "	$600

LARGER MILLS BUILT. SEND FOR CIRCULAR.

"Birch" Two-Stamp Mills, McGlew Concentrators, And All Kinds of Mining Machinery.



THE NORWALK Air and Gas Compressor.

In use in every State in the Union, Central and South America, Great Britain, etc. Also by the U. S. Army and Navy.

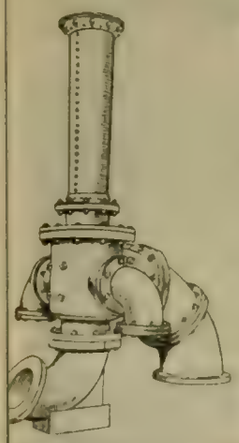
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The Evans Hydraulic Elevator,

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RISDON IRON WORKS, San Francisco.

Used in Unwatering the Comstock Lode.

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The cheapest and most efficient Water Elevator made.

It will do more and better work than any other Gravel Elevator.

It is fully protected by United States and Canadian letters patent.

CABLE HOIST CONVEYORS.



Cable Hoist Conveyor at St. Paul, Minn.

Laurent-Cherry Patent System,

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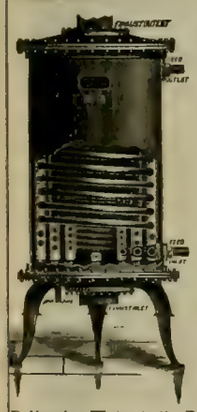
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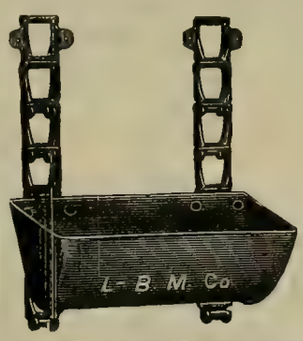
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Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the Best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY. Send for Catalogue.

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Small Portable Saw Mills and DRAG SAWING MACHINES FOR RANCHES AND MINES.



Woodworking Machinery.

LINK BELTING, SPROCKET WHEELS, ELEVATOR BUCKETS & BOOTS, TAKEUPS, FRICTION CLUTCH PULLEYS, ETC.

ALL STYLES AND SIZES IN STOCK FOR IMMEDIATE DELIVERY.

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SIZES ON HAND:
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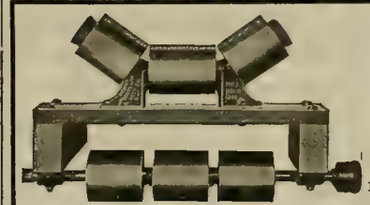
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MALLEABLE IRON BUCKETS, Electric Coal Mining and Haulage Machinery, Luhrig Patent Machinery for Washing and Classifying Coal, Shafting, Pulleys, Bearing Rope Sheaves, Clutches, Etc.

Machinery designed and erected to suit existing conditions and available space.

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JEFFREY WATER ELEVATOR.

Best and Cheapest Pump for Irrigating and Drainage Purposes.

Estimates and Plans submitted.

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A Small Sinker AT A Small Cost.

THE MOORE SINKING PUMP.



Weight 450 lbs.

No outside valve gear. Valve requires no setting. Is simplicity itself.

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PATENTS
330 MARKET ST. S.F.

Market Reports.

SAN FRANCISCO, Aug. 24, 1899.

SILVER.—London, 27 9-16d; New York, 60¼; San Francisco, 59 13-16; Mexican Dollars, 49@50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.62½ asked; brokers' price, $4.35.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake unchanged at $18.50; brokers' price, $18.75. Local—Mill copper plates, 23¼c.

The visible supply of copper in London Aug. 15th was 32,713 tons—a decrease of 306 tons since Aug. 1. Visible supply Jan. 1, 1899, was 27,896 tons; Feb. 1, 26,015; March 1, 24,326; April 1, 28,497; May 1, 26,529; June 1, 30,156; July 1, 29,004; Aug. 1, 33,019; Aug. 15, 32,713. Supplies for the fortnight, 10,569 tons, of which 950 were from Chili and 4536 from America; deliveries, 10,875 tons.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Weak; $31 bid; 31.25 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER. — Local, $43.50; export, $39.50@40; carload lots, special rates.

PLATINUM. —London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS. — Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¼@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2¼c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drusm, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16¼c; Astral, 16¼c; Star, 16¼c; Eocene, 18¼c; Extra Star, 20¼c; Elaine, 21¼c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ...)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¾	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 23, 1899.

9:30 A. M. SESSION.

100 Belcher	30c	700 Justice	12c
200 Best & Belcher	57c	100 Mexican	47c
400 Caledonia	59c	600 Ophir	$1 05
150 Caledonia	58c	1100 Overman	10c
100 Con. Cal. & Va.	$1 80	200 Union Con	23c
100 Gould & Curry	37c		

2:30 P. M. SESSION.

100 Belcher	30c	200 Ophir	$1 05
50 Caledonia	53c	100 Overman	10c
250 Caledonia	50c	400 Potosi	30c
600 Chollar	30c	500 Seg. Belcher	05c
300 Crown Point	20c	200 Sierra Nevada	69c
200 Hale & Norc's	30c	100 Union Con	21c
250 Gould & Curry	36c	100 Yellow Jacket	27c
200 Mexican	47c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.

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The oil fields of California are rivaling those of the world as fortune makers for the lucky investors. Stocks that are now selling for a few dollars will bring hundreds and in some instances thousands per share

When Oil Is Struck.

We have 2000 acres right in the wonderful Panoche Belt. The leading experts declare it positively oil bearing. Sinking of wells commences immediately. Our stock is $4 per share now. A few shares may fix you comfortably for life. Prospectus with full particulars free.

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalecknecht, Durango, Mexico.

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About 3000 Sq. Ft. No. 24 Gauge, Galvanized.
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" 5000 " No. 28 " "

SLIGHTLY DAMAGED BY WATER.

PHELPS & ARNOLD,

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Hydraulic Mines for Sale in Similkameen District, British Columbia.

667 ACRES. 5000 INCHES WATER IN DRIEST PART OF SEASON.

Two years' working bond will be given on favorable terms, or lease with option.

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FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. S. Goodwin, in the Birdseye Creek Placer Mine, at You Bet, Nevada Co., to deposit tailings in an old pit; from Mrs. E. A. Cox, in the Washington Mine, at Whiskey Diggings, Sierra Co., to deposit tailings in Fourth Ravine; and from Geo. W. Stone and Jas. J. Schenrich, in the Red Hill Gravel Mine, near Diamond Springs, El Dorado Co., to deposit tailings in a ravine and in Ringgold Creek, gives notice that a meeting will be held at Room 69, Flood Building, San Francisco, Cal., on September 4, 1899, at 1:30 P. M.

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L. PETERSON, MODEL MAKER,

226 MARKET ST., N. E. Corner Front (Up Stairs). SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.



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Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

COPPER MINE.

Partner wanted (miner preferred) who has $5000 to spend developing a mining property in Mexico, which has lately produced a considerable amount of ore.

Object, deeper development and ultimate placing the property on the market.

No attention given to brokers or middlemen.

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Practical, experienced, intelligent, and up-to-date working of gold, silver or copper mines, whether small or large. Moderate salary. Good references. Address

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THE SPOKANE BUREAU OF MINING,

N. E. LINSLEY, Manager.

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Consulting Mining and Milling Engineer.

Will Examine and Report on Mines.

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To Whom It May Concern:

The so-called Cammett Concentrator which is being advertised and offered for sale by the Denver Engineering Works Company of Denver, Colorado is a palpable infringement upon claims covered and protected by United States Letters Patent granted for the Wilfley Concentrator, and all persons who purchase and put the same in use will be promptly proceeded against as the law provides.

WHITE, ROGERS & COMPANY,

Exclusive Licensees for Building and Sale of Wilfley Concentrators on Pacific Coast under U. S. Letters Patent Granted A. R. Wilfley.

306 Pine Street, - San Francisco, Cal.

FOR SALE.

New Mining Hoist.

New Hercules Gasoline Hoist, 35 H. P.

Will hoist 3500 lbs. at 700 feet per minute. Made in sections not exceeding 1000 lbs. each.....$1400

ONE 4 H. P. HERCULES GASOLINE ENGINE—Second Hand.

Guaranteed order.....$200

ONE 12 H. P. HERCULES GASOLINE ENGINE—Second Hand.

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Finds buyers or working capital for meritorious mines or good prospects. Correspondence invited.

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AT SACRAMENTO, CAL.

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AN AGRICULTURAL SHOW, RACE MEET, AND AMUSEMENT EXPOSITION.

Over $10,000 in Premiums For Farm Stock and Agricultural Products.

Beef and Dairy Cattle from the World's Fair, and the pick of American Herds. Sheep imported from England. Fancy Swine and Poultry.

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The Great Exposition Brass Band will give daily concerts, day and evening, at the Park and Pavilion. Novel musical features and instrumental specialties.

Great Mechanical Display—Machinery, modern and novel, will be shown at work and in motion.

Pavilion Will Be Filled with Industrial, Agricultural, and Trade Displays artistically arranged, lighted by electricity, in bewildering variety and motion.

Fruit for the Great Paris World's Fair will be shown in fancy packages and crystal jars, before being transported to France.

FEATURES

A MODEL SILO AND CUTTING MACHINERY AT WORK.
A MODEL CREAMERY IN OPERATION. AN ART DISPLAY OF CHOICEST WORKS.
A CONVENTION OF THE CALIFORNIA DAIRY ASSOCIATION.
DAILY CELEBRATIONS BY VARIOUS BODIES AND ORGANIZATIONS.

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Come to the Fair for Instruction and Amusement.

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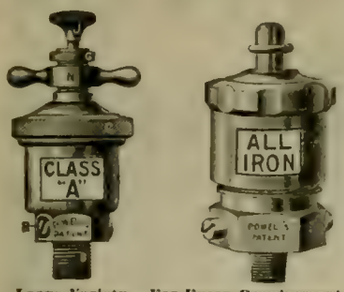
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Assessment Notices.

CENTRAL EUREKA MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sutter Creek, Amador County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of July, 1899, an assessment (No. 13) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 9, 320 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 25th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
WM. A. M. VAN BOKKELEN, Secretary.
Office—Room 9, 320 Sansome street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of July, 1899, an assessment (No. 12) of ten ($10) dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 29th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
JOSEPH H. MOOSER, Secretary.
Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 20) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
J. J. CRAWFORD, Secretary.
Office—1209-11 Claus Spreckels building, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1899, an assessment (No. 8) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

ORLEANS MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Grass Valley, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 31st day of July, 1899, an assessment (No. 9, new series) of five (5c) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 324 Pine St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 3rd day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. P. THURSTON, Secretary.
Office—Room 10, 324 Pine St., San Francisco, California

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment (No 7) of One Dollar per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24 San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before will be sold on WEDNESDAY, the 25th day of October 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
JOSEPH H. MOOSER, Secretary
Office—320 Sansome street, room 24, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINING Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 19th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

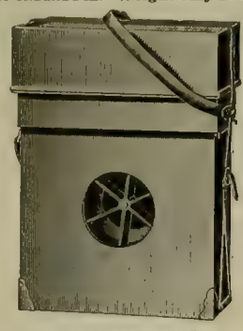
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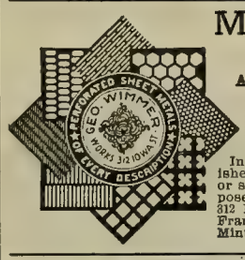
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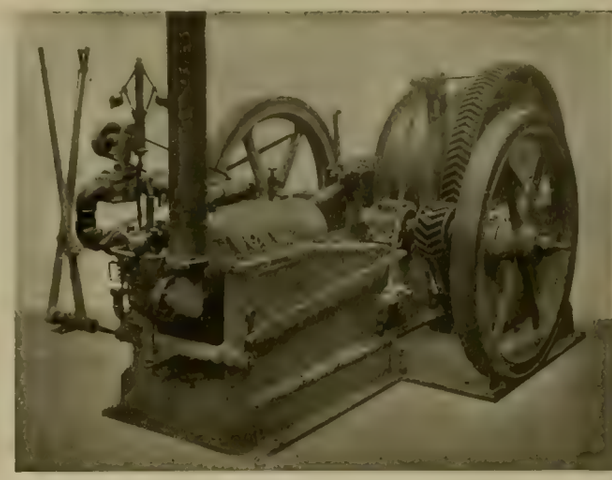
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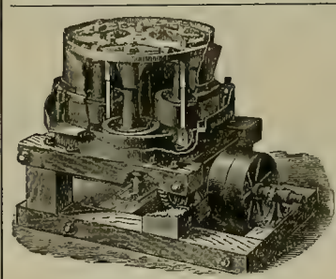
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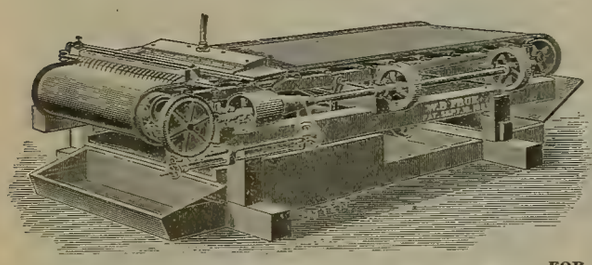
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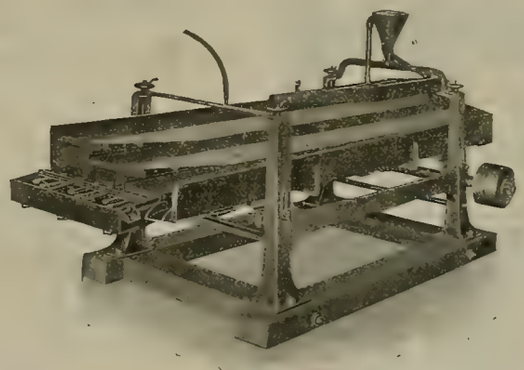
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No. 2043.—VOLUME LXXIX. Number 10. SAN FRANCISCO, SATURDAY, SEPTEMBER 2, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Coal of the Crow's Nest Pass.

The discovery and development of coal in Crow's Nest pass in Southeast Kootenay in 1897–98 is considered by the Minister of Mines of British Columbia as one of the most important developments in the province, for the reason son that it can supply the mining region of East and West Kootenay with a cheap, serviceable coal without breaking bulk, delivering the cars at the various mines. Thirty-four coal seams are known to exist in the several basins, and these afford two varieties of coal—bituminous and cannel coal. The Elk River series outcrops along the mountains on the east side of Elk river, from Morrisey creek to above Coal creek, at 1600 to 2500 feet above the valley of Elk river, the beds dipping easterly into the mountain at a low angle. These are the only ones thus far developed. In thickness the veins range from 4 to 30 feet, three of them being in the latter class and one is 15 feet. The coal veins are intercalated with sandstones, conglomerates and shales. The deposits are extensive, reaching for miles.



BRIDGE CONNECTING TUNNELS, CROW'S NEST COLLIERIES, KOOTENAY, B. C.

During 1898 tunnels No. 1 and No. 2 of the Crow's Nest Coal Company were connected by a trestle 1000 feet long, a view of which appears on this page, which was kindly loaned by Mr. Mortimer Lamb of the *British Columbia Mining Record*. Complete shaking screens have been built about the center of the trestle. At Fernie a number of coke ovens have been built and the company announces its intention of putting up 200 of the beehive pattern.

Moyie lakes are a widening of Moyie river. The town of Moyie is on the eastern shore of the most southerly of these lakes. The country rock of the vicinity is composed of gray slates and shales, with beds of quartzite dipping about 15° easterly. On the mountain above the town a number of locations have been made, among them the St. Eugene mine. On the opposite side of the lake is the Amora group. The veins at Moyie cut the stratified rocks and carry galena, being heavily mineralized in places. Bull river heads in the Rockies and empties into Kootenay river near Wardner, B. C. In early years considerable placer gold was taken from various parts of the stream, but no one has yet been able to locate the veins or formation from which the placer gold, which was rich, came. The country rock consists of alternating strata of hard, dark slates and quartzites. Near the head of the canyon the rocks are much disturbed and folded, as shown in the accompanying engraving. There are very few veins cutting the slates, and none which carry free gold. Two large dykes, parallel and several hundred feet apart, cross the river above the canyon and on one of these numerous locations have been made. Excavations on this dyke showed galena in the porphyry.



BULL RIVER, KOOTENAY, B. C., SHOWING STRATA.



MOYIE CITY, KOOTENAY, B. C.

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J. F. HALLORAN.....Publisher

San Francisco, September 2, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Bridge Connecting Tunnels, Crow's Nest Collieries, Kootenay, B. C.; Bull River, Kootenay, B. C., Showing Strata; Moyie City, Kootenay, B. C., 253. Automatic Sampler for Slimes, 256. Buffalo Hump, Idaho, Looking West from Concord Townsite, 258. Latest Mining and Metallurgical Patents, 259. The Junkers Gas Calorimeter; Junkers' Calorimeter for Liquid Fuels, 260.

EDITORIAL.—Coal of the Crow's Nest Pass, 253. Some of the Reasons; Mineral Production of the United States; Miscellaneous, 254.

MINING SUMMARY.—261-262-263.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 278.

MISCELLANEOUS.—Concentrates, 255. Notes on Sampling, Analyzing and Treating Slimes, 256. Mining Definitions; Across the Pitch Versus Up the Pitch; State and Federal Mining Law, 257. The Buffalo Hump District, Idaho; The Lucknow, N. S. W., Gold Field, 258. Latest Mining and Metallurgical Patents, 259. Measuring Gas and Liquid Fuel; Some Experiences of a Working Miner, 260. Industrial Notes; Personal; Commercial Paragraphs; Catalogues Received; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 263-264. Average Life of Iron or Steel Bridge; America Leads as a Producer of Iron and Steel; The Sequoias of the Sierra; The Largest Vessel Afloat, 265.

Some of the Reasons.

"If your mine is so good; if the prospect is so favorable, why don't you work it yourself, and if you don't do that why don't you get some one from your own city, State or country to buy it or take hold of the project? It must be that the property can not be what you represent it or it would not be necessary to bring it over here."

The above is what is often heard by anyone who proffers a meritorious mining proposition in the East, or England, or elsewhere. It is not an unnatural view, and deserves consideration.

The ordinary reason why an ordinary mine owner or prospector does not develop his own property is that he hasn't the money: if he had he wouldn't be offering the property, but would work it himself, yet this is no fair argument against the value of the property, for mines are made, and usually require considerable money to be properly started. It is the same with nearly every enterprise or business. Whether it be a railroad, a manufactory, a newspaper, a mercantile establishment, a bank, or anything else requiring much money, it will usually be found that the enterprise is not started nor run by individual capital, but that the collective contributions of hundreds of people have gone into the necessary fund that made the plan possible. It would be as reasonable to ask a man suggesting the taking of a slice of stock in any other promising proposition: "Why don't you start this thing yourself?" as to suggest the same objection to the man seeking to sell what is ofttimes more likely to develop into a dividend payer than any other corporation or partnership plan.

Again, because a mine is proffered to a foreign capitalist, it is no evidence that it is worthless or not wanted nearer home, or not considered worth having. This latter objection is the most constant, yet most inconsistent, of any. It is based on a wrong conception of facts. If there were only 200 or 300 mines or undeveloped prospects in the country, and these had been sized and sifted by home purchasers or local investors, the best absorbed and the worst neglected, it would be fair to infer that it was one of the latter class that was being offered. But it is a case of "oversupply." Local residents are not numerous enough to take all the opportunities, however promising. While thousands of millions of dollars have been and are being locally invested in mine property, as much more could be so invested to advantage. Take the case of California. It is sometimes said at home and abroad, with a sneer: "Why doesn't San Francisco invest? If you have so much valuable mining area, the people there would be likely to keep it as too good a thing to be let go."

There are thirty-seven gold-producing counties in the 156,000 square miles of California's area. San Francisco has been investing money in mines for fifty years and is to-day more heavily interested in mines in California and elsewhere than ever before. In one county in California, San Francisco has put over $5,000,000 in the last three years. There are few mining districts in any part of the west half of America in which San Francisco capital is not invested, but ten San Franciscos could not furnish the requisite amount of money necessary to develop the multitude of deserving mining projects daily brought to its attention. What is said of San Francisco applies with even greater aptness to Denver, Salt Lake City, Spokane and other cities. There are mines of merit in Colorado that cannot find capital in Denver to push them onto a stage of development that would make them big-paying propositions, not from any distrust in Denver of their value, not from any local knowledge that would cause refusal, but purely because of the multiplicity of such proffers. Denver is a rich and progressive city, and its people are not slow to seize opportunities for making money quickly in mines or any other legitimate form of investment; but were Denver a dozen times as rich and enterprising and ready to invest every available dollar in good mines in Colorado alone, the supply would exceed the possibility of such investment. And as in San Francisco and Denver, so in Salt Lake City. The writer recently sojourned in the Utah metropolis. Remembering it when it was a little adobe-built settlement, he noted with pleasure the buildings, the large hotels, stores and fine private residences, the air of growing wealth evident in every quarter. It was manifestly due to the mining element. Every mining company operating in Utah, except four, has its headquarters in Salt Lake City; to Salt Lake goes much of the proceeds of the mines; from Salt Lake went much of the money that opened up those mines and made prosperity in mountain and desert. Yet there are promising prospects enough in Utah—embryo mines that will some day be big dividend payers—to absorb every dollar that Salt Lake could raise in the next ten years.

So, likewise, it might be truthfully said of a score of other places west of the hundredth meridian. They have invested and are making money from such investments in mines, but can not absorb what is proffered, no matter how confessedly good they may be, from sheer lack of capacity; it is not the inclination, but the ability that is wanting. What wonder then that the man who knows he has a good thing, but lacks the money to develop it, failing to enlist local aid turns to the East or to Europe where money brings but 4%, in the just belief that there he can find a purchaser for or a co-operator in a mining property of value. It is not from any intent to "unload" or "work off" a questionable scheme, but in as honest a purpose as the man who in any other line of business, having only $10,000 and seeing where an investment of $20,000 would bring promise of making $200,000, asks one who has the money if he is willing to put up $10,000 with him in the venture.

The magnitude of the mining area of this country is not generally understood, still less is its value. Since the discovery of gold in California, that one State has produced gold to the value of over $1,300,000,000. There are now over 17,000 undeveloped mines in California awaiting capital to become profitable producers; fifteen years ago Cripple Creek district, Colo., was "good only for sheep grazing:" in the past two years the gold output of that sheep pasture has put Colorado in the front rank of the gold producing States of the Union. Yet there are over 15,000 undeveloped mines in Colorado. As in California and Colorado so in other States and Territories west of the hundredth meridian of west longitude.

Without decrying any metal producing region and with full recognition of the importance of other gold fields, it is believed to be a conservative statement fully justified by fact, to say that nowhere on the globe is there a better prospect for profitable investment in that form of business than in this region, and why such opportunity is proffered distant residents is manifest in the foregoing.

Mineral Production of the United States.

A summary of the mineral production of the United States in 1898 has just been issued by the United States Geological Survey. The production since 1880 has increased from $369,319,000 to $697,880,002 in 1898—nearly 90%—a normal increase of $18,000,000 per annum; but since 1893 it has been at the rate of $25,000,000 annually. A study of the tabulated statement shows some peculiar features. From 1894 to 1895 the increase was nearly $100,000,000, and in the following year it was but $1,000,000, while in the two years from 1892 to 1894 there was a decrease of over $121,000,000, owing to business depression. The total of $697,880,002 in 1898 was the largest ever recorded in the history of the United States.

The great increase came from all branches of the mineral industry, owing to greatly increased industrial activity with a consequent demand upon the mineral industries, nearly every one of them showing a gain. The metallic minerals produced were valued at $344,096,130; all of the metals, except nickel, making gains; copper, lead, zinc, aluminum and antimony during this period reaching their maximum in both quantity and value. The amount of pig iron produced was larger than in any previous year, though the value of the product was less than in 1890 or 1892. The nonmetallic products increased from $327,710,966 to $352,783,872, a gain of over $25,000,000, the largest factor being bituminous coal, which gained more than $13,000,000 over the production of the previous year.

The following table shows the value of the principal mineral products for the last two years:

	1897.	*1898.*
Pig iron	$95,122,299	$116,557,000
Silver	69,637,172	70,384,485
Gold	57,363,000	64,643,000
Copper	54,089,180	61,849,132
Lead	14,885,728	17,345,775
Zinc	8,498,300	10,385,910
Quicksilver	993,445	1,188,627
Aluminum	1,500,000	1,716,000
Antimony	109,655	184,050
Nickel	7,823	4,694
Platinum	900	1,913
Bituminous coal	119,567,224	132,586,313
Pennsylvania anthracite	79,301,954	75,414,537
Stone	34,667,772	36,607,264
Petroleum	40,929,611	44,183,350
Natural gas	13,826,422	14,750 000
Brick clay	8,000,000	9,000,000
Clay (other than brick)	1,000,000	1,000,000
Cement	8,178,283	9,781,501
Mineral waters	4,505,630	8,051,933
Phosphate, rock	2 673,2?2	3,455,460
Salt	4,920,020	6,212,554
Limestone for iron flux	2,124,000	2,638,000
Zinc, white	1,750,000	2,310,000
Gypsum	755,864	755,280
Borax	1,080,000	1,120.000
Mineral pa'nts	785,793	694,856
Grindstones	368,058	489,769
Fibrous talc	396,936	410,430
Asphaltum	664,662	675,649
Soapstone	365 629	287,112
Precious stones	139,675	160.920
Pyrite	391,541	577,731
Corundum and emery	106,574	275,064
Oilstones, etc	149,970	180,738
Garnet (abrasive)	80,853	86,850
Bromine	129,094	126,914
Fluorspar	37,159	63,050
Feldspar	43,100	32,395
Manganese ore	95,505	129,185
Flint	26,227	42 670
Monazite	1,980	12,462
Graphite	54,277	75,200
Bauxite	57,652	75,487
Sulphur	45,590	32,950
Fuller's earth	112,272	106,500
Maris	30,000	30.000
Infusorial earth, tripoli	22,835	16,691
Pumice stone	.....	13,200
Millstones	25,932	25,934
Cobalt oxide	31,232	11,772
Magnesite	13,671	19,075
Asbestos	6,450	10,300
Rutile	350	700

THE Spenazuma Mining Company, which came into unpleasant notoriety a few weeks ago through the expose of Governor Murphy of Arizona, has filed amended articles of incorporation and increased its capitalization to $10,000,000. Three gentlemen of Deming, New Mexico, whose names are mentioned as directors, repudiate the concern and deny that they are directors. This is the concern which was visited by Eastern directors, who came out in a special car in June last, and to whom was shown a dump of fine ore which, it was alleged, had been hauled from rich mines elsewhere.

DURING the recent whirlwind of flame that swept through Victor, Colo., while the buildings of the Gold Coin M. Co. were still blazing, the management ordered a complete new equipment, including steel buildings and a fireproof outfit throughout, demonstrating their faith in the property, and, in general, illustrating the good grit of the Colorado miner, who does not allow so slight a thing as total destruction of his surface improvements to more than temporarily interfere with his plans.

Concentrates.

GARNET is sometimes used for abrasive purposes, but is inferior to corundum and emery in hardness.

THE Government of the United States has no standing reward for tin or mineral deposits of any character.

THE nickel supply of America is chiefly supplied by Canadian mines. Most pyrrhotite ores contain nickel, though all do not.

NEARLY all the metallic tin produced comes from the oxide cassiterite which is derived partly from veins and partly from "stream tin."

A QUARTZ mill should be so arranged as to afford the greatest capacity at the least expense, employing no more men than are necessary.

CONGLOMERATE DEPOSITS bearing gold are really cemented placer mines, whether formed in the bed of a stream or on the slope of a hill.

DENVER, COLO., papers state that a New York firm has contracted with the owners of the Louisville mine for 10,000 tons of zinc ore to be shipped to Wales.

THE United States mining laws do not require that a location of a quartz or placer claim be recorded, but State, territorial or local laws may require such recordation.

THE production of crude petroleum in California for the calendar year '98 was 2,257,207 barrels, valued at $1,917,596. The '97 production was 1,903,411 barrels, valued at $1,713,102.

THE gates or valves controlling water in pipes should not be closed too suddenly, as the movement of the column of water when suddenly checked subjects the pipe to great strain.

A "SPILL OVER" is the language of the ancient river channel miner, signifies a place where erosion has cut into the bed of the former river the gold being reconcentrated in the modern gulch.

WHEN a load is to be lifted from a shaft in a bucket or skip or on a cage there should be no slack in the rope, or, if there is, the engine should be started so slowly as to take up the slack without a jerk.

IN the States of Pennsylvania, New York and West Virginia there were completed 7205 new oil wells in 1897; in 1898 there were 5574, and to the end of July, 1899, in the same area, 4426 wells.

THE cost of working auriferous sulphides by chlorination varies with the surrounding conditions. In California, where this method is practiced extensively, the cost varies from $5.50 to $13 per ton.

IN June, 1897, Judge Ross, in the U. S. Circuit Court, decided that the Caminetti Act was constitutional. On appeal, in May, 1898, Judge Hawley, in the U. S. Circuit Court of Appeals, affirmed the decision.

THE death of several men in different mines within the month just past from striking missed holes when drilling demonstrates the necessity for the exercise of greater care on the part of foremen or of the men themselves.

THE South African Chemical & Metallurgical Society states that ground glass is a most excellent flux for cyanide slimes. The charge for melting is 50 lbs. white glass and 50 lbs. borax to each 100 lbs. of roasted slimes treated.

FOR some purposes rolls are considered superior to stamps, particularly where the ore contains a large amount of sulphide material, which is to be concentrated by jigging. The rolls produce a more uniform product, making less slimes.

NUMEROUS samples of mica and inquiries concerning value of same are frequently received. Inquiries regarding commercial value directed to A. O. Schoonmaker, 158 William street, New York City, will meet with definite response.

AN English court, being recently required to define the word "mineral," held that the word "includes every substance which can be got from underneath the surface of the earth for the purpose of profit," which is no definition at all.

IT is cheaper to break soft ground and timber it than to break hard ground which requires no timbering. This applies only to first cost, for eventually the soft ground will require retimbering from time to time making it finally the more expensive.

THERE is a difference between relocation of a mining claim to correct errors made in the original location and relocation made for the purpose of defeating the law requiring an annual expenditure of $100, and this difference is recognized by the courts.

U. S. GOVERNMENT statistics for '98 place the mineral production of this country at a value for that year of $697,880,002, an increase of nearly 90% over the aggregate production of '90. Of the '98 total, the metallic product was valued at $344,096,120.

THE cheapest way to prospect large ore zones is by use of the diamond drill. By it the size, position and value of ore deposits may be determined at much less expense than by any other method and this knowledge is of great advantage in laying out development work.

THE tailings from the old mill at El Dorado Canyon, Nevada, have become a compact mass of rock, resembling some of the volcanic tufas covering the ancient rivers of California. Where this deposit is washed by the Colorado, the stream does not affect it in the least.

OUT of 431 accidents in English coal mines in 1897 47.4% were caused by the caving of ground, and in the previous year the percentage was higher. Many such accidents are due to the lack of care on the part of the miners, who take too many chances in recovering timbers.

THE cost of boring oil and water wells varies greatly, being influenced by the character of the rocks through which the bore passes and by its physical condition and also by the kind of "rig" employed, and not to a small extent upon the experience of the operator.

THE gold output of the Transvaal, South Africa, for the first six months of '97 was 1,630,000 ounces; for the first six months of '98, 2,321,000 ounces; for the first six months of '99, 3,042,000 ounces. Were Oom Paul to carry out his threat to flood or blow up the Witwatersrand mines, the result would affect the financial world.

ONE method of separating alumina from bauxite is by heating with soda ash, forming aluminate of soda, which is separated by solution in hot water from the insoluble silica, oxide of iron and titanic acid. Bauxite is employed as a refractory material, particularly in lining furnaces.

GAS ENGINES that work all right at sea level or low altitudes sometimes develop difficulty at considerable height. The trouble is in the "compression pressure." A properly arranged compression plate will give a higher pressure and obviate any difficulty occasioned by altitude.

THERE are few ores where the gold is extremely fine which cannot be treated by either the cyanide or the chlorination process in one form or another. Each new trial on a new ore is in the nature of an experiment, and moderate success at first may be developed into complete success later.

WHERE the acidity of ore has to be neutralized before subjecting the ores to cyanide solutions, lime has been satisfactorily employed; the lime water being slowly added until the acidity is neutralized, as determined by litmus paper. No two tests may be the same. It is a matter for experiment.

AN instance has been noted where, after the continuous operation of a quartz mill for several years, the stamps were hung up and the mill remained idle for some time. When work was resumed more than half of the stems broke off just above the bosshead within a month, without apparent cause.

INCLINED shafts are more expensive than vertical shafts of the same size in similar rock, for the reason that more time is required in placing timbers, and in handling pumps and other machinery in the shaft. A larger quantity of material can be hoisted through a vertical than through an inclined shaft.

THE new proposed shaft of the Rand-Victoria mines, it is estimated, will reach the banket at 4170 feet if the angle of dip of the conglomerate be 30° and 4550 feet if it should be 35°. These figures are deduced from the Simmer & Jack workings and a bore hole on the Rand-Victoria property 2400 feet in depth.

NEVER run a crosscut tunnel when one on the vein can be driven. Follow your vein, and when you have pay ore stay with it until it is developed. Crosscutting in the neighborhood of the vein is always advisable. Good veins and shoots of ore have frequently been overlooked from neglect to perform this essential work.

A BISBEE, ARIZONA, copper mining company writes that it is "negotiating for a hoisting engine," and on the strength of that wants to sell treasury stock. Further information is vouchsafed that "a considerable quantity of ore is piled on the dump" and that is "subject to the inspection of visitors." What more could anyone want!

IN large stopes, where filling or other supports to roof or walls has been too long neglected, the settling of the ground often makes the discontinuance of power drills imperative because of the danger of falling rocks loosened by concussion. Proper precautions taken in sustaining the ground will usually obviate this difficulty.

THE gold bearing deposits of Mercur, Utah, occur in argillaceous deposits, in altered limestones and in eruptive rocks, locally called porphyry. The greater portion of the gold of the district is obtained by the cyanide process. It was originally a silver camp in 1871. These being exhausted the camp fell into decay but revived upon the discovery of gold.

IT is claimed that some of the banded onyx (aragonite) found at the Big Bug, Arizona, quarries is gold-bearing. This deposit is the result of the precipitation of large quantities of calcium carbonate from calcareous springs, which have now disappeared. They were in many respects similar to the Formation Springs of the Yellowstone National Park.

THE term "gasoline" is an indefinite one. Technically and with reference to its use in a gas or gasoline engine, it is a petroleum distillate, colorless, volatile and inflammable, with a specific gravity of .629 to .667 (95° to 88° Baume). A great deal of stuff is sold as "gasoline." It is not by the name but by the gravity that its quality or fitness is to be determined.

THE stamp mills of the Witwatersrand crush from 2.93 to 7.9 tons per stamp daily. The number of stamps in the mills ranges from 20 at Gray's Mynpacht to 280 at the Simmer & Jack. The 20-stamp mill has the largest capacity per stamp of any mill on the Rand. Many of the mills sort the waste from the ore. The percentage of waste ranges from nothing to over 42%.

WHERE a party relocates an abandoned claim the fixtures and improvements, not removed by the original locator, become the property of the new tenant, to whom the law gives exclusive possession of the ground, and the former locator having forfeited his right has no business upon the premises and therefore can remove nothing from it. All decisions in similar cases have been rendered in this direction.

"THE best mining exposition I ever saw is the advertising pages of the MINING AND SCIENTIFIC PRESS," is the opinion of a Prescott, Arizona, subscriber. He tersely expresses a great fact, and might add it is an exposition that costs purchaser and consumer less than the more cumbrous methods of exhibition where the things themselves have to be carried to be seen, and the people must go to see them.

WHERE a partner in interest in an unpatented mining claim dies and his heirs refuse to contribute the share of deceased toward the annual expenditure for assessment work, the surviving partner should complete the full $100 worth of work and notify the heirs or executors of the estate of deceased as provided by law, and in event of their refusal to contribute the one-half of such expense their names should be included in the advertisement; the property ultimately becoming the possession of the surviving partner.

THE quantity of water required to hydraulic 1000 cubic yards of gravel daily depends upon the available head, character of gravel and dump grade. No arbitrary quantity can be given without knowledge of the conditions. Free gravel washes much more rapidly than clayey or lightly cemented gravel, and a given amount of water under a high head will remove a larger quantity of gravel than the same amount of water under low head. The grade below the working face may be too light to carry off the debris to the full capacity of the water and head to wash it down.

IN the U. S. Circuit Court this week, Judge Morrow rendered a decision of interest to foreign mining corporations, to the effect that they must obey State laws. The case was one in which a New York corporation sought to foreclose a mortgage of $50,000 on a Nevada City, Cal., mine. The defense of the Californians was that the mortgage was not in accordance with the California law, which requires in such cases a two-thirds vote of the stockholders. Judge Morrow held that the mortgage was not valid by reason of noncompliance of the directors with such State requirement.

A PRECONCEIVED IDEA of the conditions under which a deposit of mineral should occur is not a safe basis for a prospector to adopt when searching for veins or ore deposits. It is known that veins and ore deposits occur in the formations of every age and in rocks of almost every description, therefore it is unsafe to search only for those conditions with which one has become familiar in some other field, but to investigate every kind of rock, disregarding the condition under which it occurs, for in this way only can the risk of overlooking deposits of value be diminished.

WHERE a stamp is not revolved by the successive lifts of the cam—slipping back to the same position with each drop—the difficulty usually lies in the cupping of shoe or die or both. Where a poor quality of shoes and dies gives this trouble it may sometimes be lessened somewhat by shifting the position of the dies in the battery. The best shoes and dies now made are so homogeneous that there is little excuse for using an inferior quality on the score of cheapness, for the best—that is, those which wear evenly the longest—are the cheapest because of the higher efficiency which their even surface affords.

PROCESSES for the treatment of ores which are enveloped in mysterious manipulations, secret fluxes and the like may, on general principles, be looked upon with suspicion, as well as those processes which extract more bullion than the fire assay shows the ore to contain. It is true that during a period of a month or a year the bullion returns from a mill may exceed slightly the theoretical value of the ore as determined by assays, but this does not frequently occur. When such is the case, it may be laid to the fact that the error is a mechanical one in taking samples which is not positively representative. The discrepancy is rarely due to faulty metallurgical operations.

THE first use of the zinc ores of Missouri is said to have been made in 1869, though ore had been mined prior to that date, it being left on the dumps. The original discovery of lead ore was made about the year 1700. The zinc and lead deposits of the central and southeastern fields occur in Silurian rocks, and those in the southwestern district, about Joplin, in lower Carboniferous limestone. The ore bodies are massive, lenticular, tabular and rudely cylindrical in form. The minerals of these ore deposits are lead and zinc compounds, normally sulphides, and the results of their decomposition, chiefly the hydro-silicate of zinc (calamine) and the carbonate (smithsonite), and carbonate of lead (cerrusite) and more rarely the sulphate (anglesite) and phosphate (pyromorphite).

WHERE a mining claim is located in California after Nov. 2nd, it is possible to do the $50 worth of work required by the State statute of 1897 and make it a part of the $100 assessment work specified in the Federal statute. The 1897 mining law of California says that $50 worth of work shall be done on a claim within sixty days after location. The time when the $100 work required by the Federal statute must be done is during the year beginning on the 1st of the January after the date of location. So where a mining claim is located, say, Nov. 2nd, 1899, the locator has until Dec. 31st, 1900, to comply with the requirements of the Federal statute, and as he has until Jan. 1st, 1900, to do the $50 worth of work required by the State statute, he can make such $50 in work or improvements apply on the $100 required by the Federal law.

TO DETERMINE closely the cost of milling any particular ore is almost impossible without actual test, which must determine the most important economic features. The capacity per stamp is determined by the result of amalgamation. If coarse crushing does not give satisfactory results finer crushing is resorted to. It is a matter of judgment to determine where to draw the line as to fineness of crushing, the object being to get the greatest capacity with least loss. When the capacity per stamp has been ascertained the number of stamps which will determine the aggregate capacity becomes an important element, a large mill treating ore at a lower cost per ton than a small one. The matter of power is a third consideration. The cheapest available power will be chosen. Many mills are equipped with both water and steam plants, the latter being employed when water fails during dry season. There are many minor details in the mill construction which affect cost, as the size and distribution of rock breakers, method of handling tailings, etc.

THE forfeiture of a mining claim does not really follow because of non-performance of assessment work. It requires the intervention of a third party and a relocation of the ground before forfeiture can ensue. When such forfeiture becomes effectual the estate of the original locator is hopelessly lost. By resumption of work forfeiture may be prevented, but the resumption must be bona fide. The Supreme Court of California has decided that a party holding a claim for several years without doing in any year the work required, by simply going on the ground at the beginning of each year and doing a few hours' work, with no bona fide intent to comply with the statutory requirement as to the amount of work to be done, cannot hold the claim. Such work so done is a pretense and sham and will not prevent the relocation for want of necessary work. The Supreme Court of Montana has held that when a locator resumes work for the purpose of holding his claim he must continue the work with reasonable diligence until the law has been complied with. The right to resume work must be exercised, however, before another has taken possession with the intent to relocate it. The first initiatory step lawfully taken by a relocator after a claim becomes subject to forfeiture will protect him for the period fixed by law, and an intermediate resumption of work by the delinquent original locator cannot cut off this privilege.

Notes on Sampling, Analyzing and Treating Slimes.*

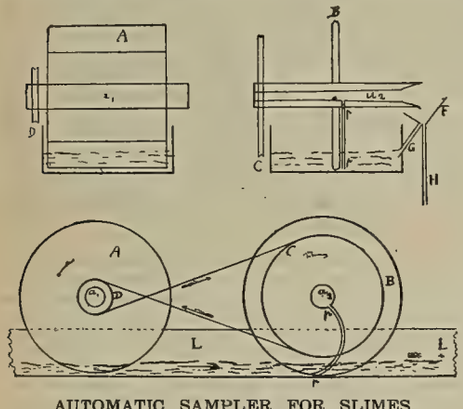
By L. EHRMANN.

To-day we have before us a slimes question, as in previous years we have had a cyanide question. We cannot even say yet that the cyanide question is closed, as we are still considering the proposals of heating solutions. The question of oxygen in solutions is also an important one, as you yourselves proved when presenting A. F. Crosse with the society's gold medal for his method of determining oxygen in cyanide solutions. By and by cyanide managers will have to test numbers of things—lime, oxygen, etc.,—not thought of some time ago, and will doubtless consider some members of this society very troublesome people. But science advances day by day, and I daresay the methods of treatment of slimes are still in their infancy. It has been started on the extreme dilution system, with electric precipitation by dynamos on lead cathodes. Now it seems we are coming to the period of concentration treatment and electrical precipitation by a primary cell being formed in the zinc boxes, so as to get rid of dynamos, lead cathodes and cupellation.

Anyway, electricity is to be, for a long time to come, the principal agent of precipitation of gold in the zinc boxes, as I explained to the society when I communicated my experiments on the zinc-copper couple in cold and hot solutions. As long as we are to employ cyanide as the solvent, there is little probability of arriving at a purely chemical precipitation of the gold without destruction of the cyanide; so we shall have, probably, to rely on zinc, as long as cyanide is used.

Now, zinc-lead couple, zinc-antimony couple, and some other improvements, are in the experimental or practical stage. Such processes are nothing else than electricity being generated in zinc boxes by a couple of zinc and some other metal; the question before us is to arrive at the maximum precipitation with a minimum of dissolution in zinc. We shall have to increase the activity of the zinc couple in weak solutions; and I think the question of slimes treatment will be settled, when gold from slimes solutions will be precipitated in zinc boxes with no more difficulty than from sands solutions, and recovered in the same way. It would be premature, at this period, to go more fully into this question, but I think I can say that we can see our way more clearly, thanks to the researches of some members of our society, and the alliance of theory to practice.

I begin with the question of sampling the slimes, and submit herewith description of an automatic sampler I have devised. A regular sampling of the



AUTOMATIC SAMPLER FOR SLIMES.

slimes passing down the launder is an absolute necessity to arrive at an accurate knowledge of the gold to be recovered. The method of sampling by a box placed in the launder is not a reliable one. The sampling in the collecting or dissolving vats has the objection of taking principally the lighter and finer portion of the slimes. For this reason I have devised the automatic sampler.

To an ordinary driving wheel *A* placed in the launder *L*, as in the automatic lime feeders, is connected—either directly or by an intermediate gear, so as to transmit the motion from the pulley *D* to the intermediate gear or to the pulley *C*—a flat disc *B*, perpendicular to a hollow axle a_2 and parallel to the axle a_1 of the driving wheel. To this is fixed an in-curved pipe *pp'*. At each revolution of the sampling disc *B* the lower part of the curved pipe plunges into the slimes from the top of the liquid to the bottom of the launder, then goes to the top again and is filled with a portion of the liquid slimes. By the revolution of the disc the sample is delivered in the hollow axle a_2 where the incline of the perforated central part is such as to cause the sample to flow at once to the prismatic funnel *F*. To this funnel is attached a double pipe, the one pipe *G* going back to the launder, the other *H* going to a tiny box or bucket where the sample for analysis is collected. In the prismatic funnel a moveable partition is placed, so as to divide the sample between the two parts of the double pipe in such quantities as are desired.

Now I have to come to the question of the addition of lime to the slimes, and I have to apologize for a third note on the subject of float gold in slimes.

Precipitation of Slimes by Milk of Lime.—After many interesting discussions on the theory of the action of lime in precipitating slimes, it is now proved that precipitation is due to the action of soluble lime.

There has been, unfortunately, a strong opinion in favor of using lime powder in the launder, and, consequently, an objection to using lime in the form of milk of lime. My purpose, now, is to show the advantage of using lime mixed with water, and to prove that the best way to obtain a regular quantity of lime so as to obtain a complete precipitation without employing an excess is to use milk of lime.

The automatic feeder for dry lime is a very ingenious apparatus, but, in practice, is inferior to a milk of lime solution, for the following reasons:

Lime must first be crushed in some form of grinding mill.

It requires almost continual attention so as to be properly filled with lime; and sometimes, even when there is plenty of lime in the hopper, lime does not fall into the launder and the screw revolves empty. Besides, the dust is very troublesome.

The supply of lime in the launder cannot be properly regulated to the exact quantity required for a complete precipitation; therefore, to obtain a complete precipitation an excess has to be used.

Two boys are required per shift working the grinding mill, and carrying the lime to the feeders.

The advantages of using milk of lime are as follows:

By the use of an inexpensive apparatus, which can be made on any mine, milk of lime can be prepared at a regular density without any trouble by the boy in charge when he has been once shown how to do it.

The supply of the quantity of milk of lime required for the precipitation of slimes can be regulated from the slimes plant with the greatest facility at a moment's notice, by using an electric bell for signalling from the slimes plant to the boy in charge, to increase or to reduce the quantity of lime.

On account of the facility and rapidity of regulating the supply of lime in the launder, no excess of lime need be used; the precipitation is regular, and a large saving can be made in the cost of lime.

When using milk of lime, there is no necessity to crush lime through a mill, the milk-of-lime mixer being filled from the bag.

One boy only is required.

As slags and unburnt limestone are separated from the milk of lime in the mixing machine, the quality of milk of lime is much more regular than the quality of crushed lime.

The quantity of pure lime (calcium oxide, hydrated) in milk of lime depends, of course, on the quality of the lime, *i. e.*, of the proportion of carbonate of lime mixed to calcium oxide.

The annexed table gives, as an average, the quantity of lime calculated as calcium oxide, at each degree Baume from 10° B. to 30° B.

If we take 1 ounce av. = 23.35 grammes.
1 gallon = 4.54 litres.
1 cubic foot = 28.315 litres,

we can calculate the size of the apparatus required so as to contain enough lime to give the required alkalinity to slimes for a fixed time. But it would be more accurate to have a small quantity of milk of lime made with the lime to be used, say one bucket, take its density, and titrate it for calcium oxide by any of the well-known volumetric processes. As, according to the nature of limestone, and the working of the lime kiln, the quantity of calcium oxide may vary from 30% to 65% in lime, I would recommend titrating the milk of lime. The best and quickest method is to transform calcium oxide in saccharate of lime, and titrate by standard acid.

The apparatus consists of a circular tank to be partly filled with water, with a vertical axis on which are attached flat iron paddles incurved so as to move the liquid upwards. To the circular edge of the top are suspended, inside the tank, metallic baskets made of iron sheets with bottom and sides perforated.

The bottom of the baskets is to dip 2 or 3 inches in water when starting; the baskets are then filled with lime, the machine started, and the finer part of the lime falls through the holes into the liquid, and is kept in suspension, enough lime being added to raise the density to 20° B. Then, by occasionally adding water in the tank and lime in the basket, the density is easily kept quite uniform.

No cock is to be used for regulating the flow of milk of lime in the launder. The best plan is to have a square hole cut at the lower part of the tank, say 12x12, to close it by a wooden plank, and to drill through this plank several holes $\frac{1}{4}$ or $\frac{5}{16}$ inch diameter, to be closed by wooden pegs when required, so as to supply to the launder the quantity of lime required. An iron plate bent downwards behind the wooden door is to protect the flow of liquid from the agitation of the lower paddle. This is the simplest and cheapest apparatus for the purpose required.

TABLE SHOWING AMOUNT OF LIME PRESENT IN MILK OF LIME.

Baume.	*Density.*	*Calcium oxide per 1000 grammes.*	*Average grammes per 1000 c.c.*
10	1075	94 to 133	113½
11	1083	104 to 142	123
12	1091	115 to 152	133½
13	1099	126 to 161	143½
14	1108	137 to 170	153½
15	1116	148 to 179½	163½
16	1125	159 to 189	174
17	1134	170 to 198	184
18	1142	181 to 207	194
19	1152	193 to 215½	204½
20	1161	206 to 224	215
21	1170	218 to 237	227½
22	1180	229 to 240	325
23	1190	242 to 246½	244
24	1200	253 to 255	254
25	1210	261 to 268	264½
26	1220	263 to 281	272
27	1230	266½ to 295	280½
28	1241	270 to 309	289½
29	1251	273 to 324	298½
30	1262	277 to 339	308

A Cause of Irregularities in Treatment and of Errors in Assays of Slimes —When recently reading the journal of the society I noted an observation made by J. R. Williams on slimes carrying away fine particles of gold, the latter thus escaping amalgamation. It reminded me that two years ago, when experimenting with old slimes to test an apparatus patented by E. Brochon, I had much trouble, and was unable to obtain reliable and concordant results before and after the experiments, until I had devised a method of taking the assay from a part of a very large sample, say 12 to 15 A. T., specially prepared to eliminate errors due to particles of gold of different size being mixed in the slimes, and not being even distributed all over the lot.

I will describe the experiment and mode of sampling I have adopted so as to obtain a very correct analysis, despite the irregular distribution of the particles of gold in the mass.

The apparatus I had to test was unfortunately of too small a size, so that it could not be run for many hours without being blocked by an accumulation of slimes. It looked like a lot of flat boxes piled one over the other, formed alternately of amalgamated copper plates separated by an india rubber isolating frame from iron plates, both to be used as cathodes and anodes respectively. The plates were perforated at alternate ends, so that the slimes could circulate between the plates and run all through the apparatus, the distance between the parallel plates being $\frac{1}{8}$ or $\frac{5}{16}$ inch.

By a special arrangement, which it is not necessary to describe, small measured quantities of slimes entering the apparatus, and also at the exit of the apparatus, were taken at regular intervals.

I had a lot of old slimes, well mixed and sieved, weighing about 100 pounds, kept in a box, the moisture being 3.54%, 3.55%, 3 58%. I took samples for assays for different parts—top, bottom, middle, diagonal, etc. Instead of mixing all the samples in one lot I decided to analyze each sample separately, so as to see if there was any difference. The assays were made under exactly the same conditions, as well as in the subsequent experiments, litharge, charcoal and fluxes being weighed and new crucibles used. I was surprised to obtain the following results:

GOLD PER TON.

Ounces.	*Pennyweights.*	*Grains.*
0	4	9
0	3	5
0	6	0
0	3	5
0	3	2
0	2	19
0	3	10
0	2	14
0	3	0
0	4	0
Average. 0	3	13½

I could only think that the irregularities were due to some particles of larger size being irregularly distributed, even after the more careful mixing. I supposed that by taking part of the lot, mixing it with water to about seventy gallons, I would get a more regular sample, and that by running the slimes through the apparatus I would be able to detect if floating gold had been retained by the amalgamated plates—of course, no source of electricity being used in such experiment. The alternate plates of amalgamated copper and of iron were not to act as cathodes or anodes, respectively, but were only to be considered as a series of amalgamated plates over which the slimes were running in a thin film. The result has proved that part of the gold is irregularly distributed in slimes, and that this is so is shown by the fact that some years ago amalgamation was probably not so effective as it is now. No cyanide was used in the solution, but, for another purpose, about $\frac{1}{1000}$ of HCl had been added to the water. From each lot four assays have been made:

A.—Slimes before entering the apparatus.

B.—Slimes after they had gone four times through the apparatus.

C.—Slimes after they had gone six times through the apparatus.

RESULTS OF ASSAYS (PER TON OF 2000 LBS.)

	A			*B*			*C*		
	Oz.	*Dwts.*	*Grs.*	*Oz.*	*Dwts.*	*Grs.*	*Oz.*	*Dwts.*	*Grs.*
No. 1....	0	4	20	0	3	20	0	3	15
No. 2....	0	2	20	0	4	20	0	3	10
No. 3 ...	0	4	5	0	2	15	0	3	15
No. 4....		(lost)		0	2	15	0	3	0
Averages....	0	3	23	0	3	6½	0	3	4

The balance of the lot C having been lost through

* Condensed from Journal of the Chemical and Metallurgical Society of S. A.

some misunderstanding, I weighed the balance of lots A and B and put each lot in a porcelain basin, where it was moistened with water and treated with aqua regia on a water bath and left for the night; then, after being well mixed with a glass rod and an addition of carbonate of soda, each sample was dried and weighed again. From the original weight compared with the second one, a simple calculation indicates the weight which will correspond with 1 A. T. of the original sample. Under such conditions the gold is evenly distributed all over the mass.

Incidentally I would recommend a similar treatment to distribute gold in the samples taken for analysis of concentrates.

Two assays made for each lot agreed exactly, and the results were:

	Oz.	Dwts.	Grs
Gold in slimes before amalgamation....	0	4	2½
Gold in slimes after amalgamation.	0	3	13½

So without any chemical treatment 13.2% of the gold in original slimes was recovered.

To conclude: Gold is very irregularly distributed (I do not say in all slimes, which may vary with the different reefs; I say only in some slimes).

Some particles of gold are not so fine as the others, and in such case we might ask if, the bigger particles, being heavier and settling first, are or are not entirely dissolved by the extremely dilute cyanide solution, since, as soon as they begin to settle, they are protected by the heavier slimes from the action of the solution. Besides, being in the bottom of the tank, there is a possibility of escaping sampling. If such is the case, the assay of residues is lower than it should be, so the percentage of extraction seems higher than it really is.

On the question of assays of slimes we have also to conclude that, to make the assay quite accurate, it is to be made from a lot of 12 to 15 A.T. treated as I have explained, so as to have the gold dissolved and distributed all over the sample.

I would recommend the following method of preparing samples of slimes for analysis (original sample before treatment):

Use a small experimental filter press; filter the slimes through the press, after the pulp has been well mixed, and make two, three or more cakes, according to the volumes of the original sample. The size of the cake is 17¾ centimeters diameter (7 inches) and the thickness 1 centimeter, 2 centimeters or 3 centimeters, according to the frame being used (0.394 inch, 0.798 inch or 1.192 inches). The larger cakes when fresh weigh 1 kilo 442 grammes, when dry 1 kilo 030 grammes; water lost, 0.412 kilo, or 28.57%. Now, from each fresh cake two opposite triangular parts are cut, and this lot is well mixed with water to a pulp and sent again through the filter press, until only one cake is obtained. From this cake, being a good average of the lot, and weighing, when dry, nearly 35 A. T. for the larger frame, cut triangular opposite parts, so as to get nearly half of the cakes, 16 to 17 A. T. Dry it, take the weight and treat as previously described, by aqua regia, etc., to get the final samples for assays.

For slimes after treatment, residue samples, containing dissolved gold, weigh first 100 grammes of the pulp and dry it, so as to get per cent solution and per cent residue slimes. Now send the full lot of the sample through the filter press, keep a sample of the clear solution for determination of dissolved gold, and prepare the cakes through the filter press as above described, until the last one is obtained; then, through this cake, by the special pump of the washing apparatus, force a few bottles of water so as to remove all soluble gold, and treat the washed cake as previously described for undissolved gold.

Mining Definitions.

One of the push gives the following definitions of mining terms:

A prospector—A man who has a hole in the ground and is the biggest liar in town.

A proposition man—One who wears laced boots and corduroy clothes and never pays his board bill.

A mining expert—A man who can talk about formations, ramifications, stratifications, dykes, zanes, dips, spurs, angles, teligtites, oozites, seddemites and all the other ites and tites; can see a mile into mother earth and invariably condemns the country.

An expert miner—A fellow who loafs around town looking for a job as superintendent of a property, but would be a foreman if he can't be superintendent; one who worked on the Comstock in '70, and has been idle ever since.

A "49er"—A man who came to the coast in the "fall of '49 or spring of '50," and knows where there are diggings that will pay $1.50 to the pan, and is going back there just as soon as spring comes.

A mining reporter—A man who wants you to subscribe for his paper, wants to write up your property, and wants you to take him out in the best buggy in town, smokes your best cigars and borrows $5.

A mine promoter—A man who has unlimited capital behind him, but not any in front of him; his watch is in soak.

A tenderfoot—A "Willie boy" just out from the East. Carries a small arsenal with him, goes out prospecting with a shotgun and a fishing rod, buys a salted claim and gets money from mother to come home in the fall.

An amalgamator—A man who wears long fingernails, draws $5 a shift and deposits $10 in the bank every day, if the ore is low grade, and more in proportion.

"A local mill man of note"—One who has been on the eve of starting for South Africa or some other far off region for seven years, to take charge of the construction of a 1000-stamp mill for a London syndicate; a man who has been positively known to have constructed a sawmill.

An assayer—A man who charges you $1.50 for throwing your samples out of the back door and writing a certificate.

A mining engineer—One who makes funny figures on blazed stumps and charges a big price.—Baker City (Or.) Democrat.

Across the Pitch Versus Up the Pitch.*

By O. E. S. WHITESIDE, Anthracite, N. W. T.

The above title tersely directs your attention to a comparison of the getting of coal from breasts driven across the pitch, nearly in the direction of the strike, and parallel with the gangway, with the same operation in breasts at right angles to the strike, or straight up the pitch, under a few of the conditions that obtain in pitching seams.

In the Cretaceous measures at Anthracite and Canmore the pitch may be said to vary from 30° to 50°, although at some parts worked the seam is flat and at others pitches 90° from the horizontal, while anticlinals and synclinals of coal are no uncommon thing.

Slopes are sunk to the depth desired on the seam, and in most cases it is necessary to do considerable grading to obtain a 300-foot slope without a knuckle or roof roller. Gangways are then started to the right and left, their course being directed by the proper gradient and the varying strike of the seam. The method adopted for lowering the coal to the gangway is, in the main, by means of chutes, although back balances or self-acting planes are resorted to in special cases. On the upper levels, where the "up-the-pitch" system of work had been adopted, gangways were driven 12 feet wide and chutes 8 feet in width were started up the pitch, leaving gangway stumps 32 feet along the gangway by 20 feet up the pitch. These chutes were then widened to 20 feet for the remainder of the way up, leaving pillars 20 feet wide, through which crosscuts 8 feet wide were driven at intervals for ventilation. In this manner the coal was worked towards the boundary, the pillars being left to pull on the way back.

After working this system for some time, it was deemed necessary, if possible, to adopt some other which would lend itself more readily to the cleaning of the coal within the mine, and thereby lessen the cost of handling and transportation.

In a paper on "Subsidence Caused by Colliery Workings," by Joseph Dickinson, F. G. S., the author, in speaking of pillars left for support, says: "Pillars for horizontal seams may be either square or oblong; but for inclined seams, oblong pillars lengthways between rise and dip are preferred, especially where well-defined cleavage or slips run level course."

This "up-the-pitch" system then left the preferred supports and the pillars were not so liable to be over-ridden and run out on a steep pitch as oblong pillars with their length across the pitch, especially where the coal is full of slips, and more especially if there is a well-defined cleavage in the direction of the strike. Breast cars were not needed; the coal fell to the chute without handling, and, if the chutes were kept full, neglecting the sizes in which it was mined, the first ought to have been delivered to the gangway, with a minimum of fall and breakage for chute delivery.

The other system which made it an easy matter to separate the rock and other refuse from the coal at the working face, with ample room to gob the same, made it necessary that the length of the oblong pillars should be in the direction of the strike. Working the coal in this manner across the pitch requires less labor and lumber for chutes; and, as it is necessary to have a wall to separate the gob from the roadway, the ventilation of the face is accomplished by the same process, and the ordinance requires the air to be kept within 12 feet of the face. This method reduces the work more nearly to that necessary on a flat seam, and consequently does not require the skilled labor necessary for "up-the-pitch" work. This matter of skilled labor probably counts for more with us than in some older districts, because laborers from the ranching country are always plentiful, while miners are very often scarce, especially those skilled at working up a steep pitch.

With regard to the strength of the pillars, a defined cleavage was not a marked feature of any of the seams which we have worked, consequently the change of system did not affect us as it might have some of the pitching seams of Pennsylvania.

In the "across-the-pitch" system adopted, narrow work was in some cases dispensed with where the seams were not close together and the coal without a well-defined cleavage. Here the gangways were driven 20 feet wide. Chutes 20 feet in width were started up the pitch, with pillars 150 feet long between them, and every 30 or 40 feet up the pitch breasts 20 feet wide were worked across the pitch to the inside chute. In this way oblong pillars were blocked out with their length across the pitch—150 feet long and 30 or 40 feet wide. In all breasts across the pitch and most gangways the road is carried on the low side and the gob and return air on the high side.

The seams worked are from 5 to 10 feet in thickness and a row of props is carried close above the track. These props are lagged. The coal is shoveled into the cars and the refuse and rock stored above, and in most cases there is enough to completely cover the props and make a good air course.

Two seams lying rather close together gave some trouble, partly on account of the measures between thinning out locally. Before starting work on these seams the rule was laid down that all breasts up the pitch on the lower seam should be driven by sights directly under those on the seam above and those across the pitch directly under those above, in the direction in which a prop should be placed. It was also decided that these places should first be driven on the overlying seam and followed later by those on the lower one. This latter rule was not strictly lived up to, owing to the intervention of faults and the demands of the market for some few months after the commencement of this work, but no trouble was experienced for a considerable time after the pillars had been blocked. Finally the floor of the upper seam commenced heaving and the pillars started to run, so we slowed up work on the lower seam and started pulling the pillars of the one above before they had time to run out. In a great many cases where one breast had broken through into another, we found the thickness of the measure between to be only 6 feet and in one case they actually run together, whereas the thickness we had previously was 14 to 20 feet.

From now on we intend to push the solid work of the overlying seams and immediately follow up by pulling the pillars, and then, after the removal of everything except the stumps, to mine the lower seam by a similar process.

Considerable might be said as regards the waste in mining and handling the coal in these two systems, also concerning the pulling of pillars.

*Transactions Canadian Mining Institute.

State and Federal Mining Law.

TO THE EDITOR:—In reply to the current question as to whether a State law may require the performance of work on a mining claim at any time within the calendar year during which such claim is located, I answer "Yes."

Under Sec. 2322, Rev. Stats. U. S., it is only "so long as they comply with the laws of the United States, *and with State, Territorial and local regulations not in conflict with the laws of the United States*, that locators are entitled to the possession and other enjoyment of their locations.

Sec. 2324, Rev. Stats. U. S., provides that "The miners of each mining district *may make regulations* not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, *governing the location, manner of recording, amount of work necessary to hold possession of a mining claim*, subject to the following requirements: The location must be distinctly marked on the ground so that its boundaries can be readily traced. All records of mining claims hereafter made shall contain the name or names of the locators, the date of location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim. On each claim located after the tenth day of May, eighteen hundred and seventy-two, and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year."

An Act of Congress approved January 22, 1880, provides "that the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January, succeeding the date of location of such claim, and this section shall apply to all claims located since the tenth day of May, Anno Domini eighteen hundred and seventy-two."

It is manifestly the intention of said Sec. 2324 to prescribe the minimum requirements for locating, recording and working a claim. But it is equally manifest from the language of the section itself that additional requirements may be established by either State, Territorial or district laws.

For instance, the Federal statute does not require any record of a mining claim; but a record may be required by State, Territorial or district regulations, and when so required such record must include the details set forth in said Sec. 2324.

It is clear that no valid regulation can be made, either by a State, a Territory or a district, which will enable the locator to hold a claim by performing

less than $100 worth of work during any calendar year; but Sec. 2324 permits even a mining district to regulate the "amount of work necessary to hold possession of a mining claim."

How, then, can a State, a Territory or a mining district make a regulation "governing" the "amount of work necessary to hold possession of a mining claim," *except by requiring the performance of more than $100 worth of work during each year?*

And so as to the requirements for the making of a location. The Federal statute does not require the doing of any work on the claim as part of the making a location. But such work may be required by State, Territorial or district regulations.

In the Rocky Mountain States and Territories this work is called "location work," and there the statutes requiring it have been upheld invariably.

I am aware of the decision in Williams & Kellinger vs. Winthrop Mining Co., 60 Cal., 631, to the effect that local regulations cannot require "that work shall be done every sixty days on the claim."

But the Supreme Court of the United States has permanently settled the main question now under discussion by its decision in Belk vs. Meagher, 104 U. S., 284, where it is said:

"The right to the possession comes only from a valid location. Consequently, if there is no location, there can be no possession under it. Location does not, necessarily, follow from possession, but possession from location. A location is not made by taking possession alone, but *by working on the ground, recording and doing whatever else is required* for that purpose by the Acts of Congress *and the local laws and regulations.*"

This language has formed the basis of numerous decisions, notably in Colorado and Montana.

I may profitably repeat that neither "working on the ground" nor "recording" is anywhere required by the Federal statutes in order to complete a location. Yet the United States Supreme Court says, in the language just quoted, that, where the local laws or regulations require that the acts of location shall include "working on the ground" and "recording," both are necessary to the making of a valid location.

In the present condition of the mining statutes of California my opinion is that the only perfectly safe course for a locator in this State is to comply with the California statute of 1897, as well as with the requirements of the United States statutes.

JOHN M. WRIGHT.

San Francisco, Cal., Aug. 23rd, '99.

The Buffalo Hump District, Idaho.

Herewith is presented a view of Buffalo Hump, Idaho, from a photograph taken by our special correspondent for this article last month. The camp is usually reached from Grangeville and is about fifty miles distant therefrom. About thirty miles of this distance is over a wagon road, the remaining twenty miles being by trail. Grangeville is reached either from Weiser, on the Oregon Short Line, or from Lewiston, on the Northern Pacific and O. R. & N.



BUFFALO HUMP, IDAHO, LOOKING WEST FROM CONCORD TOWNSITE.

With all the adverse reports from persons returning from the Hump country, there is unmistakable evidence of excellent surface showings in the region thus far prospected, and the developments seem to bear out this evidence.

The Big Buffalo, owned by Bert Rigley and the heirs of Charles Robinson, is at present tied up by litigation, thereby retarding development that otherwise might be made. The development on this property is limited to a shaft 70 feet deep, a 40-foot crosscut and 100 feet of drifting. This work discloses a ledge 40 feet wide and 250 feet long. The ore averages from $15 to $20 per ton.

The Cameron-Norman syndicate are developing the Monte Cristo group, which they hold under option. They have uncovered 5 feet of ore which assays an average of $25 per ton. Further development by a crosscut is in progress. The same parties are also developing the Fortune, which shows a strong vein on the surface, averaging about 7 feet in width, giving reported assay values of from $10 to $30 per ton.

The Boston-Buffalo-Idaho Con. Co. are developing the Concord group. A shaft has been sunk 46 feet in ore of stated value of $20 per ton. They also have 200 acres platted for a townsite.

Clark & Sweeney of Spokane are developing the Cracker Jack and Jumbo, the two being four miles apart. Their present work consists of a tunnel 150 feet long, which cuts the ledge of ore at 100 feet depth, a second tunnel, 350 feet in length, cutting the vein at 225 feet depth. The face of the tunnel shows 12 feet of ore, which is asserted to show assay values of from $6 to $150 per ton.

Twelve samples from the St. Louis, according to assayers' certificates exhibited, averaged $115.45 per ton. This property is one and one-half miles south of the Big Buffalo and is under option to Young & Turner of Spokane. The vein uncovered here is about 8 feet wide. The assays above referred to came from six surface cuts, covering 600 feet in length on the vein.

Out of 250 assays made by Buffalo Hump assayers from various properties in the district, it is asserted the average value was $26.90 per ton.

The ores of the district generally are a sulphide of iron and copper, with values in gold, silver, lead and copper. Much of the lead occurs as galena.

The altitude of Buffalo Hump camp is 8800 feet above sea level. Much of the distance by trail is extremely rugged, mountainous and picturesque.

The Lucknow, N. S. W., Gold Field.*

By A. R. CANNING.

Necessarily the sampling for market purposes of such rich stuff as that obtained from the "firsts" and also of the higher grade of concentrates has to be carried out with great care. For some time the custom was to run all the dried ore into a small hopper leading to a short down pipe which was subdivided many times until one-sixteenth of the bulk fell into a receptacle, out of which a sample was taken, the rest falling into a large hopper, from which the bags or casks were filled. Six check assays were made of the sample thus obtained, and the mean of these was taken. Later on it was found that, however dry the ore was, and however carefully mixed, some of the richer particles adhered to one another, forming small lumps, and that these seldom passed through into the sample box; the assays, therefore, underestimated the true value of the parcels. In place of this sampler, a gauge like an elongated cheese tester is now used, and by this cores can be obtained from the filled bags which give far more reliable returns.

With regard to the effect on the copper plates of antimony contained in the stone sent to the mill, a few interesting points may be noted. This metal is not found to sicken the plates to any appreciable extent, but the amalgam collected when much antimony is being put through is low in quality, averaging only about 33%, instead of 45% to 47%, bullion gained from the usual amalgam. When low-grade amalgam is obtained it is generally cleaned, the dross being floated off; this latter is found to contain about 17% of high-grade bullion, which is recovered by roasting the dross before retorting.

A curious specimen, consisting of a piece of stone carrying about 75% of pure antimony, had got among the "firsts" and was found in the mortar box after a parcel had been put through. It showed the outside faces to have taken up quicksilver and formed an antimony amalgam; two small pieces of gold amalgam were seen adhering to the sides of this stone. On one occasion, when a somewhat large patch of antimony had been struck, some tons of it were dressed to yield about 70% metallic antimony. No market, however, was found for it; either the antimony or the gold contents were negotiable, but not the two. The gold running to thirty-five ounces to the ton, the antimony was consequently sacrificed, and the stone was mixed in small quantities with the ordinary milling dirt and put through the battery, and the gold extracted in the ordinary way.

The many interesting characteristics associated with the Lucknow gold fields tend to increase rather than to diminish the difficulty of writing a paper on the subject. Geological, mineralogical, mining and milling descriptions have had to be given, and these in dealing with characteristics, many of which either have not been or have been but rarely met with elsewhere. There are points in connection with this field that claim the attention of each branch of the mining and metallurgical professions, and with so far-reaching an interest the writer cannot expect, nor does he hope, to escape criticism; such criticism can hardly fail to be instructive.

In dealing with the geological features the writer has endeavored to give a full and clear description of each point that has been noted in the workings. In facing a problem which is undoubtedly a difficult one and capable of inviting different solutions, certain points, that to one may seem trivial, to another may appear to supply circumstantial evidence towards the advancement of some particular theory. The all-important question as to how the gold and auriferous pyrites became deposited in their present position raises the consideration of many points. What inference is to be drawn from the gold being found in shoots of calcite? Does the absence of gold in the quartz reefs at a distance from the joint suggest that a leaching process took place, which concentrated the finely distributed particles of gold into rich shoots at or near the line of contact; or does the presence of antimony and arsenic at once mark the deposits as being of deep-seated origin? Again, was the deposition of the gold contemporaneous with or subsequent to the earth rendings that resulted in the formation of the serpentine? Mention has been made of an important feature at the northwest end of the ground, where the two diorites close in, only leaving a narrow band of soft "dig" intervening; how that, in spite of new reefs being struck here, carrying all the other characteristics of the pay veins, no gold has been found in them. Also, of certain veins, these, too, at the northwest end of the ground, carrying gold downwards until the diorites close in, and then become barren of gold. It would seem quite possible that serpentine will be found to widen out and again fill the space between the diorite and the veins recommence to carry gold; but, nevertheless, the failure of the pay shoots when serpentine is absent would appear to put beyond doubt the contention that the same forces that assisted the formation of the serpentine had much to do with the deposition of the gold. The final question, one of great interest alike to the geologist and to the investor, is, of course, what are the chances of continuation in depth, and this cannot be answered until a satisfactory solution to the above points have been arrived at, or the energetic prospecting now being carried on at the mines give actual proof one way or the other.

Looked at from a mining point of view, it will be seen that unusual features have presented themselves, preventing the adoption of several accepted rules in working ground, or necessitating considerable modifications to them. These have not been dealt with in detail, because it has appeared to the author that conditions of an exactly similar nature are unlikely to be met with again, and that their record would render but little service. With such extensive workings (extensive if compared with the depth reached and with the small output of milling ore), and with men employed in faces remote from the shafts, everything is done to prevent time being lost. A general principle has been adopted. Thus, unless under unusual circumstances, miners do not lay their own rails, fix on air pipes, put in timber, etc. Plate and pipe layers, timber men, and their assistants are maintained, and they have to fly around, keeping the work up to date. In the case of the latter work, timber hitches are marked out where necessary, and afternoon and night shifts cut them out ready for the timber men to work on during day shift. Nothing is allowed to hinder the actual work in the face. Contracts are let where possible, but the changes in the direction and in the class of rock to be traversed are so constant that the setting of piece work is difficult and cannot be resorted to as frequently as desired.

Telephone communication has been used during the last twelve months, connecting the two ends of the mine and the manager's room. This has been of great service as a means of saving time and labor, and by allowing sudden changes in the country to be reported, so that unnecessary or ill-directed work can be prevented. No accidents to life or limb have had to be reported during the past three and a half years, and, though no comparison can be made with the working of dangerous mines, at the same time it may be useful, especially to the students of this institute, to mention that this satisfactory record is attributed to the strictness in punishing men for carelessness without waiting for an accident. A single example of a miner dismissed for working under baulked ground, instead of first taking it down, produces an excellent result, and the same may be said with regard to punishment for reckless handling of explosives, rushing of cages, etc.

The difficulty of preventing the stealing of rich ore is ever present, and not only is a very large sum of money annually expended endeavoring to prevent loss by this means, but each move made in the mine and each appointment of foremen is influenced by this question. Precautions taken in one direction only appear to divert the danger into another. Changing rooms, of course, exist at each shaft, but nothing can prevent a certain amount of leakage through this channel. Collusion between several men was at one time very prevalent, but since the strike of 1897 this danger has been eradicated. Mineralogists and milling men can hardly fail to find certain unusual and interesting features in connection with the auriferous arsenical pyrites and antimony.

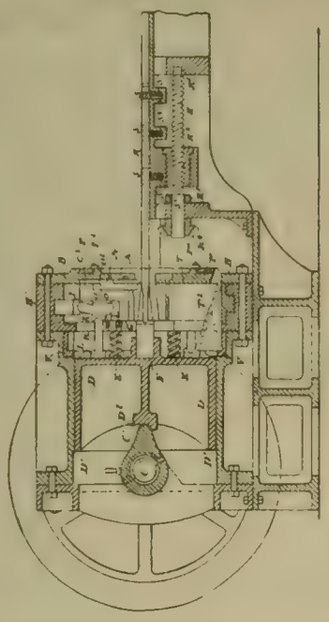
*Condensed from a paper read before the Institution of Mining and Metallurgy.

Latest Mining and Metallurgical Patents.

Patents Issued Aug. 22, 1899.

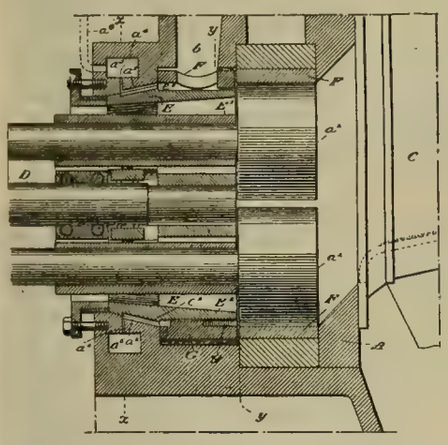
Specially Reported for the MINING AND SCIENTIFIC PRESS.

MACHINE FOR FORGING AND SHARPENING ROCK DRILLS.—No. 631,281; W. Daly, Johannesburg, South African Republic.



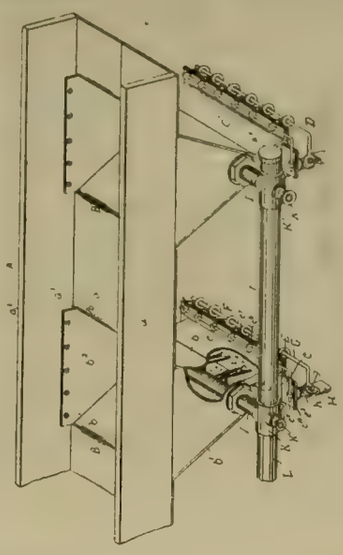
An improved drill sharpening and forging machine consisting in combination of a rotary shaft *A* provided with an eccentrically moving member operating a horizontal sliding block *D* provided with a sharpening die *F* formed with a cress to sharpen the particular shape of bit required, the series of forming hammers sliding in guides *G'* formed in the circular front plate and working toward a common center and adapted to form the shank of the bit operated from the main sliding block *D* through the toggle links *K K'*, the tension springs *E E* and *G² G²* for maintaining the parts in their relative positions, the cutters *N* operated from the sliding hammers *G* and controlled by the wedges *O* connected through the links *P'* to an adjustable annular plate, the adjustable jaws *T* to determine the size of the web of the drill working in guides *T'* formed in front of the circular plate *V* provided with circumferential inclines and the holding device consisting of a table adapted to the front of the machine having a sliding top *R* regulated and controlled by the screw worm *R'* and furnished with the spring stops *S S*.

PULVERIZING MACHINE.—No. 631,291; G. Frisbee, Philadelphia, Pa.



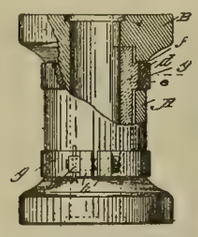
In a pulverizing machine, a die, a crushing roller, a rotatable disk back of die and closing one end of the pulverizing chamber against the discharge of pulverized material, grooves formed in the periphery of disk, an external casing around the pulverizing chamber and disk, grooves on the interior surface of external casing adjacent to the grooves in the disk, the former grooves being arranged at an angle relatively to the latter, whereby a current is created. In a crushing or pulverizing machine, a ring die, crushing rollers, a rotatable disk at one end of the pulverizing chamber, a series of obliquely arranged grooves on the periphery thereof, grooves being closed at one end, and a series of grooves in a stationary part adjacent to the first-mentioned grooves but arranged at a relatively different angle. The rotatable disk having inclined-faced projections thereon adjacent to its outer edge and directed toward the axis of rotation of disk, with a spirally grooved stationary ring surrounding disk, grooved portion of the latter being out of the path of movement of projections.

ORE CONCENTRATOR.—No. 631,411; E. C. Sooy, Kansas City, Mo.



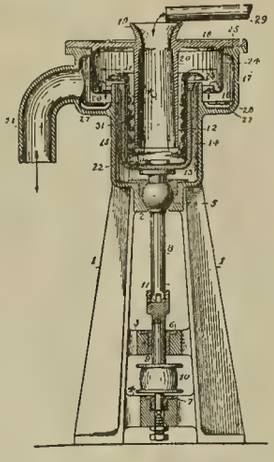
A receptacle for ores having sides and outwardly extended flanges upon the lower portions of sides, a detachable bottom to receptacle, a hinged connection of one side of bottom with one side of receptacle, the free edge of bottom and the adjacent flange on receptacle having openings registering with each other, a clamping nut opposite each of the several openings having a ring integral with nut, an eyebolt in each opening within its respective nut, a link connecting one of clamping nuts with another, and a separate link connecting one eyebolt with another, and a locking device connected with each link.

TAPPET FOR STAMPING MILLS.—No. 631,535; G. W. Waitt, San Francisco, Cal.



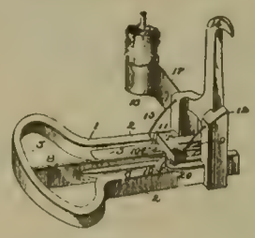
A tappet having an interior chamber or recess in its wall, and a groove around it with an opening from the recess to the groove, a gib having a stud or boss projecting into the groove, a band in the groove and mechanism for drawing upon the band and causing it to press upon the gib, the parts being constructed and combined. The combination with the sleeve of the tappet having recesses therein, a two-part hinged band, a gib arranged in each recess, one near each of the free ends of the band, sleeve having openings from the recesses through which the band and gibs are designed to contact, and means for drawing the parts of band together.

MINERAL EXTRACTING MACHINE.—No. 631,680; K. Staahlgren, Salinas, Cal.



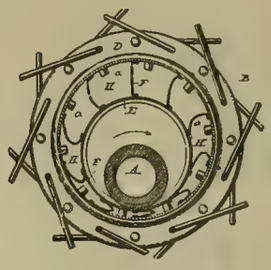
In a centrifugal mineral extractor, in combination, a stationary cylindrical vessel, provided with an annular outer chamber surrounding the same, a cover for vessel, having a central receiving nozzle and depending cylindrical tube concentric with stationary cylindrical vessel, an annular removable pan (*27*) in the bottom of annular outer chamber, an annular depending curtain (*24*) having inturned flanges (*26*), a revoluble cylindrical vessel within stationary vessel and concentric therewith, means for rotating revoluble vessel on its true axis of mass, and a removable thin metal lining, outturned at top, within revoluble vessel.

COMBINED KNIFE AND CANDLESTICK.—No. 631,270; A. Bernier, Victor, Colo.



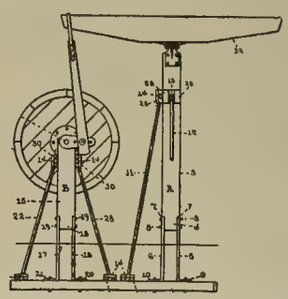
A device of the class described comprising a handle, the pivoted parts mounted within the handle, a slide arranged to lock the pivoted parts in their folded and extended positions, a frame mounted on the handle and carrying a candle holder, and a means for detachably connecting the frame and the slide, whereby both parts are held in position. A blade or device arranged adjacent to the guide piece, and a slide mounted on the guide piece and having portions adapted to engage the blade or device.

AIR COMPRESSOR.—No. 631,701; C. F. Du Bois, Denver, Colo.



In an air compressor, the combination of a pair of disks, eccentrically disposed cylinders therebetween, and fitted air tightly thereagainst, and means for rotating the cylinders; with collapsible partitions between the cylinders and the disks, whereby contractible and expansible air compressing chambers are formed between the cylinders and disks, the inner cylinder having sliding airtight joints with the disks and both cylinders being eccentric in relation to each other during the rotation thereof, whereby the air chambers are successively reduced in cubical capacity, as they pass the point of closest approximation of the cylinders; the eccentric displacement of the cylinders being produced by weight applied to one cylinder; and means for collecting the compressed air from the several chambers.

OIL OR ARTESIAN WELL DRILLING AND PUMPING RIG.—No. 631,504; C. C. Howell, Bradford, Pa.



In an oil and artesian well rig, the combination with the embedded main sill and subsill, of the samson post consisting of a timber of rectangular form provided with a tongue, and the iron plates provided with foot pieces, and the jack posts consisting of one timber each of rectangular form provided with a tongue, and the plates provided with foot pieces secured to the embedded main sill and further provided with the iron braces; the front jack post consisting of a timber of rectangular form provided at its lower end with a tongue, and the plates provided with foot pieces secured to the embedded main sill, and further provided with the iron braces; the back jack post consisting of a timber of rectangular form provided at its lower end with a tongue, and the plates provided with foot pieces secured to the embedded subsill, and further provided with the iron braces, the embedded main sill and the embedded subsill.

Measuring Gas and Liquid Fuel.

Wherever gas is used for heating purposes its heating value is suited as a standard for measuring the economical value and to fix the cost. The knowledge of the heating value is of importance, and the easy determination of the same desirable, as the use of gaseous fuel is increasing. Thirty per cent of the illuminating gas supplied by gas works is used now for heating purposes, cooking, warming, gas engines, etc.

The calorimeter herewith illustrated, while not inferior in exactness to the most scientific instrument, is simple to handle, requiring little time for taking a measurement, and may be attended to by an inexperienced person. It has the valuable property, inherent in no other calorimeter, of enabling a continuous determination of the heating value to be made, and of therefore continuously showing the fluctuations of the heating value. Besides determining the economical value of a heating gas, the calorimeter may be employed as a useful instrument in many other cases, as it gives, by means of the heating value, a number of other indications of all kinds, taken either directly or indirectly therefrom, in the same way as, for instance, the indicator of a steam engine affords, besides the amount of work performed, indications as to steam distribution, leakage in the steam pipes, etc. The calorimeter can, therefore, serve for controlling the mode of working of the gas producer, and of the separate periods of working this apparatus (illuminant gas, generator gas, or the like producer; coke ovens, blast furnaces, etc.); further, for fixing the working degree of the apparatus for heating purposes or power production. Especially in the testing of gas motors this calorimeter is of great importance.

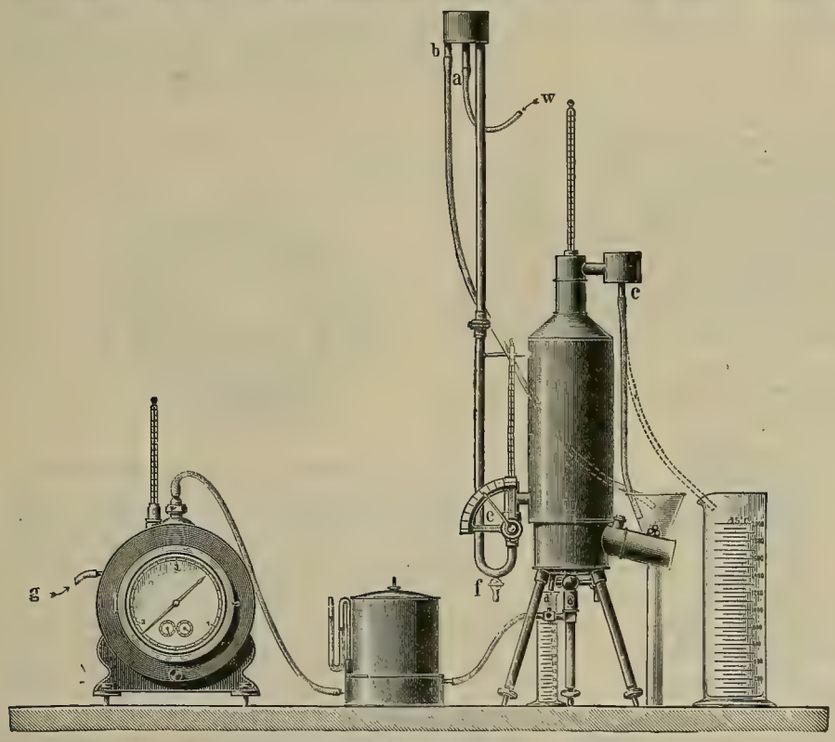


FIG. 1.—THE JUNKERS GAS CALORIMETER.

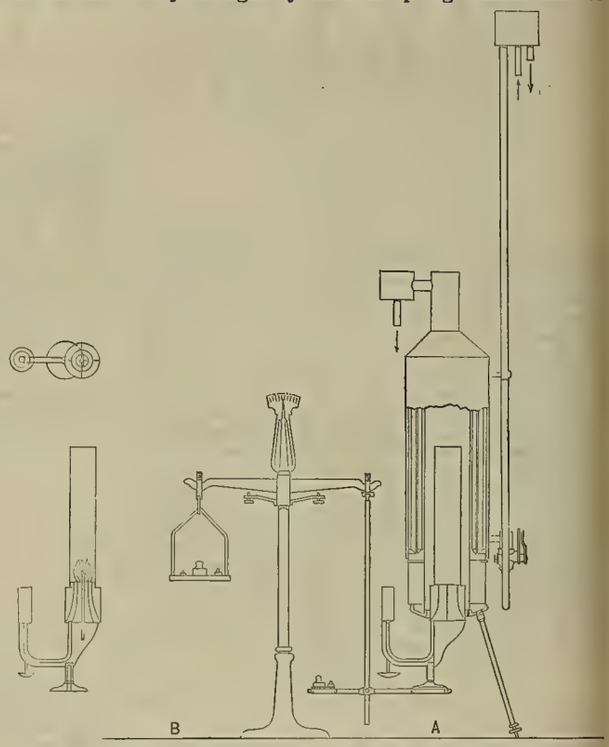


FIG. 2.—JUNKERS' CALORIMETER FOR LIQUID FUELS.

The mere determining of the consumption of gas is not decisive for the value of a motor, as the heating value of illuminating gas from the same gas fluctuates between wider limits even than does the consumption of gas of equal value by different patterns of motors. The importance of the instrument has been recognized by practical men.

The determination of the heating value of combustible gases takes place in the calorimeter by a state of permanency being established in the same, in which the heat, developed from a constantly burning flame, is entirely transmitted to an evenly flowing stream of water.

For making use of the calorimeter, the following adjuncts are necessary: 1. A water pipe capable of supplying from one to three liters per minute. 2. Standard thermometers from 0° up to 50° C. and divided into $\frac{1}{10}$ degrees for the water inlet and outlet, and an ordinary thermometer up to 30° or 50° for the waste gases. 3. A correct gas meter, with a large dial and thermometer. 4. A large measuring vessel for exactly determining a quantity of water, and also another small one for 50 to 100 cubic centimeters. 5. India rubber tubing for conveying water and gas. Stoppers for holding the thermometers. 6. A pressure regulator for the inflowing gas, because the pressure in the main fluctuates.

The calorimeter is placed in such a way that both the thermometers for the water inlet and outlet may be easily observed. The vent for the escape of the waste gas must be protected against the inrush of air. The gas meter is so arranged that the index may be observed while the water, running from the calorimeter, is collected for the purpose of measuring, so that all the readings may be taken by one person.

The center nozzle *a* is connected with the water main by means of india rubber tubing. The nozzle *b* is provided with an overflow pipe, which must, however, be arranged so that it can be seen that the overflow is really taking place during the measuring (such a device may be formed by inserting a short glass tube in the rubber pipe). The nozzle *c*, for discharging the water from the calorimeter, is connected with the tubing in such a way that the water discharged may be easily, and without splashing, conveyed into the graduated glass cylinder.

A glass is placed under the small tube *d*, in order to catch the water of condensation.

After the thermometers have been placed in position, the regulating cock *e* is opened (the pointer of of the dial being in a vertical position) and the calorimeter is filled until the water runs from *c*.

In this way the freedom from leakage of the inner part of the apparatus can be ascertained if there is no leakage from the small pipe *d*.

Professor Junkers has invented additional apparatus to also determine the caloric values of liquid fuels such as petroleum, kerosene, naphtha, turpentine, alcohol, oils, etc.

The calorimeter used for these tests is identical with the one shown in Fig. 1. The principal part of Fig. 1, the gasometer and pressure regulator, are dispensed with. In their place a specially constructed balance is used which carries on one side the burner consuming the liquid fuel, in the other pan the weights to determine the amount of fuel consumed.

Further detailed technical information regarding these calorimeters can be had on application to Eimer & Amend, 205–211 Third avenue, New York City.

Some Experiences of a Working Miner.

NUMBER XXX.

Written for the MINING AND SCIENTIFIC PRESS.

The value of a technical education is never more useful in any pursuit in life than in mining. I have met and talked with some thoroughly educated mining men in my travels. I recall one of them now—Prof. D——. Some men who have a finished education do not possess the happy faculty of imparting to others the knowledge which they themselves have absorbed. Not so the professor, however, for he was just bursting with information and it would bubble out spontaneously. Why, I have known the professor to take a piece of the most ordinary looking rock in his hand, glance at it casually and describe its manner of formation, its position with relation to a vein, whether from foot or hanging wall, and he could even tell the width and character of the vein and the value of the ore. I never could understand how he could do this, but it seemed as easy to the professor as reading out of a book. As a matter of course there are always those who do not appreciate the value of such talents as the professor possessed in such an eminent degree, and, being envious, ask absurd questions in an endeavor to lead the educated party into some ridiculous error. One day a miner handed the professor a dark, smooth, peculiar looking ball and asked his opinion without volunteering any information concerning it. The professor put on his glasses, "hefted" the ball, turned it over and over in his hand and said, "Well! This is interesting. I was not aware that these concretionary formations occurred in this section, but it is most unmistakably a concretion from the Cretaceous. These spheres are the result of a process of accumulation of atoms of ferrous oxide in the sandstones of the Cretaceous and sometimes are of great size. It is a very interesting specimen."

"Yes," assented the miner, "it sure is that." As he said this he deliberately opened his pocket knife and proceeded to cut the ball into halves, and added, "You see, professor, this is a ball of hair out of the stomach of a Cretaceous cow."

This young man had none of that respect for old age which is considered a virtue. Do not imagine that the professor was without a following. He had large capital to back his judgment and he spent a great deal of money for his company, though I never heard of his making any for them. Among his other exploits he constructed a flume in a canyon where the greater portion of the year was only a small stream and where in winter and spring was a rushing, roaring torrent which swept out the flumes and ditches without delay. He built a mill directly in the mouth of a tributary canyon, and it too was badly damaged by the first spring freshet that occurred after it was erected. Several experiments of this nature were made and each resulted disastrously, still Prof. D—— had a reputation, such as it was. It has often occurred to me that if he had had a few grains of common sense with his technical education he might have made fewer blunders if no successes.

* * *

I happened along at the P—— M—— mill one day and found the man in charge reading a story paper while the mill was clattering merrily away crushing ore worth $140 per ton. The first thing that caught my eye was the picturesque islands of sand which had accumulated on the apron plates, covering three-fourths of their surface, while a goodly portion of the plate not covered by sand had a lovely golden hue. The mill man greeted me cheerfully enough and seemed satisfied with himself and all the world. I pointed to the plates. He nodded, and bawled into my ear "Short of water." I suggested shutting down one battery and employing all the available water in the other. He thought it would be too expensive, as it would reduce capacity one-half, and assured me he was catching most of the gold inside of the mortars. I didn't agree with him and offered to prove it by panning the tailings. He did not hail my proposal with the delight he might have shown, but still made no serious objection. Pan tests showed a good deal of quicksilver passing off into the tailings and also little particles of hard amalgam. He was, fortunately, getting about 50% inside of the mortars. He was later directed by the owners to shut down one battery, and several tons of tailings were shoveled up and put through the mill a second time and they were found to pay as well as the ore run previously. Some men in charge of quartz mills should be driving a sprinkling cart, but perhaps they would not know when the tank was empty.

MINER.

Mining Summary.

ARIZONA.

COCHISE COUNTY.

Globe *Silver Belt*: It is reported that one company will buy the several mining properties in Tombstone and provide a pumping plant to unwater the mines. It is now twelve years since operations ceased, owing to the destruction of the pumps by fire, and Tombstone has since steadily declined.

GRAHAM COUNTY.

Graham *Guardian*: The Horsehoe mine, located in the Lone Star mining district, is ten miles in a northeasterly direction from Safford. It shows on the surface in the shape of a horseshoe. The ledge is a circle, except 40 feet on the west, which is covered with the surface soil. It is 750 feet around this circle. The ledge is from 4½ to 6 feet across, averaging 6% to 12% copper and carrying some gold and silver. Four shafts have been sunk on it in a space of 500 feet. The deepest is 35 feet.

MOJAVE COUNTY.

Kingman *Miner*: W. E. Ewing, of the Sheeptrail mines, reports the 20-stamp mill ready to crush ore. The bins and chutes are full of ore at the mines. A tunnel is being driven into the mine from the valley and is now near the vein. All ore will be handled through the tunnel. At the mill the pulp will run over plates and concentrators and the tailings cyanided.

PIMA COUNTY.

Arizona *Star*: F. McMasters of Los Angeles bought the Tres Amigos property a few days ago for $40,000. Shafts have been sunk and tunnels driven. A small stamp mill is running night and day, eight tons of ore being handled daily. No ore is put through the mill that runs less than $25 per ton. Twenty men are employed. Beside the increase in the capacity of the mill, Mr. McMasters is figuring on placing a cyanide plant on the property to handle the tailings. —— The Golden Eagle mines, belonging to Mr. McDonald, are making a good showing.

YAVAPAI COUNTY.

The Hillside mine, fifty-five miles west of Prescott, is one of the most valuable mining properties in Arizona, but has been idle for several years owing to litigation. The vein was discovered by J. Lawler. The croppings were limited to a foot in width and were not exposed over 10 feet in length. The first ore shipped from the Hillside claim returned over $350 per ton, the values being about equally divided between gold and silver. Soon after its discovery ore was found which returned nearly $1000 per ton by the carload, which attracted attention to the property, and numerous offers were made for it, all of which were refused. As development progressed it was found that the ore shoots continued, though the surface croppings gave no indications of it. It has since been extensively developed and thousands of feet of drift run on the various levels, and still these may be called superficial workings, as the vein is worked through crosscut tunnels. The average depth of the lowest level is less than 200 feet from the surface. The veins, of which there are several, occur in a silvery gray phillite and the ore shoots are 400 to 1200 feet in length. In 1890 the mine was sold to Dr. Warner of Buffalo, New York, who organized a company and attempted to float the mine for $3,000,000 giving certain guarantees of dividends to any who would subscribe to the stock. The scheme failed and the mine has since remained idle excepting during a short time when it was operated by the Warner Co., which was known as the Seven Stars M. Co. Dr. Warner defaulted on his deferred payments and by the terms of the agreement the property reverted to the former owners. It is this matter that is now the cause of pending litigation.

ARKANSAS.

MARION COUNTY.

The Standard Oil Co. and the Palmer Oil Co. are purchasing large bodies of land in this county which is believed to be underlain by lead and zinc ores. The Standard people have sent steam drills and have prospected many hundred acres. In nearly every case rich zinc ore has been found, in many places the rosin blende being so pure as not to require the use of a crusher. This zinc field extends over four or five counties. Marion county is the center.

CALIFORNIA.

Amador.

Jackson *Ledger*: At a depth of 160 feet the shaft in the Shenandoah, near Plymouth, cut an ore body 25 feet between the walls, in some of which free gold can be seen. The shaft is down over 200 feet.

Sutter Creek *Record*: S. R. Porter, Supt. of the Mutual mine, between Sutter Creek and Amador City, is sinking a new shaft on this property, which had been abandoned many years. The old shaft has also been cleaned out and retimbered as far as necessary. The latter 10 feet of sinking exposed two veins divided by a foot gouge seam, and an 18-foot crosscut reached a 4-foot parallel vein. The new shaft is 300 feet south of the old shaft.——At the Bay State mine, four miles north of Plymouth, drifting is in progress on the 700 level. Stockton parties have control of this property.——The Wheeler mine, near Plymouth, has been shut down.

Jackson *Republican*: Stewart & Savallo, who own a mine on the Pablo lead, Volcano mining district, shipped 5500 pounds of ore to Selby & Co. at San Francisco, Cal., and have received $640 from the run.——The Yellow Jacket mine, located three-fourths of a mile west of the Defender, Volcano mining district, is shipping ore to Selby & Co. at San Francisco, Cal.——The Defender mine near Pioneer is down 200 feet and the 4-stamp mill is crushing $60 rock which is taken from a 5-foot ledge.

Butte.

Marysville *Appeal*: At the De Long mine twenty men are employed in the mine and on the flume. The first flume put in did not carry sufficient water and a larger one is being built. The lumber for this flume is being cut by whipsaw, the Maxwell Bros. having a contract at $60 per M. feet.——The Butte Creek Power Co. at the Carter quartz mine on Butte creek has put an electric plant in and air compressors are in place. The shaft on the ledge is down 150 feet and the tunnels are in 300 feet. C. M. Spangler has charge of the machinery.——The Golden Trout Co. are employing twenty-five men on their 10-stamp mill, in the mine and in the sawmill. A. Hamilton has charge of the building of the quartz mill.

Oroville *Mercury*: Pres. W. P. Hammon of the Butte County Miners' Association has appointed a committee of five citizens to devise ways and means of entertaining the members of the American Institute of Mining Engineers when they visit Oroville. J. L. Gray, H. P. Stow, A. F. Jones, A. Ekman and N. Goldstein (ex-officio members, W. P. Hammon and O. W. Jasper, president and secretary, respectively, of the Miners' Association) are the members of the committee.

Calaveras.

A tunnel is to be run under the gravel deposit on French hill, a half mile north of Mokelumne Hill, for the purpose of reaching a basin of gravel presumed to be there. On the west side of the hill is a remnant of a gravel channel which was very rich when worked in early days. No work has been done there in many years and no one seems to know whether the deposit was worked out or not. The gravel is covered by volcanic mud and tufa.

At the Vorlander mine work has been suspended owing to the heavy flow of water in the shaft. C. M. Burleson, the Supt., states that a 5-inch pump will be required to handle the water.

The Thorp mine, near Fourth Crossing, is closed down.

S. H. Lucas reports that he is crushing thirty tons of ore daily in the 10-stamp mill at his mine, near Big Bar bridge, at a total cost of $1 per ton.

The Ford mine, near San Andreas, is to resume work after several weeks of idleness. The holdings of the Ford Bros. have been placed in the East and money provided for continuing development. The mine is 700 feet deep and has several levels. The veins are large but low grade. There is a 10-stamp mill on the property.

Wallace Gold Placer M. Co. has been organized at Stockton; W. Tucker, L. W. McKee, A. J. Taylor, H. N. Tremper and A. N. Petty; capital stock, $100,000.

The construction of the 120-stamp mill for the Melones Con. mine at Robinsons Ferry is being pushed with the utmost vigor. The ditch and tunnel connections will be in readiness for the beginning of work before the mill can be completed. The camp has grown into a good-sized village. In the early '50s it is said that more than 3000 people lived in tents and slab shanties on the steep slopes of Carson Hill, but the town now growing there will have more of permanence than the early village of Melones.

San Andreas *Citizen*: The new gallows-frame for the Fox mine, owned by J. V. Coleman of San Francisco, is completed and the shaft has been retimbered. Opening the levels will begin next week. It is the intention of Mr. Coleman to erect a 20-stamp mill on the mine.

Amador *Ledger*: The Sheep Ranch mine is being put in condition for the installation of a new plant under Supt. V. S. Garbarini. The collar of the shaft has been raised. The boiler room and engines have been set back from the shaft and their foundations raised. The new steam hoist is being changed to meet the conditions at the mine. The tunnel from the Ploche mine has been extended toward the shaft. The shaft has been retimbered to the depth of 300 feet. The shaft is 1200 feet deep, with extensive workings. Some of the levels are 1400 feet long.

San Andreas *Citizen*: The additional twenty stamps on the Lightner mine have been placed and are running on rich rock of this mine.——Arrangements are being made to resume operations at the Veritas property, near San Andreas.

Angels *Echo*: C. A. Lillie has bonded a gravel claim on Birney's ranch, one and one-half miles east of Angels, and is sinking a shaft to the channel. A whim will be put on and other improvements made. These channels are very wet and a pump will no doubt be needed before the channel is reached.

El Dorado.

(Special Correspondence).—The Gopher-Boulder and Dalmatia mines near Kelsey have been sold by J. C. Bell, through Col. D. H. Jackson, to J. C. Alvarado and associates for $100,000, part cash, the rest in twelve and eighteen months. The Dalmatia was the first mining property on this coast to be operated by electricity.

A contract has been let to the Simmons Co. for a 200 H. P. three-phase electric plant, the generating dynamo to be placed at Rock creek, where was located the old power house, which was burned down about two months since. This dynamo will supply power for the mines and mill. The present mill capacity is about 130 tons per twenty-four hours. There is a large quantity of low-grade ore in sight at present time which ought to yield a handsome profit to the new owners. Col. Jackson is in charge of the property for the new owners.

Placerville, Sept. 1st, '99.

On the 26th ult., at its regular annual meeting, at Placerville, the El Dorado Co. Miners' Association elected C. H. Dunton Pres., H. E. Pickett Vice-Pres., and C. H. Weatherwax Sec. The association will elect delegates in October to the annual State convention.

Placerville *Democrat*: On the Cinnamon Bear mine, in which A. D. Henderson, Supt. Deep Gravel M. Co., is interested, near the mouth of Big Canyon, just above Chili Bar bridge, a 5 foot ledge has been found.

Placerville *Democrat*: E. Bind reports recent developments in the Blue Gouge as encouraging. The surface improvements are being pushed rapidly. A mill is to be built before winter.

Mountain Democrat: It is reported that a shoot of $50 ore has been discovered at the Union mine.——At the 800 level in the Mt. Pleasant they have struck ore said to be richer than that which made the mine famous in its early history.——The machinery from the Gold Note is being taken down and hauled to the Alpine, near Georgetown, and the Three Stars in Placer county, both of which properties are being developed by E. W. Chapman.

Auburn *Republican*: I. L. Moore, Mgr. of the Lucky Marion mine, near Greenwood, reports that a decision has been rendered by Judge Prewett, in the El Dorado court, in favor of his mine and against Judge Williams and others who contested the title of the St. Louis Co. to the Lucky Marion. The mine cost the company $30,000 and has been in litigation two years, work having been suspended in the meantime. There is a 20-stamp mill on the property. The company will commence operations on the mine. An incline shaft is down 112 feet and the ore will average $7 to the ton.

Georgetown *Gazette*: The mill test from the Little Gem mine, near Josephine, made at the Esperanza last week, proved satisfactory. The work of retimbering the shaft will be commenced and a new hoist and pump will be installed and sinking resumed.

Fresno.

(Special Correspondence.)—The Ohio State M. Co., in the bed of the San Joaquin river near Millerton, near the mouth of Fine Gold creek, have at last strong hopes of success in their diversion of the stream, pumping dry the pool and getting the gold supposed to be in the bed. They have the pool nearly pumped out, and expect by Sept. 1st to begin getting gold.

Pollasky, Aug. 29th, '99.

An oil company has been formed at Fresno, capitalized at $100,000, in which Mrs. Phœbe Hearst is the principal stockholder. Her agent recently inspected the oil territory.

The Mammoth Oil Co. has been organized at Fresno; capital stock, $300,000; V. H. M. MacLymont, J. Berry, G. L. Hoxie, H. C. Smith, F. R. Lindsley.

Poso Oil Co., No. 1, has been organized at Fresno; capital stock, $100,000; W. H. Bradley, L. G. Hall, J. S. Bedford, G. L. Long, F. M. Hague, S. McKay, W. D. Foote.

Kern.

At the Little Butte mine, Randsburg, it is reported, all work has been suspended; the improvements are mortgaged for $2000.

At the Wedge claim some good ore has been taken out recently.

L. Bethune and C. Sears of Santa Barbara will work the claims of the Little Dick M. Co. at Randsburg. The shaft will be sunk to 100 feet and 100-foot drifts will be run and crosscuts driven.

The Kern & Trinity Mines Co. has been organized in San Francisco; capital stock, $200,000; C. L. Blair, E. C. Ward, W. H. Davenport, H. C. Cantelow, W. H. Waterhouse.

Mariposa.

The Green Mountain copper mine, eight miles northwest of Raymond, has been on fire during the past two weeks and is giving much trouble to the management. The ore is bornite, which, upon exposure to the atmosphere, oxidizes so rapidly that spontaneous combustion results. A quantity of ore broken down in the stopes took fire on Aug. 16th and clouds of sulphurous gas poured from the shaft. The workings were bulkheaded and were kept closed several days; but, when reopened, the fire was discovered to be still in progress and the bulkhead was replaced. Workmen who ventured into the mine were nearly asphyxiated by the gases.

Merced *Sun*: A. L. Briggs, who bought the Coppertown mines some months ago, is shipping high-grade copper ore, which contains $8 per ton in gold.——A thirty-ton water jacket will be built at the mines in Hunter's Valley.

Mono.

Bridgeport *Chronicle-Union*: Mr. Page, who is at the Arnot mine, has made a new find on the extension of the Arnot ledge on Green creek. A number of men located claims on the extension and vicinity. The ore shown was rich. The Arnot-Par Value mine is proving to be a valuable property, and the Green Creek district is attracting attention. The Arnot is rich in gold and galena. The ore will be concentrated and shipped.——It is reported that rich copper ore has been struck in the Copper Mountain mine at Jordan.

Nevada.

Nevada City *Herald*: The Rocky Bar placer mine on the South Yuba river, near the town of Washington, was sold to satisfy a judgment obtained by J. Kelleher of that district against J. D. Rockefeller, E. A. and J. O. Hays. Mr. Kelleher bid in the claim for $747.59.

Grass Valley *Tidings-Telegraph*: E. A. Roberts of Sacramento and W. H. Weldon of Grass Valley have men working on copper claims near Spenceville, the most important of which is the Last Chance.

Marysville *Appeal*: J. Sincock, who is prospecting a claim on the King ranch in the Buena Vista district, exhibits ore from the croppings which shows galena and iron. It is in serpentine and is identical with rock from the Brunswick. The ledge is from 1 foot to 18 inches wide.

Tidings-Telegraph: The Union Hill mine is to have a 16-inch pump with a capacity of 664 gallons a minute, running 8-foot stroke, eight strokes to the minute.

Placer.

Colfax *Sentinel*: The new 10-stamp mill of the Dutch Flat Blue Lead M. Co. is completed and operating, run by water power. It has a capacity of 75 to 100 tons of gravel daily. The company has begun an incline shaft to the surface 1000 feet from the mouth of the tunnel. The number of men will be increased to thirty. The gravel prospects well. S. L. Jordan is Supt.——W. Nicholls, Jr., of the Polar Star mine will resume hydraulicking as soon as the season permits.

Plumas.

Quincy *Bulletin*: B. N. Ivanisevich and five others are developing the Bluenose Con. gravel mine. The tunnel is in 650 feet and will run 150 feet. From the end of the tunnel an upraise of 150 feet will be made into the Bluenose channel. —— At the Plumas Eureka mine twenty men are working on tribute taking out pillars left by former operators. —— Fifty men are working at the Four Hills mine, where an electric plant will be put in. It will generate 180 H. P. and be run by water. The mine is reported to have a large body of gold-bearing quartz.

Riverside.

There is an area of broken hills fifteen to twenty miles south of Perris that have been but little prospected, though in a gold-bearing region.

There is an ancient river channel containing gold four to six miles southwest of Perris. It can be seen near the Good Hope mine and at several points between there and the San Jacinto river. It has been tilted with the uplift of the rocks of that section.

There are numerous small veins, rich in gold, west of Perris, some of which have been worked extensively, the quartz being hauled to arrastras in the neighborhood. In one locality are the basins of more than 100 arrastras, formerly used by Mexicans.

Los Angeles *Times*: Work has been resumed on the Leon mine, fourteen miles southeast of Perris.——The mica ledges recently discovered near San Jacinto are reported to be of commercial value.

Los Angeles *Herald*: The prospectors have found a mica ledge near San Jacinto, and parties are out in the mountains near and in other parts of the county looking for other deposits of mica. Two brothers named Trujillo and a man named Dunn in Chihuahua district, near Oak Grove, have found a ledge in which are sheets several inches square. The ledge is 8 feet thick.

San Benito.

The Dublin G. M. Co. has been organized at Hollister by F. W. Shields, Grass Valley; L. A. Spinelli, San Jose; L. W. Jefferson, J. M. Button and J. J. Croxon, Hollister; capital stock, $50,000.

San Bernardino.

San Bernardino *Sun*: The Tecopa M. & S. Co. has taken an abandoned mining property on the Nevada border and is preparing to begin work at the mine. The Tecopa mine was worked years ago and is ninety miles north of Vanderbilt, on the line between this county and Nevada. The Tecopa M. & M. Co. have headquarters in Los Angeles, with D. W. Shanks as president. The new company will equip the mine with machinery. It is stated that eight ore wagons will be in use hauling rock to the smelter.

San Diego.

A corporation known as the Great California M. Co. it is reported will take an option on the Dewey claim in Grapevine district, near Warner's ranch, if D. Clark does not take up his option.

L. N. Bailey has resumed work on the Kentuck S. crosscut tunnel near Banner. It is being driven through hard silicious mica schist to develop several gold-bearing veins which were rich near the surface. There is a three-compartment shaft on the property, 100 feet deep. The new tunnel will cut under it about 400 feet.

In the early history of the Cargo Muchacho district, a few miles south of Hedges, the most important mine and the largest producer was El Padre y Madre, located in a basin-like depression surrounded by the rugged, barren hills of the desert, at the western edge of the range. The formation is chloritic schist, traversed by numerous quartz veins, some of which were rich and the ore free milling for the most part. These veins were worked Mexican fashion by a series of pits and shallow shafts, the deepest 165 feet, yet the mine is credited with the production of a large amount of gold. The ore was crushed in the Cargo Muchacho mill, two miles distant, to which it was hauled and packed. Since it was shut down years ago nothing has ever been done with the property, though it is doubtful that it is exhausted.

Yuma *Sentinel*: The Colorado mine, owned by A. Modesti and F. Avila, employs twenty-five men. Six thousand dollars worth of ore was shipped during August.

Santa Clara.

The Harmony Iron Co. has been formed, to explore for and mine iron ore, by M. H. Chenoweth, E. A. Hayes, J. O. Hayes, M. B. Hayes, C. L. Hayes, W. P. Lyon, Jr., and E. C. Lyon, Eden Vale; capital stock, $1,000,000.

Shasta.

The Afterthought group, recently bought by A. H. Tarbet and associates, consists of six claims on the same zone as the Bully Hill property, bought by J. R. DeLamar recently for $250,000. It was worked originally for silver; the ores were quarried from the vein, that is 50 feet between walls. In this quarry, 40 feet deep, large bodies of ore have been exposed. At each end of the quarry copper sul-

phides have been exposed, while a solid body of ore 26 feet in width is uncovered. There are several tunnels that cut the vein at greater depth that show the copper sulphides. Mr. Tarbet says that they will follow up the purchase of the property with erection of a smelting plant.

Redding *Searchlight*: The Gold King quartz mine, one mile north of the Rabbit claim on Muletown mountain, was sold last Monday by J. G. McDaniel of Redding to J. V. Cooke of Colusa. The Gold King has been worked for three years. Development includes a shaft, tunnel and several cuts. A lot of sorted ore sent to Selby's assayed $700 per ton. Mr. Cooke will let the contract for a tunnel to crosscut the three veins.

Redding *Free Press*: L. F. Sheppard, Supt. of the Old Spanish mine in the Lower Springs district has started another shaft on the vein.——Myer & McGinnis, owners of the Scorpion mine in the Whisky Creek mining district have taken out ore recently which carried 37% copper. The ore also carries gold and silver.

Sierra.

F. M. Manson has sold the Gray Eagle mine in Kanaka ravine, near Gold Point, to Messrs. Hastings & Wilbur. They have bought a 10-stamp quartz mill from one of the mines near Nevada City and will transport it to the Gray Eagle mine.

Grass Valley *Union*: Fifty sacks of sulphurets from the Triple Pocket mine have been sent to the Selby Smelting Co.'s works at Vallejo Junction.

Downieville *Messenger*: F. M. Manson reports that he has sold the Gray Eagle mine in Kanaka ravine, near Gold Point, to Hastings and Wilbur. Last week they bought a 10-stamp quartz mill from one of the mines near Nevada City and will have it transported to he Gray Eagle mine.

Siskiyou.

Yreka *Journal*: G. W. Grayson of Oakland, Cal., has made a deal with Bennett, Smith & Co. for their mine at Know Nothing creek.

Yreka *Journal*: At the Schroeder mine on Deadwood in a short time the mill will be started up.——The Wheeler Co., sinking to bedrock at Greenhorn, south of the Blue Gravel mine, has not reached bedrock, the work progressing slowly owing to the large quantity of water.——Mr. Scott, the former Supt. of the Mount Shasta mine, is developing a mine near Hornbrook.

Yreka *News*: At the Barron mine, on Knownothing creek, an arrastra is crushing one ton of ore daily.——The location on the south extension of the Gold Run mine has a 4-foot vein of high-grade ore.——On Knownothing creek, it is reported J. Hogan has a vein 5 to 8 feet wide. Free gold is visible in it. He panned out $50 in one day from a rich portion of the vein.——Forrest & Campbell are extracting $7 per man daily from their claim on Knownothing creek.——Ore of the value of $60 per ton has been found in a 16-inch vein on the Wolverine ground on Knownothing creek by A. Heglan.——The summit of the Salmon river range was covered with a light fall of snow last week. —— Brown & Reeder have bonded their mines to W. H. Crocker who will erect a mill.——The Summerville M. Co. has completed a trestle to convey water across Indian creek to their mine.——The Golden Eagle mine on Indian creek is building a 6-stamp mill. —— At the Wheeler blue gravel mine sinking has recommenced. The shaft is down 130 feet and bedrock nearly reached. Tests of the gravel show gold.——One hundred and ten sacks of high-grade copper ore have been shipped from the Crawford & McGowan mine on upper Smith river, San Francisco.

Trinity.

The Enterprise mine at East Fork will increase its milling plant by the addition of five stamps, recent development having exposed a large amount of ore.

Santa Rosa *Republican*: Dr. M. M. Shearer of Santa Rosa has for months kept a prospector in Trinity county on a grub stake. The prospector has found and located copper-bearing lands. Samples of ore are reported to be rich.

Tuolumne.

The town of Carters, which for a time will be the terminus of the Sierra railroad, is growing rapidly.

The Dead Horse mine at Carters is closed owing to a scarcity of water.

The project to run a long tunnel from the Stanislaus canyon under the limestone potholes of Columbia Flat has been abandoned.

A 20-stamp mill is to be placed on the Mount Jefferson mine at Groveland. J. Meighan is Supt.

A 5-foot ledge at the depth of 335 feet is reported in the Longfellow at Big Oak Flat.

At the Accident mine at Big Oak Flat, the shaft is down 300 feet with good rock from surface to bottom. J. Meighan has charge and intends to put up a 20-stamp mill.

The Sonora Quartz Mine Development Co. was incorporated at Sonora by F. L. Coombs, F. B. Lloyd, R. G. Hart, Sr., H. R. Wiley, H. E. Wise, J. Kirby, J. Gartland, F. Homer, A. N. Hart; capital stock, $500,000.

Sonora *Independent*: Near Parrot's Ferry on the Stanislaus river, at the Deozzle mine, operated by an Illinois company, fifteen men are at work.——A company will commence work at Prether Bar, Parrot's Ferry, where it is expected a deposit of gold will be found. A 35-H. P. engine will operate an air compressor and centrifugal pump.

Union-Democrat: The development of the Crœsus mine, owned by T. G. Winwood and W. Carter of Summersville, has been commenced by San Francisco capitalists. A shaft is being sunk to the vein.——At the Kincaid Flat gravel mine sinking is progressing.——Saturday two miners working in a drift of the Excelsior mine near Confidence were nearly drowned by a sudden inflow of water which broke in from the old workings.

COLORADO.

CHAFFEE COUNTY.

Leadville *Miner*: At Granite a new hoisting plant is being erected on the Magenta and a mill is in contemplation for the Cuba mine in Low Pass canyon. The mine was recently bought from Captain McCannon by a Cripple Creek company who have put on a hoist and are sinking a shaft. They have 2½ feet of quartz, making a rich concentrate. A shaft is also being sunk on the vein of the Spondulix, down 35 feet and showing a pay streak of gold-bearing hematite.——In the Saguache range veins of zinc and copper ores are reported, which have never been prospected.

CLEAR CREEK COUNTY.

At the Mendota mine, at Silver Plume, F. A. Maxwell is building a concentrating mill to treat the Mendota dump. Two 20 H. P. electric motors will be used to run the mill.

The Griffith is contemplating the addition of machine drills and possibly a concentrating mill at that mine.

W. Rogers is getting the machinery of the Debbins mill in order to concentrate the Paymaster dump in the East Argentine district.

The Humphrey Zinc Spelter Co. have completed their 150-ton concentrating mill near Montezuma. They have 5 feet of zinc-bearing quartz.

Wolfe, Robeson & Seifried, owners of the Stevens mine, have men cleaning out the levels of that mine, and fifteen lessees are taking out ore.

McLaughlin & Co., leasing on the Mathews tunnel, are shipping good ore every week.

Denver *Republican*: In widening the sump at the Sun & Moon mine a new ore body has been encountered on the east side of the shaft.——Jones & Jones, working the Brazil, near Freeland, have a body of sulphuret ore which is carrying native silver.——A local pool recently took charge of the Silver Link mine and began cleaning out one of the levels. To put in new timbers it became necessary to blast into one of the walls. One of these shots opened an ore body which had never been disclosed before. In the lower level of the mine a body of lead ore is opened.——The Frostburg mine at Silver Plume is showing up a good grade of mineral. Two classes are shipped, the first running 28 ounces silver and 65% lead and the second running 110 ounces silver and 24% lead to the ton.

EL PASO COUNTY.

Woodland Park *Times*: The tests by the Halt process on the Sandstone ores of Woodland Park district have been made. They were conducted by Dr. I. P. George under lock and key, with the solution and instructions furnished by C. Halt. The tests were made at the temporary mill at the Manitou Park hotel on ore that Mr. Halt had given $5 in gold on before. The doctor's tests resulted in returns of a trace to 1.5 cents per ton. Mr. Halt explained the circumstance by saying he had inadvertently omitted a certain ingredient of the process.

GILPIN COUNTY.

J. W. Cairns, formerly of Boulder, has associated himself with Eastern parties who have taken a lease and bond on the Hayes & Wheeler property on Quartz hill. A new shaft house is being erected and a plant of machinery is in place. This building has been put up over the west shaft, which is 110 feet deep.

A new shaft house is being built on the Freedom lode on Winnebago hill by the Freedom M. Co., under the management of S. Hoskin. The plant, consisting of a 45 H. P. hoist and a 60 H. P. boiler, is in place. The collar of the shaft has been raised 6 feet. The shaft on the Freedom has been sunk 400 feet and will be sunk to 1000 feet. This lode is supposed to be the same as the Rialto vein.

Nevadaville people are working as a pool on the French mine on Quartz hill. Shipments of smelting ore have given values of $65 per ton. They have started a new shaft 400 feet westward, which will be sunk 200 feet to make connections with the old working shaft. The property is owned by Willard Teller and Judge Wells of Denver.

Prof. E. C. Linderman has started the Wide Awake stamp mill and is running twenty stamps on ore from the Stewart mine and other claims in that vicinity.

The water in the California mine is down to 1745 feet from the surface, where it is being held while cleaning out the 700 level. A new flat steel cable over 2000 feet in length will be put on the hoist. A small force of lessees are working in the fourteenth and fifteenth levels, and taking out mill and smelting ore, the latter carrying over $100 per ton. This shaft is the deepest of any gold mine in the State, being 2230 feet deep.

Regular shipments of milling ore are now being made from the Gladstone property of the Gilpin & Boston M. Co.

The Kansas Burroughs Con. M. Co. has purchased the English-Kansas mine on Quartz hill, embracing 700 feet on the Kansas vein, east of and adjoining the Pease - Kansas property.

Denver *Republican*: H. P. Barbour has started up the mill in Moon gulch, recently leased to handle the ores being mined on Jenny creek. The plant has a capacity of thirty tons a day. The underground force has been doubled. A good body of mill ores carrying pockets of chlorides has been opened in a shaft started last month. At 40 feet this working is entirely in ore.

GUNNISON COUNTY.

The Black Queen mine, near Crystal, is reported sold for $150,000 to Warner Miller of New York. The property consists of four claims—the Black Queen, Fargo, Legacy and Last Chance. The Fargo made a copper strike during the past month from which a car of ore has been shipped.

HINSDALE COUNTY.

The managers of the Ute & Ulay, Hidden Treasure, Lellie and Golden Fleece have adopted the eight-hour plan, with no reduction in wages, notwithstanding that men are scarce and forces of all the mines are short of the number they need.

The ore shipments from Lake City have run from three to five cars per day all summer, the shipments being principally to the Philadelphia smelter at Pueblo.

The new mill being erected by the Golden Fleece people is nearing completion and will treat the low-grade ores in the mine and on the dumps which have been accumulating for many years.

Above this mill the Contention people are driving a crosscut tunnel, which has reached the vein and is piling up a quantity of milling ore.

The Monitor mine, owned by local parties, is taking out bismuth ore. A car of this ore was shipped recently.

LAKE COUNTY.

Leadville *Miner*: Machinery is on the way for the Elgin smelter. It will have a capacity of 300 tons daily.

SAN JUAN COUNTY.

The company that has leased the Zuni mine is incorporated under the laws of Colorado and is known as the Commonwealth Leasing, Mining & Prospecting Co. R. W. Heflin is Supt. It is the intention to start another tunnel to tap the vein at greater depth, and a tramway and mill are contemplated.

The Syndicate G. M. Co. recently shipped a ton of ore valued at $10,000. This company employs twenty men. A building large enough to accomodate sixty men is being constructed.

Hass, Cooper & Harwood have claimed a vein of tungsten ore on Cement creek.

Silverton *Miner*: The sale of the Excelsior group of five claims on Boulder mountain was made last week by the first payment of $3000. The owners were J. and C. N. Carver and J. Butler, and the purchase price is $30,000. There are fifty tons of ore on the dump. The Excelsior has a vein of lead ore 6 feet in width and another vein 4 to 6 feet of free milling ore.——Another strike was made in the Ridgway in Maggie gulch last week in the new 400-foot crosscut at a depth of 200 feet, where 2 feet of ore was found that will run 25 ounces gold and 1000 ounces silver. The force of miners has been increased.

SUMMIT COUNTY.

Breckenridge *Journal*: Recently M. G. Frey and W. Lawver leased and bonded to J. M. Larsen, of Aspen, the Hancock and O. K. lodes, on the north slope of Glacier mountain. In the past these claims produced a good grade of silver and lead ore. The mines contain large bodies of low grade concentrating ore. Mr. Larson is considering the building of a mill of sufficient capacity to treat the ore and to do custom work. The mill will be similar to that of the Smuggler at Aspen.

Breckenridge *Journal*: The Pennsylvania mine at Rathbone is one of the largest producing mines in Summit county. The past four years the Pennsylvania has been under the management of F. Graham, and since that time has produced 150 tons of shipping ore per month. Within the past year a new mill, designed by Mr. Graham, has been built and is in operation. It is located 1000 feet below the mine and the ore is transported by a gravity tramway. Its capacity is fifty tons every twenty-four hours. Four large dumps will be run through the mill, besides which Mr. Graham estimates that there is sufficient ore broken in the mine to keep the mill running for three years. The Pennsylvania is working twenty-five men in the mine and mill.

TELLER COUNTY.

Victor is being rebuilt and real estate is worth more than before the fire.

The Independence mine is reported to have made $540,000 since the incorporation of the new company.

Cripple Creek *Times*: The Creston Leasing Co., working the Jack Pot mine, has declared a dividend of $80,583.80, the profit on ore mined in July. The money the Iowa men expended before getting pay ore represents a few hundred dollars per share, and now it is returning a hundred fold.——The Independence mine has developed in the stope from the third level an ore body 60 feet wide in places. In the crosscut from the fourth level a new vein 3 to 4 feet wide has been opened since the mine changed hands, that is settled for in carload lots at six ounces. This shoot is 140 feet long. The Independence is averaging 3000 tons a month of four-ounce ore, and 75% to 80% represents net profit.——P. E. Johnson has taken a fifteen months' lease on 350 feet of the Gray Eagle, Mountain Peak and Stella A. claims, at Grassy. The contract provides for 20 feet sinking per month, and 25% royalty.——The Pinnacle is taking free gold from the 100-foot level, an average of two cars a day being sent to the mills and smelters.——The Mountain Beauty will again commence to break ore in the 100-foot level, and regular shipments will be made.——Lessee Lambert, on the Lost Lillie, on Copper mountain, is hoisting ore from the 150-foot level. The vein is 5 feet wide and assays $30 to $60. This was found by putting a shot into what was supposed to be the foot wall.——A rich streak of ore has been opened in the upraise from the 300-foot level of the Maloney workings of the Orphan Belle claim. The company will continue the upraise to the surface.

Denver *Post*: Production from the lease operated by Magner and others on the Minnie Belle fraction of the Wilson Creek Con. M. & M. Co. will reach little more than 200 tons during August. This small showing is due to the fact that until the reopening of the smelters the lessees had no market for their ore. —— Beginning Sept. 1st sinking will be resumed, and the shaft will be deepened from 380 to 430 feet. The level to be started at the depth will be the sixth in the Magner workings.

Victor *Record*: The Sellers, Stephens & Co. lease on block 2 of the Mountain Beauty is in bonanza. The ore in the 100 level will average fifty ounces across the vein, while the mud seam, 6 inches wide, that lies alongside, is impregnated with coarse gold. The lessees have 309 feet of ground. At a depth of 240 feet they are crosscutting.——In the third level of the Whipp & Glenn lease on the Pinnacle, near the shaft, 3½ feet of ore that assays from $30 to $100 has been cut. After passing through a barren zone in the second level the workings have cut 6 feet of ore of good grade.

IDAHO.

(Special Correspondence).—Cottonwood is fifty miles southeast of Lewiston and eighteen miles from Grangeville. From Cottonwood to Salmon river is fifty miles, and here are located a number of gold prospects. Salmon river is half a mile from the claims and parallel with them. The formation is porphyry, running north and south, veins of gold-bearing quartz crossing the formation east and west. The quartz, iron-stained, prospects well and is impregnated with auriferous pyrite.

Col. Danforth of Lewiston, who has several claims on the belt, has run in on a vein, 3 feet wide, which at the end of a 50-foot tunnel has widened to 4¼ feet and averages $30 per ton. On the east and west side of the porphyry is marble or limestone; above, or east of the limestone 1500 feet, is a body of timber. In addition to the river, there are on the south end two large creeks. Work can be prosecuted the year round. Assays on some of the quartz ran as follows: $619.48 gold and $14.46 silver; a cube of iron, $25.63 gold and $1.20 silver; a leached piece with light-colored iron cubes, $4.13 and $4.75 gold.

Most of the outcrop is free, but there are some sulphurets, and, where work has been done, sulphurets predominate.

A sale of the Black Jack for $10,000 failed, owing to a disagreement.

The veins vary from 2 to 6 feet in width.

Cottonwood, Aug. 20th, '99.

BLAINE COUNTY.

Hailey *Times*: J. Flemming has bonded his Little Johnnie, Lame Deer and Collier Boy claims and water right, on the Hailey Gold Belt, to L. S. McLure of San Diego, Cal. All are promising claims, situated easterly from Camp creek. There is a 250-foot tunnel on the Little Johnnie, a 40-foot shaft on the Lame Deer and cuts and prospect holes on the Collier Boy. It is stated that the price to be paid is $20,000.

ELMORE COUNTY.

F. R. Reed has a placer property which is being prospected with the view of determining if it will justify a plant. The work of prospecting is being done by the Pennsylvania Placer Co., in which Mr. Black and J. Leisenring are stockholders. T. F. Van Wagenen is in charge of operations. This property embraces 4000 acres located on the south fork of the Boise river, five miles below Pine. The gravel has a depth, where exposed, of 200 feet, but it is not known how far it extends. Part of the property is a meadow of 800 acres, which may be valuable as placer ground. The entire tract is being surveyed and prospected. In connection with the ground the company controls 20,000 inches of water. To put this on the gravel and fit up for working will cost $200,000. With the placer are five quartz claims.

IDAHO COUNTY.

Cuprum *Standard*: W. H. Hancock, Supt. Boston & Seven Devils Copper Co., will commence development work on the South Peacock and Decorah mines, employing thirty-five or forty men.

NEZ PERCES COUNTY.

Owners of the Imnaha copper properties, near Lewiston, have received returns from Butte, which show a value of $28.50 in copper to the ton, based on a valuation of 19 cents a pound. The ore was the first from the district and was taken from the surface of the ledges. Assays of ore recently brought out show 13% copper.

OWYHEE COUNTY.

Spokane *Chronicle*: A mill, probably a cyanide plant, will be bought for the properties of the Hoosier M. Co. near Silver City. The mines adjoin the DeLamar properties and are said to have bodies of low-grade ore. F. W. Wegner is the Mgr. of the company.

SHOSHONE COUNTY.

A Boston syndicate has bought a large number of placer mining claims in the Cœur d'Alene district, along Prichard and Eagle creeks. A large dredging and hydraulic plant will be put in and the whole district, about twenty-three miles in length, worked.

Union miners are adopting the permit system inaugurated by the State authorities shortly after martial law was declared in the Cœur d'Alene district. Dozens of union men are applying daily for permits but in numerous instances they are denied.

MINNESOTA.

ST. LOUIS COUNTY.

Up to Aug. 1st the iron mines of the Lake Superior region produced and shipped since the first of the year 5,781,000 tons of 2240 pounds. In the Mesabi range the Mountain Lion mine began the season by shipping 5000 to 7000 tons of iron ore a day, but recently the shipments have run from 8000 to 11,000 tons a day.

The Fayal mine will ship a total of 1,000,000 tons this season.

MISSOURI.

JASPER COUNTY.

In the zinc fields the country is gently undulating. The mineral is in a blanket formation, in flint or chert upon lime, under the clay and soil from 10 to 200 feet from the surface. Most of the shafts are getting ore from less than 100 feet depth. The ore is in flat shoots and one shoot may lie below the other. When one is worked out, another is opened up.

Prospecting is done by churn drills and shoot holes are bored at a cost of $1.25 per foot. When mineral is found a shaft is sunk. The sinking of shafts costs $4 per foot. Not much drifting is done away from the shafts. It is cheaper to sink a new one than to follow up a shoot for a distance. The ore is hoisted and jigged by hand or steam jigs, and each mine has its own mill for crushing and jigging. The ore is washed clean. The clean blende will run as high as 63% zinc. It is sent from the mines to the local smelters and also shipped elsewhere. The mines furnish most of their own water for washing and carrying the ore through the mill.

MONTANA.

JEFFERSON COUNTY.

Whitehall *Zephyr*: E. R. Holden & Co. of New York have secured control of the Hope mine at Basin and will build a concentrator and start up the mine. The mine has yielded $700,000. The Basin Gold & Copper Co. is the name of the new company. The main shaft on the Hope is down 900 feet.

SILVER BOW COUNTY.

The Parrot smelter closed down Aug. 24th and the matte on hand will be sent to the Anaconda for treatment. It is understood that the smelter will be permanently closed and ores from the Parrot mine sent to smelters at Anaconda hereafter. The Parrot smelter has not been running full blast for some time.

It is locally stated that experts in the employ of the Rockefeller interests in the Amalgamated Copper Co. are making an inspection of the mines in Butte and smelters in Anaconda.

NEVADA.

HUMBOLDT COUNTY.

The Glasgow & Western M. Co. intend to enlarge their plant at Golconda to 400 tons daily capacity. O. Stahlmann, Gen. Mgr. of the company, is now engaged upon the details of the plans.

The Utica-Bullion M. Co., organized by H. Greeley, to develop mining locations near the outlet of Humboldt lake in the early sixties is still in existence. The company expended $30,000 in the building of a 10-stamp mill.

STOREY COUNTY.

The following is the latest telegram regarding the pumping operations on the Comstock:

VIRGINIA, NEV., Aug. 31, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: — At 6:30 this morning the water was down 39 feet 9 inches below the 1950-foot level. No. 1 elevator has been running continuously. The two elevators were run together for about an hour. September 1 Joseph R. Ryan will assume the duties of superintendent of the Comstock Pumping Association.

The Comstock mining companies have been signing the contracts with the electric power company the past few days. The companies first signing are the Con. Cal. & Va., Ophir, Mexican, Sierra Nevada and Union Con. The Utah Con., Best & Belcher, Gould & Curry, Savage, Chollar, Potosi, Bullion, Alpha Con., and all the Gold Hill and other Comstock mining companies it is expected will do likewise.

OREGON.

BAKER COUNTY.

(Special Correspondence).—The property of J. Arthur, consisting of 300 acres of placer ground and twelve quartz claims, is under bond for $200,000 to Eastern capitalists. This property was taken up, with the water right, eighteen months ago, at the cost of location.

Cornucopia, Aug. 28th, '99.

Spokesman-Review: Another rich pocket has been found in the Golconda mine in the drift on the 250 level and several sacks taken out. It is estimated that $60,000 worth was sacked in an hour's time; this, with the strike made some days ago, making over $100,000 taken from this drift in the last few days.——The stamp mill is ready to begin operations on the Great Northern mine at Canyon City. The property is owned by Mr. Harris and associates of Salt Lake City. The vein is free-milling and 35 feet wide.——The Miner claim, in Cable cove, is reported sold to Pendleton parties. This claim is on the Imperial lead, below that property, and has several hundred tons of ore on the dump. It has been idle for some time.

CROOK COUNTY.

The Silver King mine, which recently sold for a large amount, is thirty miles north of Prineville. The purchasers are P. J. Quealy of Rock Springs, Wyo., and J. F. Edwards of Salt Lake, Utah.

JACKSON COUNTY.

During the past year 110 placer and 224 quartz mining locations were recorded in Jacksonville.

JOSEPHINE COUNTY.

Gold nuggets valued at about $12,000 are exhibited the Medford Bank, a part of the cleanup of the Sterling M. Co.

SOUTH DAKOTA.

The smelter plant of the Golden Reward Co. was burned at Deadwood Aug. 28. The plant was the largest of its kind in the Black Hills.

UTAH.

BEAVER COUNTY.

The Horn Silver mine, at one time a large producer of lead-silver ore, is now shipping high-grade copper ore to Salt Lake smelters.

GRAND COUNTY.

The International Copper M. Co. has been incorporated by S. A. King, W. H. King, J. W. Burton and H. A. Hatch. The company owns nine claims in Beaver basin, thirty-eight miles southeast of Cisco, on the line of the Rio Grande Western Railway, twenty miles east of Moab, in the La Sal country.

IRON COUNTY.

The Johnny mine at Stateline is shipping to Salt Lake ore that will yield $100 per ton in silver and gold, and it is said that 4 feet are exposed, occurring in which is a 10-inch paystreak which shows free gold and is rich in silver.

JUAB COUNTY.

The pyritic ores in the mines of Treasure hill, at Diamond, between that camp and Silver City, is interesting those conversant with pyritic smelting. An analysis of the ores recently encountered in the Tesora and those on the dumps in the Shoebridge Bonanza show that these ores possess the elements essential to pyritic smelting, and charges at local smelters would be greatly benefited by such a plant. Col. O. P. Posey, who has operated pyritic plants in other localities says the ores are adapted to the scheme, and that with such a plant the producer should realize a great saving on the cost of treatment. The erection of a plant is under consideration.

At the La Reine in Tintic ore is exposed in every opening on the vein. In an upraise are 15 feet of ore, with no wall in sight. An average from this body gave 8% copper and 114 ounces silver.

Shareholders of the Centennial Eureka have authorized the board of directors to sell at any time within six months after August 1st last the entire property of the company for $2,100,000.

Tintic *Miner*: At the Centennial Eureka changes will be made in the method of transporting ore to the railroad by means of a tramway to the tracks. The force will be increased. There is enough shipping ore in sight to pay the purchase price of the mine, besides several thousand tons of milling grade.

Tintic *Miner*: On the 300 level the Showers Consolidated has found rich silver-lead ore 2 feet wide which assays 50% lead and fifty ounces in silver. In connection with this deposit is another vein carrying a small percentage of copper, 15% lead and $2 in gold. The vein is wide between the 200 and 300 levels and is thought to be the junction of the Bowers and Showers veins.

SALT LAKE COUNTY.

Bingham is in West Mountain mining district, twenty-five miles southwest of Salt Lake City, in the Oquirrh range. The first discovery was made in the early '50s, when lumber men found galena rich in silver. It is said the lead ore was smelted into crude bullion containing as high as 1000 ounces silver per ton and melted into bullets. About 1870 the placers were worked to large profit and in 1871 the ores of the Old Jordan and Galena, Old Telegraph, Winnamuck, Trewaukee and other mines were being worked in smelters. Early in the seventies the Telegraph group was sold to a French company for $3,000,000. The new company worked it with profit. On this zone are the Highland Boy, Giant, Niagara, Old Jordan and Galena, Utah and other noted mines. The Brooklyn workings are the deepest in Bingham, being 1500 feet below the surface, but, generally speaking, the great volume of ore thus far taken from these mines is from the upper portions of the workings. It has now developed into a sulphide proposition of great extent and concentration must become an important factor in their further development. In former years the bulk of the ore taken from the district were silver-lead ores, running from 30% to 60% lead, 8 to 60 ounces silver and $4 to $100 gold per ton. The operation of these mines paid, but the copper ores were neglected, being too low grade at that time to attract attention. It is to the recovery of the copper as well as the other valuable metals in these ores that particular attention is now being directed, and large capital has been interested to this end. The consolidation of these various mines into large groups is an important feature in the economy of future operations in the district.

The Dalton & Lark has a body of ore exposed that shows 11% copper and six ounces silver per ton in the north drift off the 850-foot level, where the vein is 5 feet wide. The management is considering the hydraulic ejector system of draining the property.

Bingham *Bulletin*: The Last Chance mill, which has been shut down for a year, is to start up. Several thousand tons of ore, containing gold, silver and lead, is ready for the mill. The plant will handle 100 tons of ore daily. The mine has produced several million dollars.

TOOELE COUNTY.

Mercur *Mercury*: It has been decided to increase the capacity of the mill at Manning to 600 tons daily capacity. It will be still further increased next year to 1000 tons daily. The building of roasters has been postponed, as experiments have not yet determined which is best suited to the ore.—The contractors on the upraise shaft from the tunnel level on the Rover broke through at the surface last Wednesday at 160 feet. A hoisting plant will be put in at the shaft.

WASHINGTON.

OKANOGAN COUNTY.

The Palmer Mountain tunnel has been driven 2175 feet. Fifteen locations have been added to the twenty-seven and taking in thirty parallel veins 2 to 16 feet wide on the surface. Twelve veins have been crossed, ranging in width from 5 to 42½ feet and carrying ore veins of solid mineral of 2 to 35 feet.

On Mount Chapacca the Golden Zone, a company composed of Pittsburg men, is working fifty men and having 2000 feet of work done on the property. The ore assays $30 in gold.

On Little Mount Chapacca the Six Eagles will work twenty-five men.

STEVENS COUNTY.

The Crystal Butte mine, 1½ miles south of Chesam, has put in a 10-stamp mill and concentrator with a capacity of twenty tons per day. The company has 100 men on the payroll. The vein is from 6 to 29 inches wide, but is continuous and rich. There are 1000 feet of tunnels and shafts. The War Eagle, four miles west, is putting on forty men. They are 80 feet down and have run a crosscut in ore resembling that of Republic.

At Summit camp, twelve miles west of Republic, limestone that assays 98% calcium carbonate has been found. Gold ore has been discovered in the same vicinity in a large ledge. The surface shows 40 to 60 feet wide. Assays made show values of $5 per ton. The property is owned by the Republic Gold Mining & Lime Works Co.

W. S. Willis reports the finding of rich silver-lead ore in the property of the Apex M. Co., a Spokane corporation, which is on south half of the reservation.

Spokesman-Review: The Princess Maud winze at Republic is reported improving. The winze is sinking on a shoot, the apex of which did not reach the surface.

WYOMING.

CARBON COUNTY.

The Union Pacific Railroad will build a branch line to the new copper mines at Grand Encampment.

The Hagerty mine is reported to run 60% per cent copper and $30 gold to the ton.

The Charter Oak ore runs 35% copper and $30 gold per ton.

The Meter mine carries galena with $15 silver per ton.

FOREIGN.

AUSTRALIA.

The gold yield of Queensland for the six months ended June 30 was 451,400 ounces, as compared with 427,600 ounces in the corresponding period of '98.

The surface ores of the Broken Hill Proprietary Co. in New South Wales are excavated in a cut 200 feet deep. An extension has been made to the concentration plant, and a special plant for the treatment of slimes has been added. Experiments in making a clean zinc sulphide concentrate from mixed ores are reported as resulting satisfactorily, and several lots of zinc sulphides have been shipped.

London *Mining Journal*: The block of telluride sent to the Adelaide School of Mines by Mr. Warden Gee (South Australia Mines Department) for assay gave twenty-one ounces gold to the ton. The excitement on the South Australian and Victorian stock exchanges is at fever heat. Five companies were floated within a few hours. The Wortupa Reward Development Syndicate shares, in which shares were £100 each, have gone to double that amount in a day. The other companies' shares went to a premium of 50% at once. This discovery will lead to a thorough opening up of the lower northeastern area, especially as the telluride is associated with chalcopyrite and is in the heart of the great copper belt.

BRITISH COLUMBIA.

The new town of Phœnix, 4½ miles from Greenwood, is growing rapidly. There are five or six large producers in and around the town. It is proposed to build a tram line from Greenwood to Phœnix.

The main line of the Canadian Pacific Railroad will be completed to within four miles of Phœnix by Sept. 10, and spurs are being built to the prominent mines.

The eight-hour law has resulted in closing a number of mines in Greenwood district. The scale of wages now paid is: Hammersmen and muckers, $3 for eight hours; power drill men, $3 50 for eight hours; all men in wet ground 50 cents per day extra.

Favorable development is reported on the Elise at Ymir, owned by the Lerwick G. M. Co. From the bottom of the shaft, 115 feet deep, a drift has been run 162 feet. There is a streak 8 inches wide which gives assays of $40.42—$18 being silver, the balance gold. Besides the paystreak there is a width of 4 feet of quartz assaying $9.11. The directors of the company intend to buy a steam hoist and pump and to carry on the work of development on a larger scale.

There is no trouble between the mine owners and miners in East Kootenay. The Fort Steele *Prospector* says the owners are paying $3.50 per day for eight hours work, and it is difficult to get men in sufficient numbers.

While grading on the Canadian Pacific extension workmen have uncovered ledges of ore carrying copper, gold and silver. The richest ledge was found near Cascade, on the Columbia & Western Railroad, building from Rossland into the Boundary creek district. Assays from the surface give $40 to $50 per ton. McKenzie & Mann have filed on the property and will develop it. Two smaller ledges have been uncovered by the grading crews.

Spokane *Chronicle*: The crosscut tunnel being driven on the Rambler-Cariboo mine, in the Slocan, to tap the ore body, has reached the ledge. The Rambler has not been shut down by the eight-hour troubles and will soon begin shipping ore. The average value of the ore heretofore shipped has been 130 ounces of silver and 25% lead to the ton.

MEXICO.

(Special Correspondence.)—During the rainy season in Mexico, which commences about June 20th and continues into September, little prospecting is done. At Fuerte, Sinaloa, Mr. Snyder is working his Santiago mine. He has three ore shoots and is drifting east from the shaft at the third level, in which direction the ore carries more gold. He is going to build a mill in October.

Fuerte, Aug. 10th, '99.

J. B. Frisbie is reported to have sold his interest in the American mine, adjoining the Esmeralda, in the El Oro district, to an English syndicate for $1,200,000.

Modern Mexico: An 80-stamp mill is to be built at the Esperanza mines, El Oro district.——The Cuchilla gold mine near Altar, Sonora, has been bought by California parties for $30,000. Another deal at the same place was the sale of a gold mine by J. J. Pompa for $17,000. The Calera, also gold, near Magdalena, is bonded for $60,000, and a New York syndicate is reported to have bought the Copita copper mine for $3,000,000.——At Sonora the El Cobre Grande mine, in which J. Shirley and others are interested, is to be developed. J. H. Costello of Buffalo has bought a control in this mine and put C. O'Keefe in charge as Asst. Gen. Mgr. G. Mitchell will be metallurgist.

James Shirley has sued to enjoin George Mitchell, former president of the Cobre Grande mines in the Cananea district, Mexico, from disposing of his stock to J. H. Costello, who recently took a lease on the Cobre Grande.

NEW GUINEA.

South African Mining Journal: Miners have done fairly well exploring gullies in the mountains near the Dutch boundary of New Guinea. The difficulties presented by the existence of almost impenetrable bush and the almost entire absence of roads to the interior, as well as the hostility of the natives and the deadly character of the climate, almost preclude exploration on a large scale. Those miners who have lived to return to Australia state that the gullies where they had been working had been practically exhausted.

NEW ZEALAND.

The gold output of New Zealand for July amounted to 25,838 ounces, of the value of £98,237, as compared with 17,891 ounces, value £68,711, in July of '98.

The director of the Thames School of Mines has reported the discovery of sulphide of molybdenum within the area of the Thames gold field, in Ohio creek, by W. Martin, Mgr. of the Iron Cap mine.

ONTARIO.

It is reported a new mining district has been found east of Mine Center, Ontario. The veins are gold-bearing quartz.

The Sultana mine has been sold to the British Capital Corporation, Ltd. The mine has been the property of J. F. Caldwell, who developed the property to its present condition. The mine comprises seventy acres, with a vein 30 feet wide on the surface and running $7 to the ton gold. Its gross output for three years, with a 10-stamp mill, averaged $3000 per month. A 30-stamp mill was put in last fall.

SOUTH AFRICA.

Diamonds are being found in a number of new localities at Kimberly and Pretoria. A third pipe has been found at the new Schuler mines.

London *Mining Journal*: The shaft of the Cinderella Deep at Boksburg has reached a depth of 200 feet. The borehole which is being put down in front of the shaft has attained a depth of over 1000 feet.——The Pretoria diamond fields continue to attract attention, and now that washing operations have been resumed at the Schuller mine some idea of its value may be obtained. During the month of June this mine returned 570 carats, Elandshoek 1500 carats, and Byenestpoort 415 carats.——The New Primrose July production was 10,762 ounces; profit, £16,073; 160 stamps, 28 days.——The Robinson Deep reports Aug. 9 for July: Crushed 15,505 tons; obtained 6103 ounces of gold from mill, 3393 ounces from tailings by cyanide, 506 ounces from slimes; total, 10,002 ounces; profit for the month, £10,000.——Jumpers Deep reports results for July: Number of days working 100 stamps, 29 days 15 hours; tons crushed, 15,787; yield in gold from mill, 4270 ounces; tons of sands and concentrates treated by cyanide, 11,490; yield in gold, 3117 ounces; tons of slimes treated, 4050; yield in gold, 371 ounces; total yield in bullion, 8763 ounces, equal to 7758 ounces fine gold; estimated profit for month, £9100.——Simmer & Jack Proprietary during July crushed 45,000 tons, obtained 13,578 ounces of gold from mill, 7908 ounces from tailings cyanide, and 786 ounces from slimes; total 22,272 ounces; profit for the month, £32,268 10s.——Langlaate Estate and Gold reports production for July: Stamps running, 200 for 25 days, owing to lack of labor; ore crushed, 25,333 tons; gold retorted, 5776 ounces; tailings, cyanide process, 15,750 tons; gold recovered, 2470 ounces; concentrates, cyanide process, 591 tons; gold recovered, 1772 ounces; total gold recovered, 10,018 ounces.——The Langlaate Star Gold reports production for July as follows: Stamps running, 60 for 27 days, owing to lack of labor; ore crushed, 7780 tons; gold retorted, 1810 ounces; tailings, cyanide process, 6340 tons; gold recovered, 578 ounces; concentrates, cyanide process, 65 tons; gold recovered, 132 ounces; total gold recovered, 2520 ounces.

THE YUKON.

Dawson reports hydraulicking operations in progress on Bonanza creek. Pulver & Pellitier are operating a duplex pump throwing a 5-inch stream of water against a point of hill near claims 61 and 62 below on Bonanza.

Pay dirt has been discovered high up on points jutting out into Bonanza valley, above tiers of bench claims. The pay runs from 15 to 40 cents per pan. All are being sluiced.

Recently Declared Mining Dividends.

Empire State, Idaho, M. Co., Wardner, Idaho, $19,703; Aug. 20.

Creston Leasing Co., working the Jack Pot mine, Cripple Creek, Colo., $80,533.80; Aug. 30.

Pennsylvania M. Co., Nevada Co., Cal., 20 cents per share; Aug. 25.

Industrial Notes.

—In every line is at present found a sellers' market.

—An advance of 5% in the price of cold rolled steel shafting is reported.

—The New Zealand Government will join in defraying the cost of the proposed Pacific cable.

—The Standard Electric Co. is running a line for power between Stockton and San Francisco, Cal.

—Crushed linseed oil has been advanced to 40 cents a gallon by the two companies controlling the output.

—Trinity Co., Cal., placer mine owners are paying $2 a day and board and lodging to pick and shovel men.

—Barstow, Cal., is to be made division headquarters for the Santa Fe. The shops now at San Bernardino will be moved.

—Smelter preferred and railroad stocks have advanced several points since the cessation of the Colorado smelter strike.

—To carry out its proposed works the Kootenay Railway & Navigation Co. of Kaslo, B. C., has arranged a 5% mortgage for $2,400,000.

—The Butte County, Cal., Electric Power & Lighting Co. has a contract to furnish power to Chico and Oroville and to dredgers on Feather river.

—The Colorado Fuel & Iron Co. is building the Crystal River Railway, and have 200 men grading and laying track between Redstone and Marble, Colo.

—Tampico, State of Tamaulipas, Mexico, is to build a water works and sewerage system. Consul Magill, at Tampico, advises contractors to write to him for details.

—The Virginia *Chronicle* figures out that the Floriston, Cal., Co. will make 55% on the investment in the power plant to furnish the Comstock mines with electric power.

—The Southern Pacific Co. is replacing its twenty-ton coal cars with cars that carry 100,000 pounds. The coal is unloaded from these cars by two chutes, one on each side.

—A telegraph line from Umtali to Tete in South Africa, 1000 miles in length, has recently been completed, by means of which Nyassaland is brought into communication with the outside world.

—Orders have been received by Mgr. Merriman of the American Steel Co. at Everett, Wash., to send the nail machines there to San Francisco, to be used in enlarging the nail mill operated by the company.

—A mortgage for $100,000,000, issued by the Central Pacific Co. to the Central Trust Co., is being filed in the counties of California through which the road runs. The mortgage requires $50,000 worth of revenue stamps.

—Bradstreets estimates that the recent smelters' strike in Colorado resulted in a loss of $10,000,000, divided among the smelters themselves, their employes, miners, coke burners, rock breakers in the limestone quarries and the railroad lines.

—Burlington officials are reported negotiating for the purchase of the Denver, Lakewood & Golden road, a suburban line twenty miles long, owning valuable terminals in Denver and Golden, Colo., as well as a right of way through the mountains for a Salt Lake, Utah, short line.

—The Yuba, Cal., Power Co.'s sixty-four-mile line to Sacramento is completed. It furnishes the greatest voltage of any Western electric company, with the exception of the Provo-Mercur Co. of Utah. The 5000 H. P. to Folsom will be conducted over the wires at a loss of less than 10%.

—The directors of the Union Pacific will increase the company's capital stock to absorb the Oregon Railway & Navigation Co. and Oregon Short Line, the exclusive ownership of the entire line operated by the Union Pacific from the Missouri river at Omaha and Kansas City to Portland being thus vested in the Union Pacific.

—The California State Fair begins at Sacramento on the 4th inst. and continues to the 16th inst., and this year offers unusual attractions to exhibitors and visitors. The great race horse "Ormonde" will be on exhibition at the State Fair. This is one of the most famous horses in the world, and will be an object of great interest.

—H. M. Whitney in Cape Breton will sink a shaft which is to have a daily capacity of 4000 tons of coal, and will command 55,000,000 tons. The acquisition of one-half of the Belle Isle, Newfoundland, iron fields has been completed by representatives of the Whitney syndicate paying over $1,000,000. The contract for 400 coke ovens has been given to the United States Gas & Coke Co. of Philadelphia for $1,000,000.

—The Trans-Andine railway line, which is expected to connect the Pacific with the Atlantic, from Valparaiso, Chili, to Buenos Ayres, Argentina, lacks but forty-six miles of completion. Recent appropriations for completing the tunnels required for this purpose encourage the belief that it will soon be completed, and through land transportation thus given between the Pacific and the Atlantic at that point.

—The American-China Development Co. and the British-Chinese Corporation of London and Shanghai have agreed to consolidate in the formation of an Anglo-American syndicate to carry on various projects in China, notably building railways and developing gold and copper mines. The first work contemplated is the building of a railway from Shanghai to Canton, a distance of 700 miles. D. D. Mann is to have charge of the work.

—United States Consul Halstead at Birmingham, England, gives publicity to the belief that to those engaged in wheat-cornering operations in the United States is due the competitive opening up of vast areas of wheat land in Russia, India, South America and Egypt. The present corner in copper and resultant high price of that useful metal, he says, may result in injury to the copper-mining interests in the United States parallel to the loss caused to America by the corners in wheat.

—Regarding the statement in this column last week that "the War Department will soon buy 40,000 horses," which has been questioned, the facts are in exact accordance therewith. Government agents are now traversing the country buying suitable horses and sending them in for government shipment. The Pacific section will get about one-half the number stated. Lieut. Horne of the Ninth Cavalry, U. S. A., is doing the buying for the Pacific coast. He is now in Ogden, Utah. He buys the biggest animals he can get and sends them in lots of 200 to the quartermaster at San Francisco who sends them to Manila.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING AUGUST 22, 1899.

631,414.—FURNACE—J. A. Anker, Los Angeles, Cal.
631,692.—CAR WHEEL—J. W. Breeding, Bisbee, A. T.
631,693.—CAR AXLE BOX—J. W. Breeding, Bisbee, A. T.
631,620.—CORSET—R. Cousins, S. F.
631,710.—ELEVATOR—E. M. Fraser, S. F.
631,399.—GUN BARREL—H. P. Gillette, Roseburg, Or.
631,712.—ROCK DRILL—W. Gleeson, Unga, Alaska.
631,506.—NUT LOCK—J. Jorgenson, S. F.
631,507.—POLISHING ROLL—E. Kelly, S. F.
631,526.—DRAPER SLAT PROTECTOR—C. J. and T. T. Luckehe, Gridley, Cal.
631,431.—LOCK—P. Phelps, Seattle, Wash.
631,432.—LOCK—P. Phelps, Seattle, Wash.
631,433.—LOCK—P. Phelps, Seattle, Wash.
631,434.—LOCK—P. Phelps, Seattle, Wash.
631,443.—DOG HARNESS—B. A. Sammann, S. F.
631,477.—WAGON TRUCK—H. B. Schindler, Oakland, Cal.
631,680.—MINERAL EXTRACTOR—K. Staahlgren, Salinas, Cal.
631,535.—TAPPET—G. W. Waitt, S. F.
631,492.—SHAKE REGULATOR—R. G. Williams, Stockton, Cal.
631,602.—HAMMOCK SUPPORT—Wood & Taitt, Prescott, A. T.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DRAPER SLAT PROTECTOR.—C. J. and T. T. Luckehe, Gridley station, Cal. No. 631,526. Dated Aug. 22, 1899. This invention relates to a device for protecting the transverse slats of canvas and for carrying belts commonly known as drapers, and to provide a means for readily removing broken slats and introducing new ones without removing the protecting portions. It consists of a canvas belt having leather straps extending along the edges and central portions of the belt in the direction of its travel, transverse slats extending across the top of the belt at intervals having the ends secured through the edges of the belt and through the straps beneath. Metal caps are fitted over the top, sides and ends of the slats, with bendable tongues and pins by which they are removably locked to the slats. Loops or keepers are fitted over the slats intermediate between the ends so that the slats can be slid through the loops to put them in place or remove them. These loops are riveted upon the central portion of the belt or these straps which pass beneath.

ELEVATOR.—E. M. Fraser, San Francisco, Cal. No. 631,710. Dated Aug. 22, 1899. This invention is designed to provide a means for automatically maintaining any desired tension upon the endless traveling ropes or cables by which the raising and lowering of the cage and connected parts are effected. The tension device is automatically operating. The rope passing from the car over a pulley is counterweighted at the opposite end, and guides are formed upon the counterweight. A second counterweight is slidable upon these guides, a rope passing from it over a pulley, and thence to a movable frame. In combination with these are independently actuated driving pulleys, with an endless rope or cable thereon and pulleys upon the main counterweight and the frame around which the said rope or cable passes.

NUT LOCKING DEVICE.—J. Jorgenson, San Francisco, Cal. No. 631,506. Dated Aug. 22, 1899. The object of this invention is to provide a means for locking nuts upon the ends of axles or shafts or for other like purposes. It consists essentially in the combination with a nut having a slot made in the outer end and a spring pressed lever fulcrumed to one side of the nut, having the outer end diagonally beveled, and an axle or shaft, the end of which has V-shaped locking notches formed in the angle of the end in such a manner that the locking takes place from the end and side. In connection with this is a latch lever to engage the locking notches in the spindle end, and the long arm is tapered and extends around the side of the nut. A spring acts to normally force this end of the arm of the lever outwardly to cause the latch to engage with the notches of the spindle. This arm will be depressed whenever a wrench is placed upon the nut, thus disengaging the opposite end from the notches preliminary to turning the nut by the movement of the wrench, and when thus disengaged the nut can be easily removed.

Personal.

THOS. EWING of the Arizona & New England M. Co. is in Kingman, Ariz.

JAS. H. BARRY has taken charge of the Jessie mine, Breckenridge, Colo.

J. B. FRANK has charge of the cyanide plant at Camas No. 2, Hailey, Idaho.

F. H. DAKIN, JR., is chemist at the De Lamar mines, Copper City, Cal.

JNO. J. LAWRENCE is the new Supt. of the Conlan mine, Grass Valley, Cal.

T. A. RICKARD has returned to Cripple Creek, Colo., from an Eastern trip.

ALBERT BURCH is now Supt. of the Bunker Hill & Sullivan at Wardner, Idaho.

SUPT. BASSETT of Los Angeles has charge of the Kenton mine, Alleghany, Cal.

JNO. B. RULE is the new foreman at the Boston Group, Gold Creek, Juneau, Alaska.

A. R. WILFLEY, the inventor of the Wilfley concentrator, is visiting Cripple Creek, Colo.

JOS. R. RYAN succeeds G. McM. Ross as Supt. of the Comstock Pumping Association.

JNO. BRADBURY of Los Angeles, Cal., is examining mining property at Mazatlan, Mexico.

GEO. E. WOODBURY of San Francisco, Cal., has returned from a business trip to Denver, Colo.

F. M. JOHNSON takes the place of E. A. Powers as Supt. Cochiti G. M. Co., Bland, New Mexico.

THOS. CLARK, a prominent member of the El Dorado, Cal., County Miners' Association, is in San Francisco.

DR. PFLEUGER, the noted German geologist, is in San Francisco, Cal., circling the globe for the fourth time.

ARTHUR WARREN, of the Westinghouse Electric & Mfg. Co., has returned to New York City from Europe.

T. B. DILLON has returned to San Francisco, Cal., from an examination of the mines of El Dorado canyon, Nevada.

E. H. BENJAMIN, Sec'y Cal. State Miners' Association, has returned to San Francisco from El Dorado Co., Cal.

J. S. COXEY, of Commonweal army fame, is at the head of a company that has opened a lead mine at Joplin, Mo.

F. MURPHY, a South African mining engineer, is examining a copper property at Sodaville, Esmeralda Co., Nev.

A. E. VANDERCOOK, Supt. of the cyanide plant at El Dorado canyon, Nevada, is in San Francisco, Cal., on business.

JOHN W. MACKAY arrived in San Francisco from New York City on the 28th, and will remain in California some weeks.

KARL PETERS was at Unyango, South Africa, Aug. 1st, '99. He reports the discovery of an ancient gold mine at Mt. Swia.

W. H. HONNOLD, late Supt. and Mgr. Thorpe G. M. Syndicate, Calaveras Co., Cal., is examining copper properties in Arizona.

JOSEPH BROWN has been appointed Supt. of the White Hills M. Co.'s property in Mojave Co., Ariz., succeeding W. A. Robinson.

FRANK C. ROBBINS of Greenwood, B. C., has been appointed consulting engineer for the North Star M. Co. at Fort Steele, B. C.

J. P. CHANNING, a mining engineer of New York, and B. B. Knobenhauer are at Virginia City, Nev., guests of Prof. F. E. Fielding.

PROF. S. F. EMMONS of the U. S. Geological Survey is in Butte, Montana, completing a report on the economic geology of that district.

WM. MCDERMOTT, who recently bonded the Afterthought and other copper properties in Shasta Co., Cal., has returned to Salt Lake, Utah.

W. J. ADAMS has returned to San Francisco, Cal., from a visit to Mariposa county mines, and has gone to Jackson, Cal., to examine the Kruger and Vaughn.

T. H. OXNAM, till recently manager DeLamar, Nev., G. M. Co., is in Los Angeles, Cal., with a view to interesting English capital in mining investments.

PROF. AGASSIZ sailed from San Francisco, Cal., for the South Pacific last week with a party of scientists on the steamer Albatross for a six months' trip of exploration.

C. H. LINDLEY has returned to San Francisco from Harqua Hala, Ariz., where he sold the famous mine of that name to its original owner, as related in the issue of Aug. 19th.

W. B. STOREY, JR., formerly assistant engineer U. S. Debris Commission, has been appointed chief engineer Santa Fe Railroad system, with headquarters at Topeka, Kan.

COL. D. H. JACKSON, present Supt. Darling mine, will have charge of the work on the Gopher, Boulder and Dalmatia mines, Kelsey, El Dorado Co., Cal., recently bought by English parties.

JOHN B. FARISH, E. M., of Denver, Colo., is at present in Mexico. He will return to the United States and make an examination of the Heath district in Idaho, between Weiser and Seven Devils.

DUNCAN MCVICHIE, Gen. Supt. De Lamar's Mercur mines, accompanied by H. H. Greene, has gone to prospect the Heath district, Idaho, which begins fifty miles north of Weiser and is between that camp and the Seven Devils country.

W. A. PRICHARD has been appointed Mgr. of the Keystone Con. Mines at Amador City, Cal. The Keystone property is one of the largest gold producers on the mother lode, its total production to date having passed the $15,000,000 mark. Mr. Prichard was formerly connected with the U. S. Geological Survey, and is a graduate of Stanford University.

V. C. HEIKES, Honorary Special Agent of the Department of Mines and Metallurgy for the Commissioner General of the United States to the Paris Exposition, has gone from Arizona to New Mexico in his quest for mineral exhibits.

G. McM. ROSS, who recently resigned the superintendency of the Comstock Pumping Association, is credited with intention to resume direct control of the Empire copper property at Copperopolis, Cal., which he was recently instrumental in selling to the Ames estate of Boston.

Commercial Paragraphs.

THE Edward P. Allis Co. of Milwaukee has a contract to supply five vertical cylinder blowing engines, aggregating 500 H. P., for the Dominion Steel Co.'s blast furnaces at Cape Breton, Canada. The Allis Co. has also been awarded the contract for engines to supply electrical power for the Glasgow, Scotland, tramway. The contract price for the latter was £114,544.

"LOWER CALIFORNIA ILLUSTRATED"—*Baja California Illustrado*—is the title of a finely bound and superbly printed book now being compiled by Col. J. R. Southworth, 23-25 First St., San Francisco, the first publication on Lower California ever published. An official map of the entire peninsula accompanies the publication, which is devoted to the mining, agricultural, industrial and commercial interests of that region.

WM. AINSWORTH & SONS of Denver, Colo., under date of Aug. 24 write that after Sept. 1st, '99, the discount on button balances of their manufacture will be increased to 25%, and on pulp and chemical balances to 15% from Catalogue "A" list. They say: "This reduction is made possible by the modern equipment of our factory for the manufacture of balances, and by the decreased cost of manufacture and excelling facilities we now have for placing our product in the markets of the world. Although the reductions in prices of our balances will make them as cheap as inferior instruments, their high standard will be maintained and our reputation as makers of the most accurate assay balances shall never be questioned. We are now prepared to furnish balances for scientific purposes, sensitive to 1-1000 milligramme, under full guarantee."

FRASER & CHALMERS have issued in pamphlet form the recent decision by Federal Judge Moses Hallett in the Circuit Court district of Colorado, affirming the validity of the U. S. letters patent granted to Horace F. Brown for improvements in the construction of ore roasting furnaces. The case in question is No. 3508, a bill to restrain infringement of patent, Horace F. Brown, plaintiff, the Metallic Extraction Company, defendant, the decree issued July 31st, '99, being wholly in favor of plaintiff. In his decision of July 28th, '99, Judge Hallett concludes: "I suppose there will be a decree for an accounting in the first instance. If an injunction is desired and respondent will agree to pay what shall be regarded as a reasonable royalty at the end of the suit, no injunction will be issued. The furnaces which are being used by the respondent are, it appears, in somewhat general use in different parts of the country, and the question as to infringement has been a matter of some doubt. Of course, the case is to be reviewed in the Court of Appeals, and until that shall occur and the rights of the parties are finally settled by a decision in that court, I should think it unreasonable to restrain the use of the furnaces which have been put up by the respondent."

INCREASING business and the consequent necessity for better quarters occasion the removal of the San Francisco Plating Works from 653 and 655 Mission street, San Francisco, to 652 Mission street, corner Annie, opposite their present place of business. The removal of such an old and prominent establishment is worthy of more than passing notice. Reference to the old files of this paper shows that more than twenty years ago the advertisement of the "San Francisco Plating Works, E. G. Denniston, Proprietor," appeared in these columns, and, through the years, the announcement with the familiar "653-655 Mission street" has steadily appeared in every issue. So firmly is this number fixed in the minds of Mr. Denniston's many patrons that it will require a little effort to remember that it is no longer "653-655;" but, as the works are simply going across the street, it will not be long before the new number will be as familiar as the old. Twenty years in San Francisco mercantile life is a long span, and Mr. Denniston, the energetic proprietor of the San Francisco Plating Works, is to be congratulated upon his well-merited success. Many of the largest mills in the country have recognized the advantage of silver-plated copper plates and the fine character of those furnished by Mr. Denniston's establishment. In manufacturing his silver-plated copper plates he uses only the best annealed Lake copper and refined silver. This point is of value to mill men who may find difficulty in saving gold on raw copper plates because of its fineness, or for other reasons.

Catalogues Received.

THE Jackson Drill & Mfg. Co., 1756 Larimer St., Denver, Colo., issue an illustrated pamphlet with halftone and sectional views of the Jackson drill, and special information of interest to any miner who wants some points as to a hand power drill. On the principle that a pleased customer is a good advertisement are given testimonials from miners who have used the drills and a list of recent purchasers of the Jackson hand power rock drill is appended.

Average Life of an Iron or Steel Bridge.

The estimate of the length of life of steel bridges is altogether too limited. The permanence of a steel bridge will depend upon three conditions—the design, the loading, and the maintenance. If it be properly designed for a specified maximum loading; if oversight be exercised that this loading is never exceeded, and if the steel work is thoroughly accessible and painted at regular intervals, there is no reason why a bridge should not last for centuries. As a matter of fact, however, these conditions are too often ignored or imperfectly fulfilled. In the first place, although bridge designing should always be intrusted to a specialist, even if the structure is to cost no more than $50,000, many county bridges and those constructed in smaller towns are built from the designs (so called) of the local surveyor, who may have the vaguest ideas of the strains to which the various parts are to be subjected and the best way to proportion the different members and connect them into a finished structure. The construction also should always be carried out by a recognized bridge firm, for the local blacksmith or machinist's shop is usually no more fitted for building good bridges than it is for building lathes and locomotives. It is questionable whether amateur bridge building can produce a structure with a useful life of twenty-five years.

To secure the best results the county officers, board of aldermen, or whoever it is that has the matter in hand, should first determine exactly what uses the bridge is to be put to, and the greatest possible loading to which it will be subjected. This information, together with the location and other data, should then be published for the benefit of the competing bridge companies, who should be given a free hand as to the style of structure best adapted to the case. In this way a better and a cheaper bridge will be secured, even in the case of insignificant structures, whose construction it might be supposed the bridge companies would not be at the trouble to undertake. When such a bridge is completed the question of its life will be one of care and maintenance. If every inch of the steel work receives a periodical coat of the best non-corrosive paint, and care is taken that the bridge is not strained beyond the limit agreed upon when it was designed, it will probably outlast its usefulness. The popular belief that a subtle process of crystallization is slowly weakening the metal of all the bridges is a fiction, pure and simple. The metal can only lose its life when it is strained beyond its elastic limit, and so long as the designed loading is not exceeded this contingency can never happen.—Iron and Steel.

America Leads as a Producer of Iron and Steel.

The following shows the quantity and the percentage of the production of iron and steel by each of the important producing countries for the latest available years, the quantities being expressed in gross tons of 2240 pounds for Great Britain, United States and Canada, and the metric ton of 2204 pounds for all other countries:

Countries.	Year.	Tons.	Per cent.
United States	1898	11,773,934	33 02
Great Britain	1898	8,631,151	24 21
Germany and Luxemburg	1898	7,232,988	20 29
France	1898	2,534,427	7 11
Belgium	1898	979,101	2 75
Austria and Hungary	1897	1,308,493	3 67
Russia and Finland	1898	2,193,750	6 15
Sweden	1897	539,197	1 51
Spain	1898	261,700	.73
Italy	1897	8,393	.02
Canada	1898	68,755	.19
Other countries	1897	125,000	.35
Total		35,655,088	100.00

The production of steel for the same countries upon the same basis was as follows:

Countries.	Year.	Tons.	Per cent.
United States	1898	8,932,857	37.02
Great Britain	1898	4,665,986	19 33
Germany and Luxemburg	1898	5,779,570	23 96
France	1898	1,473,100	6.11
Belgium	1898	653,130	2 71
Austria and Hungary	1896	880,696	3 65
Russia and Finland	1897	1,153,000	4.78
Sweden	1897	275,128	1.14
Spain	1898	213,015	.88
Italy	1897	63,940	.27
Canada	1898	21,540	.09
Other countries	1897	15,000	.06
Total		24,126,962	100.00

Ten years ago the United States produced 30% of the world's pig iron and Great Britain made 33%. Twenty years ago the percentages were 16 and 45 respectively.

W. R. DUDLEY, professor of botany in Stanford University, speaking of the sequoia of the Sierra and their distribution, says the sequoias of California represent a type of tree found nowhere else. Were it not for the high mountains of California there would be no forest except in the fog belt along the northern coast; consequently there would be no summer flow in the rivers and the State would be largely a desert, instead of being possessed of great fertility. The Pacific coast, on account of its variety of climate, is the home of a large number of conifers that are extremely rare in other parts of the country. These forests deserve protection and particular care on account of the rare types, of interest to science, which they contain, aside from all questions of commercial utility.

The Largest Vessel Afloat.

The new White Star liner Oceanic, expected to arrive at New York this week, is 704 feet long, 68 feet beam and 44 feet depth of hold; gross measurement, a little over 17,000 tons, or about 5000 tons larger than the Cunard line vessels, Campania and Lucania, which have held the record for size on the New York and Liverpool route. Her cost is over $5,000,000. The following table illustrates some features of the development of large shipbuilding during the past forty-one years:

Names.	Year.	Length, ft. in.	Breadth, ft. in.	Depth, ft. in.	Displacement, Tons.
Great Eastern	1858	680	83	57–6	27,000
Britannic	1874	455	45	36	8,500
Arizonia	1879	450	45–2	37–6	.....
Servia	1881	515	52	40–6	9,000
Alaska	1881	500	50	39–8	.....
City of Rome	1881	542–5	52	38–9	11,380
Oregon	1883	500	54	40	.....
Paris	1888	527–6	63	41–10	13,000
Teutonic	1890	565	57–6	42–2	12,000
Campania	1893	600	65	41–6	.....
Kaiser Wilhelm der Grosse	1897	625	66	[illegible]	20,000
Oceanic	1899	704	68	[illegible]	28,500

The Oceanic will have accommodations for 1710 passengers and will carry a crew of 390 men.




"GIANT" SHOES AND DIES.

Made of hammered steel, forged and hardened by special process.
These shoes and dies are made in San Francisco and can be furnished within a week after receipt of order.




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ORE AND BULLION ASSAYERS.

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TYPE "C" INDUCTION MOTOR OPERATING MINE HOIST.

Westinghouse Induction Motors

The most economic motor for mine service.

Westinghouse Electric & Mfg. Co.,
PITTSBURG, PA.
Mills Building, San Francisco.

All Principal Cities in U. S. and Canada and Foreign Countries.

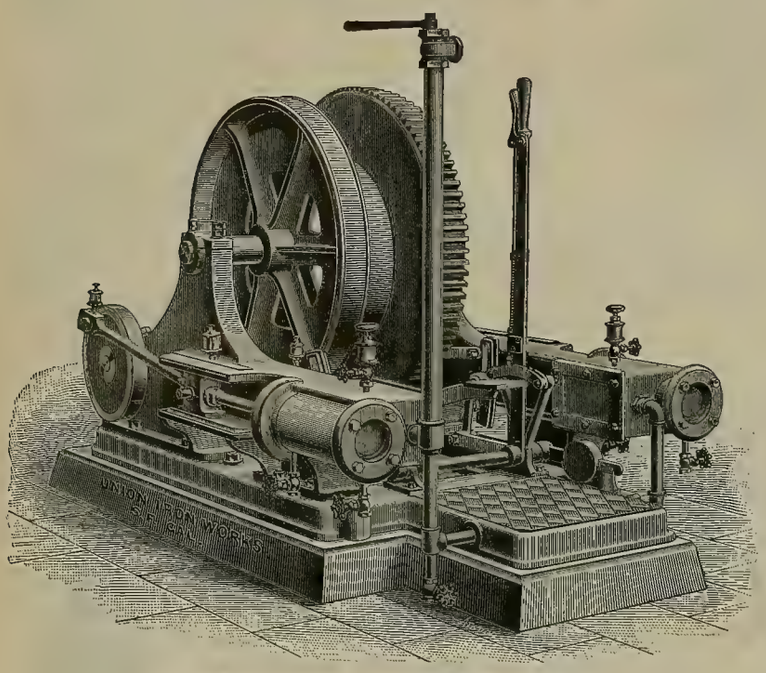
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UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

MAKE THIS SMALL

DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

For Prospecting Purposes or Underground Work,

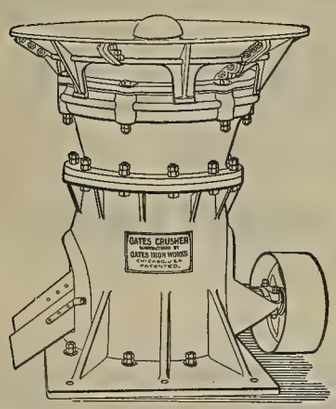
USING COMPRESSED AIR.

The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

GATES IRON WORKS.



The Original GYRATORY BREAKER.

It is ADJUSTABLE, and INDESTRUCTIBLE.

THERE ARE 4,000 OF THEM IN USE.

The South African Mines Have Purchased 200.

. . We build a FINE CRUSHER that is a wonder. . We know how to design this class of machinery. . . . There are others who think they know how to make a Gyratory Crusher; they are simply poor imitators of The Only Great Gates Rock and Ore Breaker. .

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J. FURTH, President. I. HULME, Manager. H. P. STRICKLAND, Secretary. R. V. ANKENY, Treasurer.

THE VULCAN IRON WORKS COMPANY,

SEATTLE, WASH.

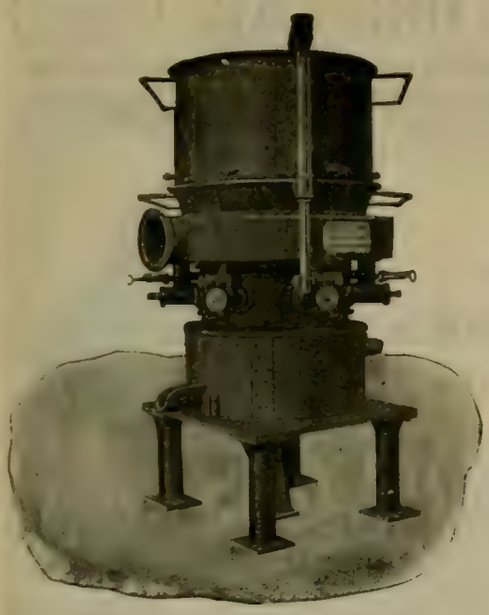
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Mining Machinery and Engine Building

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A MODERN COPPER SMELTER (ROUND FORM).

THE COLORADO IRON WORKS CO.,

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For the Treatment of

GOLD, SILVER, LEAD, COPPER and PYRITIC ORES.

THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 273.)

THE MINE AND SMELTER SUPPLY CO.,

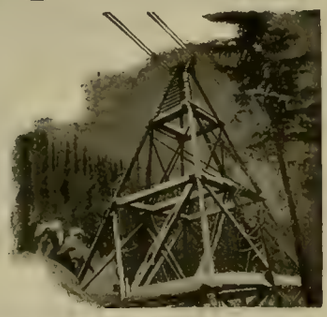
DENVER, - - COLORADO.

Mining and Milling Machinery and Supplies.

We beg to call your attention to

THE FINLAYSON PATENT WIRE ROPE TRAMWAY—

the latest and best system of double-rope automatic aerial tramway in the market.
If interested in the most economical system of transporting ores from mine to mill and to shipping stations, send for our special tramway catalogue.



We carry a complete stock of Machinery and Supplies for immediate delivery.

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THE MINE AND SMELTER SUPPLY CO.,.....Salt Lake City, Utah.
THE MEXICO MINE AND SMELTER SUPPLY CO.,
No. 16 San Francisco St., City of Mexico.

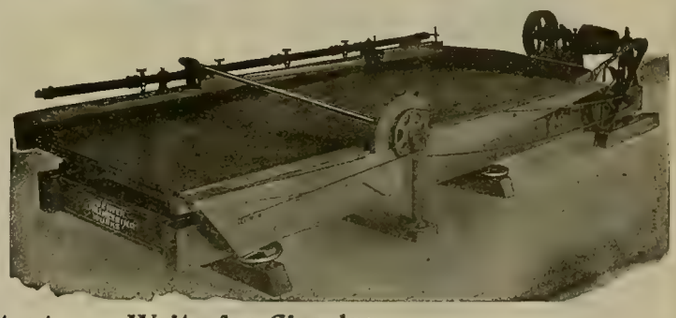
BOILERS, ENGINES, STEAM HOISTERS, ELECTRIC HOISTERS, ROLLS, CRUSHERS, WILFLEY TABLES, CARS, CAGES, ORE BUCKETS, RAIL, PIPE, FITTINGS, BELTING, ETC., ETC.

THE : CAMMETT : CONCENTRATOR.

Designed with some Regard for the Laws of Concentration.

The perfect vanner motion given to the pulp by our head motion, together with the freedom from "jumping" resulting from the special rigid guides used, explains why the Cammett riffles never "pack," and why the table has such a great capacity when handling slimes. : : : : : : : : : : : : : : : : :

The continuous grooves and riffles extending from end to end of the table maintains the greatest possible margin of safety between the concentrates discharge and the tailings. : : : : : :



Thoroughly Protected by Strong Patents. Write for Circular.

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30th and Blake Streets, - - - - DENVER, COLORADO.

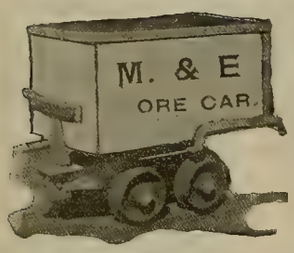
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Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information. 32 FIRST STREET, SAN FRANCISCO, CAL.



CLOSED.

THE M. & E. AUTOMATIC ORE CAR. (Patented Jan. 2, 1894.)

Dumps easily in any direction. Boxes of sheet steel, wheels cast iron. All other parts are forged and hammered wrought iron or steel. No unnecessary weight, but every part heavy enough for the work required of it. Get estimates and prices.

"Snow" Mine and Sinking Pumps,
"Oil City" Stationary and Gasoline Engines,
"Bates" Corliss Engines,
Shafting, Belting, Pulleys, Hangers, Boxes, Etc., Etc.

ORE BUCKETS, WHIMS, HOISTING ENGINES, AIR COMPRESSORS,

Boilers, Engines, Pumps, Mine Rail.


DUMPED.

THE MACHINERY & ELECTRICAL CO., 351-353 North Main Street, Los Angeles, Cal.

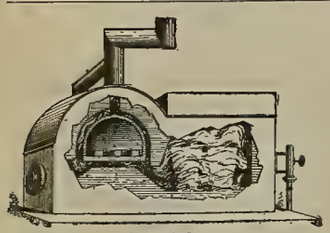

Patented.

Illustration shows L. & C. Combination Assayers' Furnace melting and cupelling at same time with one burner.

ECONOMICAL.
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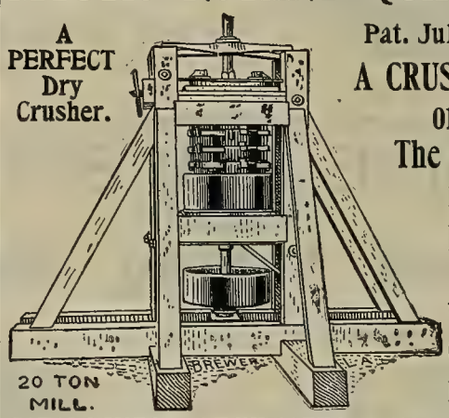
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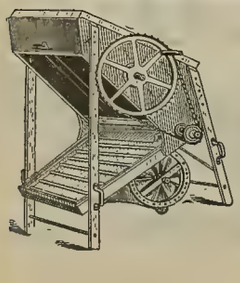
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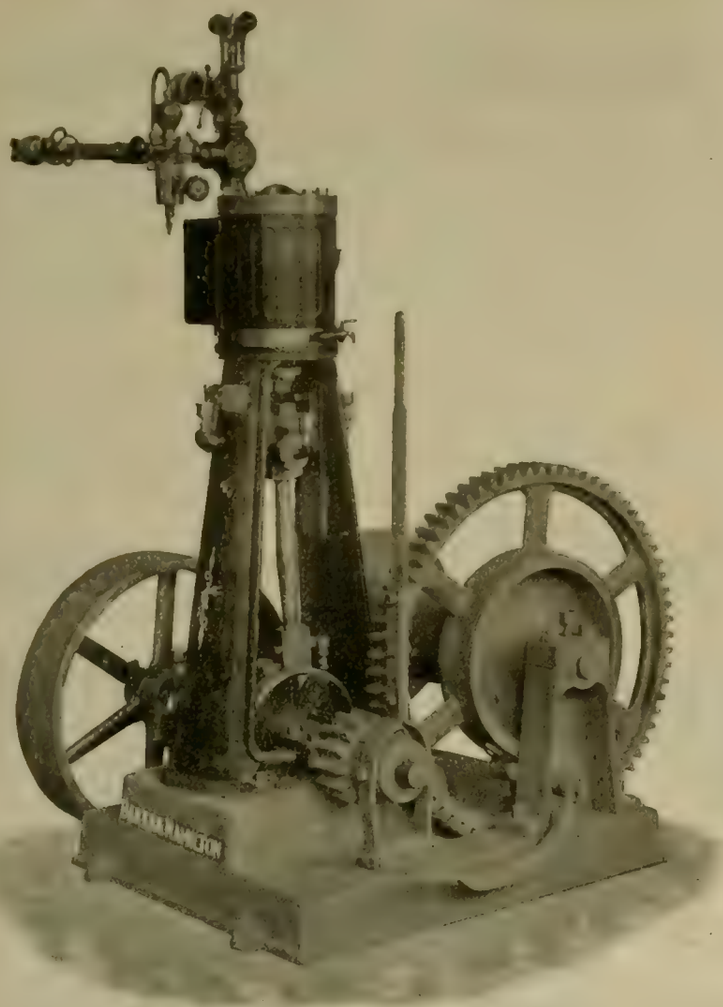
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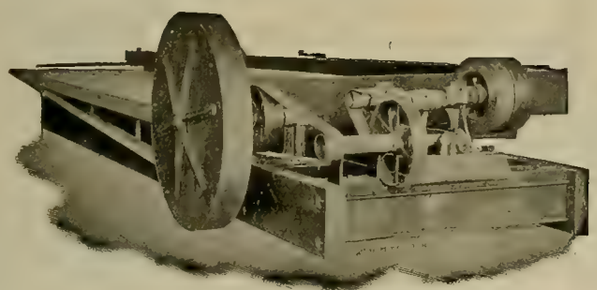
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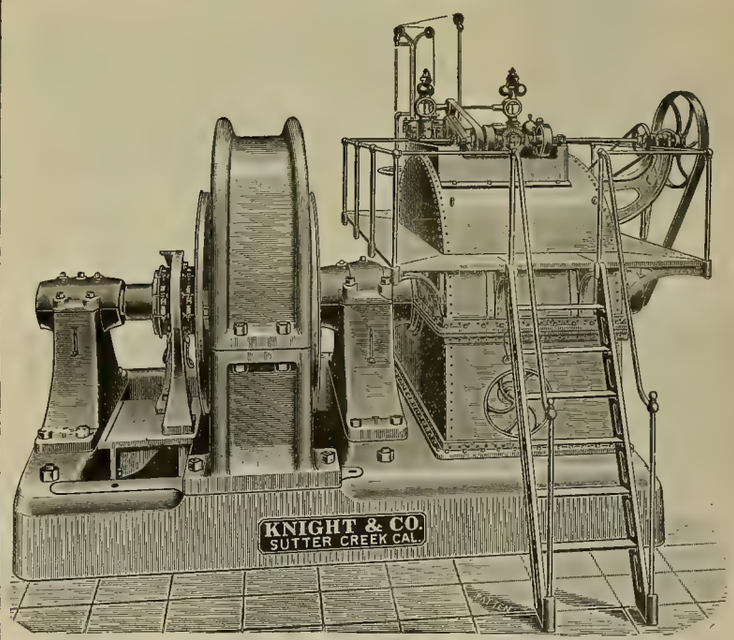
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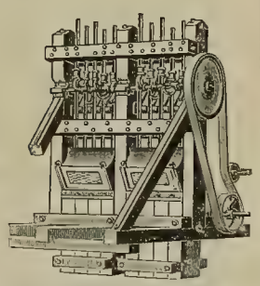
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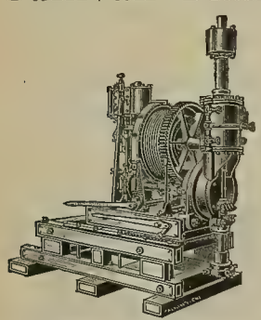


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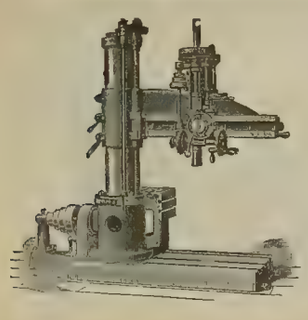
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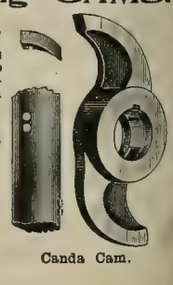
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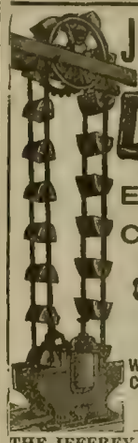
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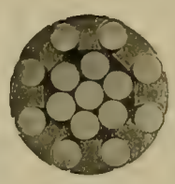
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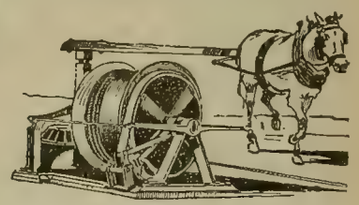
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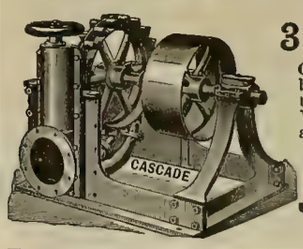
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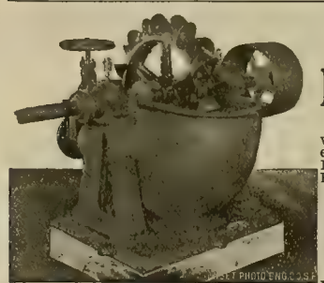


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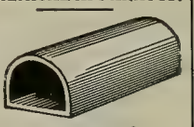
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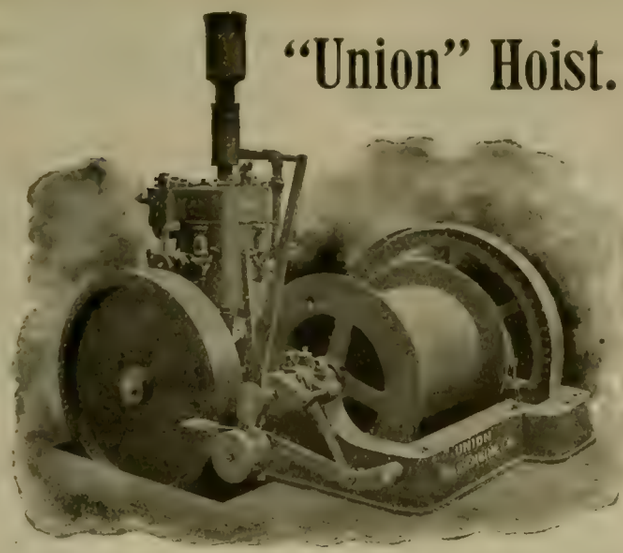
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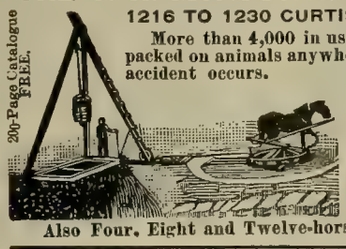
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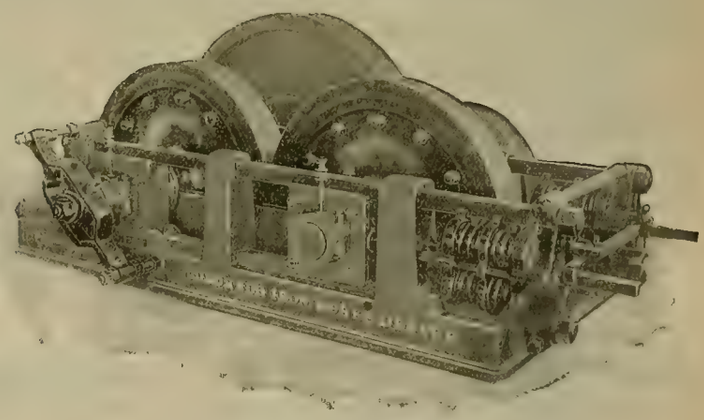
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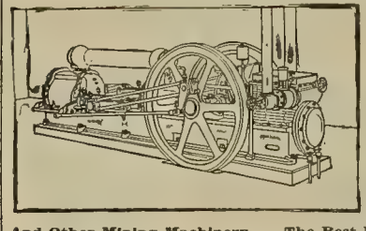


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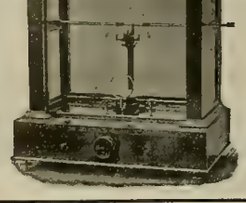
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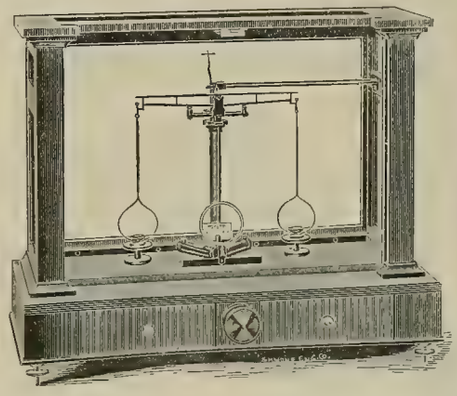
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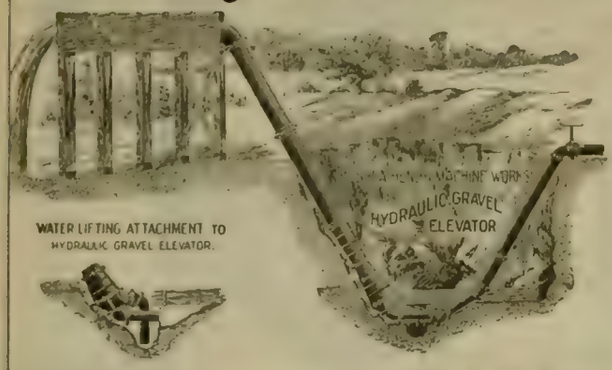
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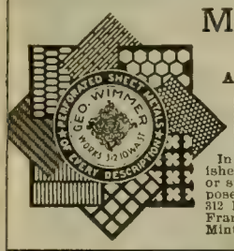
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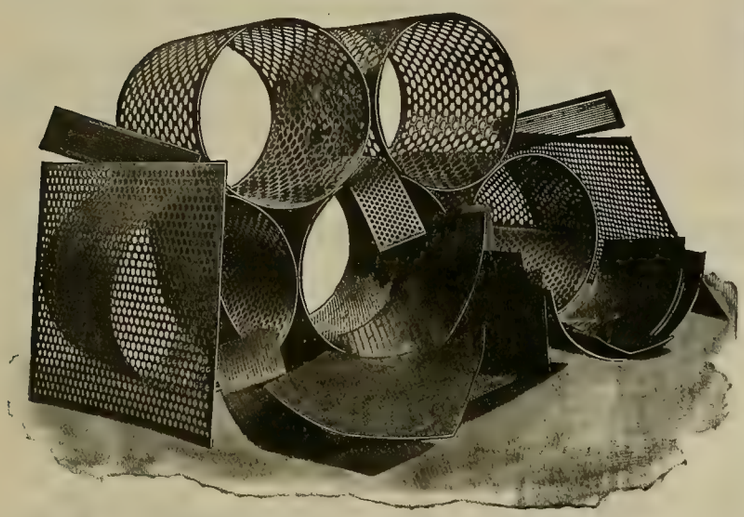
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FRASER & CHALMERS,

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Mining Machinery.

Stamp Mills, Smelting Furnaces,
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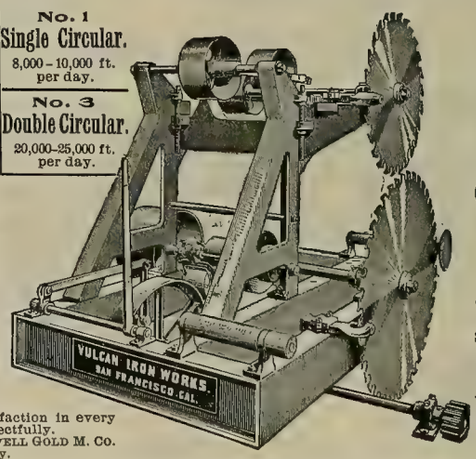
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Portable Saw Mills.

No. 0 Single Circular.	No. 1 Single Circular.
4000 – 6000 feet per day.	8,000 – 10,000 ft. per day.
No. 2 Double Circular.	**No. 3 Double Circular.**
15,000–20,000 ft. per day.	20,000–25,000 ft. per day.



Alaska Treadwell Gold Mining Co.
SAN FRANCISCO.
Feb. 20, 1896.

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GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully.

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For Mining Companies —OR— Other Consumers of Lumber at Remote Points.

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VULCAN IRON WORKS, Office, 505 Mission Street, SAN FRANCISCO, CAL.

THE MARION STEAM SHOVEL CO.,



Steam Shovels
Dredges and
Traction Dredges

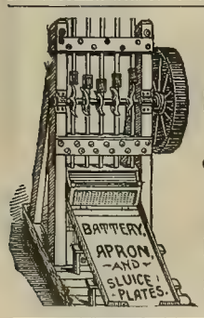
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PLACER MINING MACHINES,

separate or self-contained, either as a **dry land excavator** or **floating dredge.**

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MARION, OHIO.

GEO. W. BARNHART, No. 4 Sutter St., San Francisco, Cal.



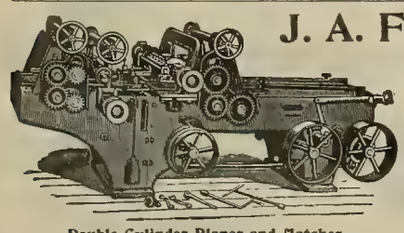
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Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

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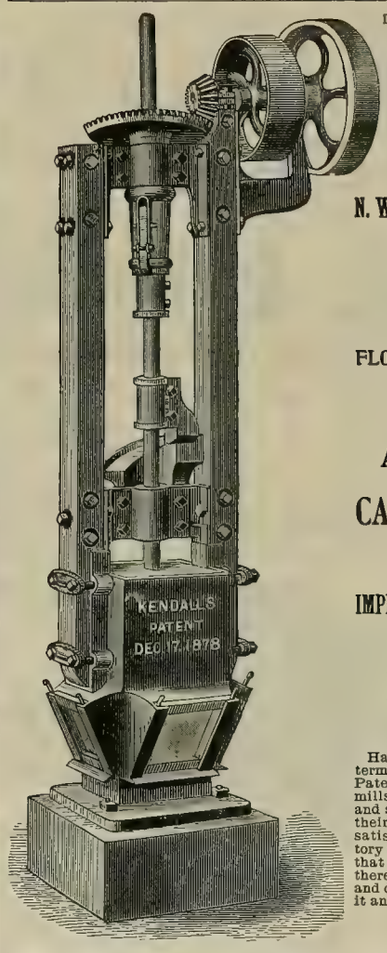
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Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

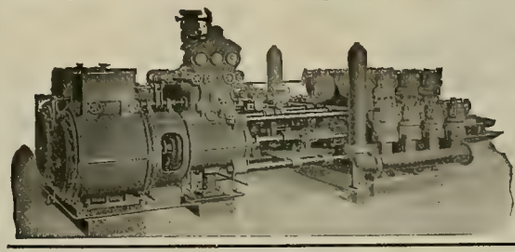
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The Best MINE PUMPS in the World.

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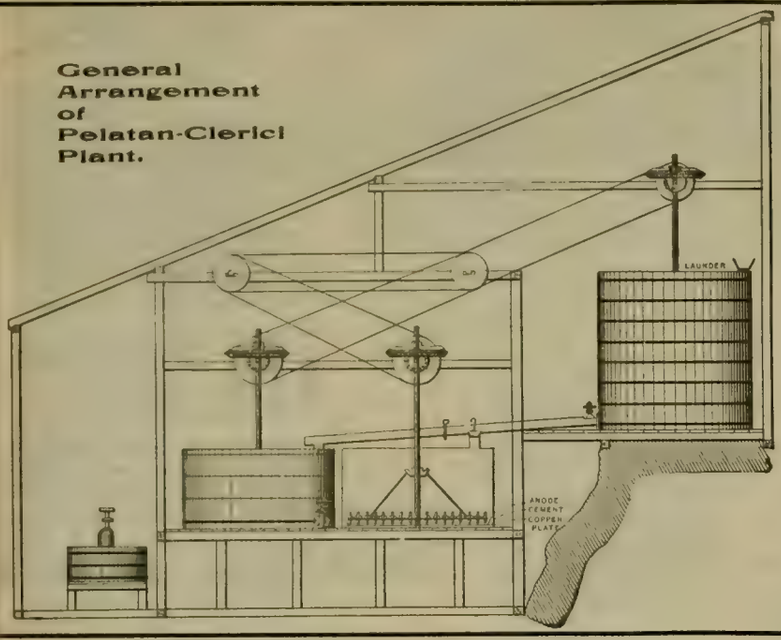
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"Lunkenheimer" On any Brass or Iron Steam Specialty is an absolute guarantee that the quality is unequaled and the material and workmanship the best. If you want goods that satisfy the most exacting, specify "LUNKENHEIMER" make.

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General Arrangement of Pelatan-Clerici Plant.

The "Pelatan-Clerici" Process

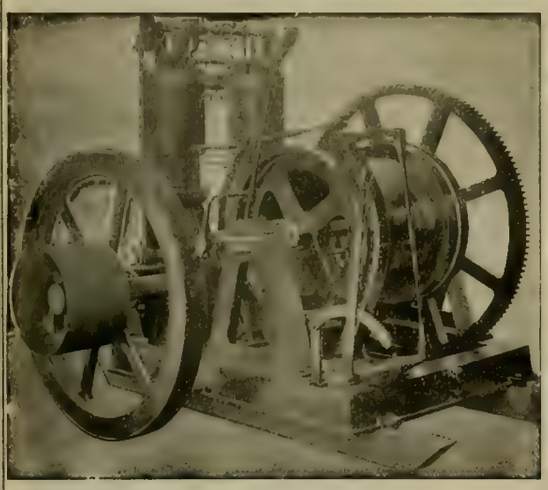
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Saves the precious metals by the simplest, most economical and most efficient process known. No roasting or previous treatment, except ordinary crushing. Extraction complete in from 6 to 12 hours. Extracts equally well both fine refractory gold and coarse gold in the form of amalgam. Makes a greater saving of gold than any other process from raw material at less cost. The electric current and dissolving agent promptly dissolve the precious metals, both gold and silver. Samples of ore tested free of charge. Several mills saving over 90 per cent of values by bullion returns. Simplicity. Economy. Efficiency.

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THE RISDON IRON WORKS,
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THE
Golden Gate
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Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.
Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power Etc.

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IRON & STEEL
WIRE ROPE
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BUILDING PAPER

The walls of a house are built for protection. If the sun and weather open up the sheathing, the rain or the air will get in and cause discomfort and doctor's bills. To prevent this the architect or builder uses building paper. There are many kinds, but only two classes—the poor and the good. P & B PAPER is good—the best. It is very strong, odorless, waterproof and airproof, and will not rot. Ask your dealer for samples, or write us for them. We are the makers.

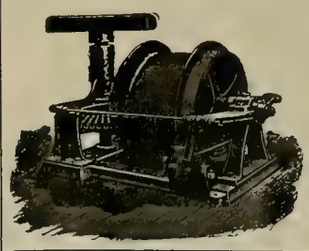
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JOSHUA HENDY MACHINE WORKS,

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Specialty of PROSPECTING, MINING and MILLING PLANTS.

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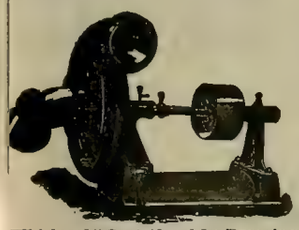
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Will pump rocks as large as will pass through the pipes. Also Compound Centrifugal Pump for 200 feet or more lift.



"Whirlpool" Centrifugal for Pumping Rock and Gravel.

OIL, GAS OR GASOLINE ENGINES, COMPOUND STEAM ENGINES, HARVESTING MACHINERY, ETC.



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Manufacturing Company,
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Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers
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HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.

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Market Reports.

SAN FRANCISCO, Aug. 31, 1899.

SILVER.—London, 27 3-16d; New York, 59 1-16; San Francisco, 59 1-16; Mexican Dollars, 49¼@50; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.62½ asked; brokers' price, $4.35.
Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6½c.
The National Lead Co. has advanced the price of white lead, red lead and litharge to the basis of 6c per pound in 500-pound lots and over.

COPPER.—New York reports Lake unchanged at $18.50; brokers' price, $18.75. Local—Mill copper plates, 23½c.
Copper remains unchanged, though there is an upward tendency in the American market. The English market is strenuously opposing any advance. It has been reported during the week that another strong syndicate is arranging to still further control the leading copper mines of the world, absorbing the Amalgamated Association, but these rumors have not affected the market.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Weak; $30.65 bid; 30.85 asked; pig, 36@39c per lb.
A slight decline in tin has been noticed the past two weeks. This metal is a favorite among English speculators, to whose manipulation the changes are largely due.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Demand strong. Local, $45; export, $40.50@41; carload lots, special rates.
The quicksilver market has shown signs of rising value for some time past, but this is the first official announcement of an advance in price. No particular cause is assigned.

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ALUMINUM.—N. Y. price, 26c.

Last year 5,200,000 pounds of aluminum, valued at $1,716,000, were produced in the United States. The value per pound was therefore 33 cents. In 1888 19,000 pounds of that metal were produced valued at nearly $3.33 a pound. This was for most purposes a practically prohibitory cost. But improved processess of manufacture reduced rapidly the market price of a metal that can be utilized in so many ways, and as a consequence there was a great increase in the output. The value per pound in 1889 was about $2.50, in 1890 $1, in 1891 66 cents, in 1894 57½ cents, in 1896 40 cents and in 1897 37¾ cents. The cost of production is being lowered, but not as rapidly as in earlier years. The slight reduction in 1898, as compared with 1897, was accompanied, however, by an increase of 30% in the output.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $8; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drusm, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c @ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18¼c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11¼c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

COKE.—Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Aug. 30, 1899.

9:30 A. M. SESSION.

450 Ophir	$1 25	200 Yellow Jacket	32c
100 Gould & Curry	37c	300 Sierra Nevada	78c
100 Best & Belcher	66c	100 Utah	09c
450 Con. Cal. & Va.	$2 00	100 Justice	14c
100 Chollar	37c	200 Union Con	26c
500 Potosi	34c	100 Alta	07c

2:30 P. M. SESSION.

100 Mexican	53c	100 Hale & Norcross	32c
200 Gould & Curry	36c	100 Belcher	34c
100 Best & Belcher	64c	200 Sierra Nevada	75c
100 Savage	19c	400 Justice	16c

Mines or prospects operated on contract to purchase, MONEY or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.
EDW. N. BREITUNG, Marquette, Mich.
Cable address Edco. Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial. **U. S. A.**

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

A Fortune Maker.

The oil fields of California are rivaling those of the world as fortune makers for the lucky investors. Stocks that are now selling for a few dollars will bring hundreds and in some instances thousands per share

When Oil Is Struck.

We have 2000 acres right in the wonderful Panoche Belt. The leading experts declare it positively oil bearing. Sinking of wells commences immediately. Our stock is $4 per share now. A few shares may fix you comfortably for life. Prospectus with full particulars free.

Union-Consolidated Oil & Transportation Co.
332 PARROTT BLDG., SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Sailor Consolidated Mining Company will be held at the office of the company, 318 Front St., room No. 7, San Francisco, California, on MONDAY, the 18th day of September, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. M. C. LUND, Secretary.
Office—318 Front St., room No. 7, San Francisco, California.

Group of Gold and Silver Mines for Sale

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

COPPER MINE.

Partner wanted (miner preferred) who has $5000 to spend developing a mining property in Mexico, which has lately produced a considerable amount of ore.
Object, deeper development and ultimate placing the property on the market.
No attention given to brokers or middlemen.
Address G. PETERSON, Ahlborn House, San Francisco, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from J. S. Goodwin, in the Birdseye Creek Placer Mine, at You Bet, Nevada Co., to deposit tailings in an old pit; from Mrs. E. A. Cox, in the Washington Mine, at Whiskey Diggings, Sierra Co., to deposit tailings in Fourth Ravine; and from Geo. W. Stone and Jas. J. Schenrich, in the Red Hill Gravel Mine, near Diamond Springs, El Dorado Co., to deposit tailings in a ravine and in Ringgold Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on September 4, 1899, at 1:30 P. M.

F. B. COOK & CO., MINES AND MINING,
Atlas Block, Salt Lake City, Utah.
Properties reported on and development work superintended for investors.

AN EXPERIENCED MILLMAN DESIRES position in a mill: understands concentrators and assaying; thoroughly competent. Address AMALGAMATOR, Care of Mining and Scientific Press.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

WANTED—To purchase working gold mine with mill and machinery; give full particulars. **FOR SALE**—Fine hydraulic proposition in Calaveras county. Developed and undeveloped quartz mines on mother lode. Purchaser may deal with owner direct. W. F. Aram, room 40, 8th floor Mills bldg., S. F.

GOLD MINE.—Ledge 22 ft. wide, developed 45 ft. deep; $14 per ton; free gold and 1½% sulphurets of the value of $482 per ton. Partner wanted with a few thousand to continue development. Correspondence solicited. F. O. NORTON, Reno, Nevada.

FOR SALE,
3000 Feet 15-Inch Water Pipe, Two Water Wheels, One No. 9 Sturtevant Blower.
The Copper Mine, Camp Seco, Calaveras Co., Cal.

Mines for Sale.

A specialty made of properties in Mexico and the Southwest. I have orders for *large, developed* and *producing* gold and copper mines. Must have good reports, maps, etc.
H. E RUNKLE, Mining Broker, El Paso, Texas.

NOTICE.

To Whom It May Concern:

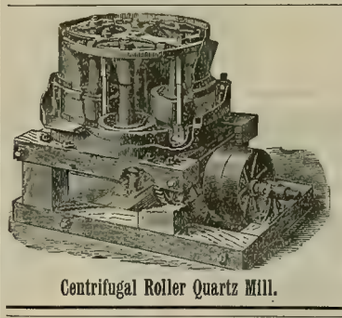
The so-called Cammett Concentrator which is being advertised and offered for sale by the Denver Engineering Works Company of Denver, Colorado, is a palpable infringement upon claims covered and protected by United States Letters Patent granted for the Wilfley Concentrator, and all persons who purchase and put the same in use will be promptly proceeded against as the law provides.

WHITE, ROGERS & COMPANY,
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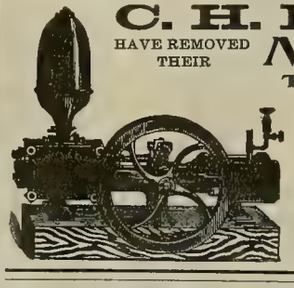
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Assessment Notices.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco. California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 28th day of July, 1899, an assessment (No. 12) of ten ($10) dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 29th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 20) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209-11 Claus Spreckels building, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of August, 1899, an assessment (No. 8) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment (No. 7) of One Dollar per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary

Office—320 Sansome street, room 24, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINING Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

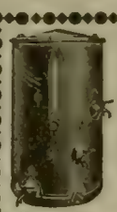
Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 19th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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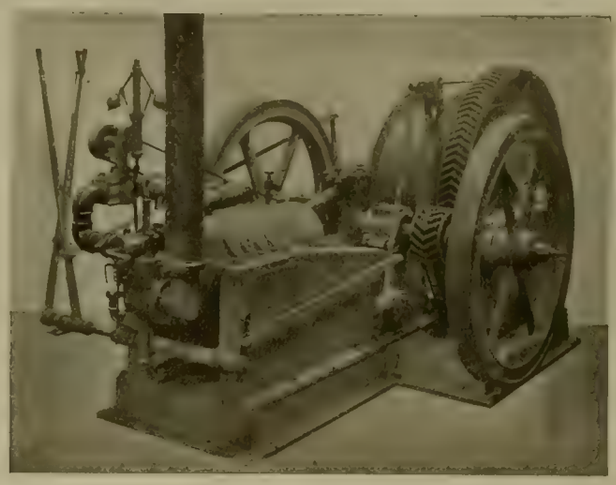
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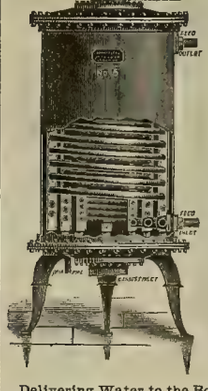
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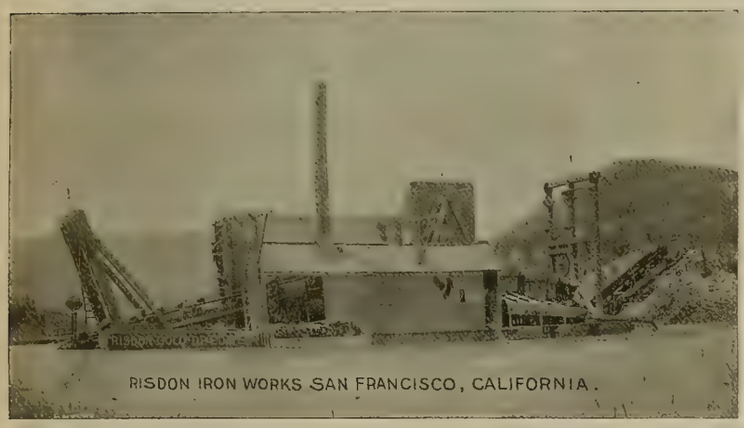
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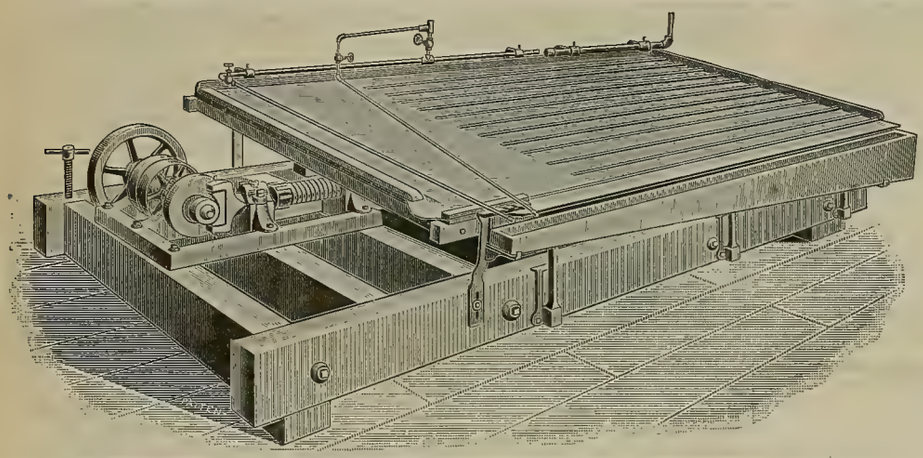
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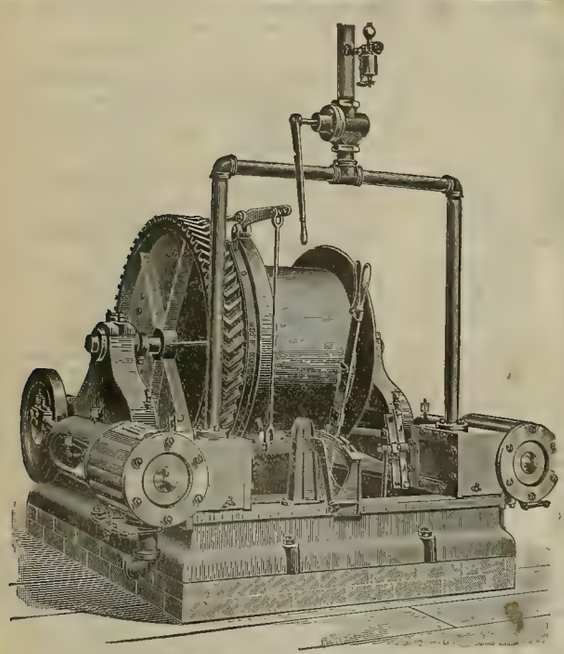
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2044.—VOLUME LXXIX. Number 11. SAN FRANCISCO. SATURDAY, SEPTEMBER 9, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Types of Head Frames.

There is great diversity in the style of structures erected at the collars of mine shafts for the purpose of carrying the sheaves over which the cables pass from the cage, skip or bucket to the hoisting engines. The design must necessarily vary with the requirements. An inclined shaft requires a somewhat different type of frame from that suited to a vertical shaft, and shafts of different angles require variations in the head gear. Those who have seen only the great, massive timber frames found at most large mines, erected without regard to expense, braced and tied in most elaborate fashion; or those who have seen only the graceful steel frames which of late years are replacing the heavy timber frames, would doubtless form the opinion that all productive mines should be similarly equipped. Such, however, is not the case. Some mines which have produced large amounts of gold or silver have had the simplest equipment. On Fryer Hill, Leadville, Colo., some of the very rich ore bodies were raised to the surface by hoisting engines costing no more than $2000, the head frame consisting of a simple tripod—three stout poles disposed about the shaft and tied at the top, with a sheave wheel fixed near the apex. A more simple device can scarcely be imagined, yet a large amount of rich ore was hoisted from those early-day mines with devices of this description. It is true the workings were comparatively shallow, and these simple plants would not have proven efficient on the large, deep mines of Leadville to-day.

In the construction of gallows frames it is evident that an attempt is too often made to secure symmetrical proportions and strength without due regard to the strains to which these structures are subjected, with a consequent unnecessary extravagance in construction.

The accompanying illustrations show several of the types of head frames most commonly in use. The two-post gallows frame with the back diagonal braces is typical of the Cripple Creek district, Colo., and this style of frame is extensively in use there. It will be noticed that there are side braces to give it greater rigidity, the side swaying of this type of head gear making it necessary to frame it with much care and to tie it with strong iron rods.



HEAD FRAME, VAN ANDA, TEXADA ISLAND, B. C.

The four-post style of frame at the Van Anda mine, B. C., is much in use on the Pacific coast, and, while a strong frame, is too often built without due regard to the strains. The two-post frame is quite as good and is adapted to either vertical or inclined shafts. The Marble Bay head frame is after the modern type of steel frame and resembles in its construction that at the High Ore mine, Butte, Mont., designed by Geo. S. Binckley and described in the issue of the MINING AND SCIENTIFIC PRESS of July 22nd, '99. This style of frame embodies many of the best features of construction, as the timbers or steel columns and beams are disposed with direct reference to the strains.



GALLOWS FRAME, CRIPPLE CREEK, COLO.



HEAD FRAME, MARBLE BAY, B. C.—(MONTANA TYPE)

The head gear of the Oneida mine, Amador Co., Cal., designed by H. C. Behr, is one of the simplest types and withal the strongest frames in California. It has no superfluous timbers and each piece is placed in a position to resist and equally distribute the resultant strains when hoisting heavy loads rapidly from great depth, and when under heavy work shows scarcely a tremor.

In mines where the tonnage hoisted is not very large the trip rope and bucket are frequently employed, particularly when the mine is in the development stage. At Cripple Creek it is a common thing to find a two-post frame, like that illustrated on this page, provided with two horizontal timbers which are securely bolted to the vertical posts and back brace and extending beyond the shaft in front of the frame, the ends being joined by a heavy crosspiece, morticed and bolted to the extensions. This addition is made level with the cross-tie joining the two posts several feet below the sheave. Its purpose is to carry a trip rope in front of the shaft, and, if desired, another rope may be fastened to the tie joining the angle braces back of the shaft. By means of this arrangement ore may be dumped on one side of the shaft and waste on the other. This device saves much otherwise necessary sorting of ores.



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J. F. HALLORAN.....Publisher

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Gallows Frame, Cripple Creek, Colo.; Head Gear Oneida Mine, Amador Co., Cal.; Head Frame, Van Anda, Texada Island, B. C.; Head Frame, Marble Bay, B. C., 281. Latest Mining and Metallurgical Patents, 287.
EDITORIAL.—Types of Head Frames, 281. Benefits of Concentration; Stamp Mill Mortars; Miscellaneous, 282.
MINING SUMMARY.—289-290-291.
THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 306.
MISCELLANEOUS.—Concentrates, 283. Characteristic Mines of the California Gold Belt; The Diamond Drill in Germany; Some Experiences of a Working Miner, 284. The Seven Devils Country; Mechanical Haulage by Compressed Air; Absorption of Gold and Cyanide; How Low-Grade Ores Pay, 285. Gold Extraction; Heat in Ore Mines, 286. Latest Mining and Metallurgical Patents, 287. The Concentration of Ores; Notes on Gold Precipitation by Zinc Dust; Notes on the Occurrence of Quicksilver in Canada, 288. Industrial Notes; Personal; Commercial Paragraphs; Catalogues Received; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 292. Broken Hill Sulphides; Railroad Building by Music; Abuse of Machinery; A Natural Motive Force; A Substitute for Platinum; Krennerite. 293.

SOME Colorado mine managers have adopted the weekly payment of wages system, it is said, "with gratifying results," presumably to the workmen.

A SECOND oil exchange has been organized in San Francisco, Cal., as the result of the interest in the development of southern California oil lands.

A PREJUDICE appears to exist against veins in mica schist where the veins occur as lenses of quartz of varying size. Just why such prejudice exists is not easy of determination for the reason that, where such veins occur in a rugged mountain country, as good veins or lenses are found below the bottoms of the deepest canyons as are found on the summits of the highest hills, and therefore it is but reasonable to conclude that the lenses may be found to continue into the mountain to as low a level at least as the lenses appearing in the canyon bottoms; but for some reason the work in mines of this class usually stops with the first disappearance of pay ore, though the succession of lenses may be followed longitudinally for miles, their peculiar irregularities being recognized. Veins of this type undoubtedly extend to greater depth than is generally supposed, for, if they do not, then we must believe that the surface topography has a distinct relation to the distribution of veins, their continuity and depth, but facts tend to disprove this assumption.

THE jointing planes in rocks are often mistaken for planes of bedding, but where large exposures may be studied it will be observed that the joints are rarely really parallel though approximately so. They usually have the form of wedges though the bounding planes lie nearly parallel. Often the jointing planes are shown with great distinctness when in the same rock mass the bedding planes are almost wholly obliterated. In large rock exposures, such as the faces of vertical cliffs, a study of the jointing system often throws light upon the character and relation of the planes occurring in zones, which by reason of being connected with deeper seated regions have become the vehicles for ore deposition. This deposition of mineral from solutions rising along these passages from great depth take place in those portions of the fissured zones best prepared for their reception, notably in those portions of the zones where the greatest amount of crushing and pulverization has taken place. The zone may be narrow, less than a foot wide, or it may be hundreds of feet wide. In such wide zones the mineralization is usually found to occur in separate bands or streaks independent of each other, but having a general parallelism. Smooth, well defined walls are often misleading and crosscutting shows often that there are walls within walls in deposits of this character.

Benefits of Concentration.

One of the most important branches in the metallurgical field of the mining industry is that of concentration. In many districts too little attention is paid to it. Ores are shipped in bulk or are rudely hand-sorted and the best portion shipped to the smelters at a profit, it is true, but at a greater cost than would be necessary if concentration by mechanical means were first employed. The second grade ores remain on the dump in many cases, practically waste, though containing good values. In some mines the ores are so disseminated through the gangue that hand sorting can be carried on rapidly and economically, but this is only the case where the ore occurs in considerable masses. Hand sorting is not economically practicable when the mineral occurs in the form of disseminated grains.

Concentrating machinery is designed for specific purposes, but has considerable range of application. Most ores are easily concentrated at low cost, but some complex ores, such as those containing an intimate mixture of pyrite, galena and blende, afford unsatisfactory results. Fortunately, the latter class of ores do not occur universally, though found in large quantity in some mining regions. Generally, a plant consisting of rock breakers, rolls, trommels, jigs and concentrating tables, buddles or belt machines are better adapted to concentrating ores than stamps and concentrating machines alone, for the reason that a large percentage of the mineral is obtained in the first parts of the operation, the particles being comparatively coarse, the fine material being collected in the latter part of the process. Stamps crush all portions so fine that the subsequent recovery of the smallest particles, which in some ores crushed by stamps form the largest portion of the valuable mineral, becomes a matter of great difficulty. Rolls create a more uniform product, as they have a tendency to crack and not to grind the ore; and as most sulphide minerals break along the lines of their natural cleavage when subjected to crushing force, the small grains have angular faces which seem to facilitate their separation from the gangue. It is the aim of the successful concentrator to make as few slimes as possible.

When ores high grade enough to ship without sorting are concentrated by machinery, the gangue, if containing values in gold and silver, may be separately treated subsequently by amalgamation or some leaching process. If they will not pay for this subsequent manipulation they certainly will not pay the transportation and reduction charges when shipped to the smelter. It is a mistake which many miners make to send poor ore with rich, even though the average be high, for if the poor ore alone will not pay, it pays no better when mingled with the high-grade ore. This is a simple proposition which seems to be lost sight of in the desire to secure quantity. In shipping ores the aim should be to get as high value as possible in as small bulk as possible.

AN Eastern financial newspaper, speaking of the probable value of the stock of a certain mining corporation, concludes with this remarkable statement: "Still no one should forget that it is a gold mine, and that gold mines should be looked at, not annually, but very semi-occasionally, as they have a habit, so far as Boston investments are concerned, of coming and going almost in a night." If it is a fact that Boston investors have found that stock in gold mines has proven unsatisfactory as an investment, the fault must have been largely with the investors themselves. The gold mines of the United States have paid to their stockholders hundreds of millions of dollars in dividends and the stock of the leading gold mines constitutes as secure an investment as stocks of any other branch of industry.

AN unsettled condition of the political situation in Africa is attracting attention to that county. Statistics recently prepared by the Treasury Department of the United States shows that there has been a large increase in the demand for the manufactures and products of the United States, amounting since 1893 to an increase of 218%. Railroad bridges in the valley of the Nile, mining machinery for the gold and diamond districts and clothing and foodstuffs for the Soudan have all found an increasing demand.

Stamp Mill Mortars.

The form of the stamp-mill mortar has not changed materially since it was first introduced, in the early '50's, and it is not apparent that its general form should be changed. It is true the low, broad mortar, called by mill men in the early days "the hog trough," has been generally replaced by the high, narrow mortar with what has proven to be satisfactory results in most cases. This latter type of mortar increases the capacity of the battery, but it is much shorter-lived, owing to the increased scouring effect of the sharp grains of hard rock, which are repeatedly and constantly thrown against its sides and ends by the force of the falling stamp. This has led to the introduction of iron or steel plates, called "liners," which, when worn, may be renewed, thus increasing the life of the mortar by many years. Mortars, as now generally cast, are heavier than formerly, and it has been found an advantage to make them so, but the necessity for making the upper portion—that portion above the tops of the screen frames and feed holes—as heavy as they are made, is not apparent. It would seem preferable to reduce the thickness of the upper portion and to put the weight in the base. This is the portion subjected to the hardest service. The rapidly repeated heavy blows continue almost without cessation year in and out—in a single year about 260,000,000 blows are delivered by a 5-stamp battery—and this constant shock and vibration must be taken up and distributed by the mortar and absorbed by the mortar block. Realizing the necessity of rigidity, mill founders have increased the weight of the mortars throughout, and constructing engineers have attempted to make more and still more rigid mortar blocks. Recently concrete foundations have been introduced, and upon them a heavy anvil block is bolted, the mortar being bolted to this heavy casting. This must necessarily afford a block almost absolutely rigid. Some experiments in this direction have shown the desirability of heavy base; the base of the mortars may be made heavier with good results. For mountainous regions, where transportation is effected by the use of pack animals and men, the sectional mill has been designed. In these mills the upper portion of the mortar is made of boiler iron, riveted to the base, and mortars so constructed have given satisfaction, showing that a light upper portion is not detrimental.

IN the issue of Jan. 23d, '97, this paper published the names and addresses of 213 *new* subscribers received at the business office in the twenty-one days from Dec. 5th, '96 to Dec. 26th, '96, as the best kind of evidence of the growth of this paper's circulation. In the issue of October 2, '97, was stated the fact that during the twenty-six working days of the preceding month, September '97, there had been received the names of 179 *new* subscribers. This last statement was questioned, whereupon in the issue of October 9th, '97, were published the names and addresses of the 179 *new* subscribers to this paper received at the business office during the time specified. With these names and addresses was published an invitation to any one who doubted the statement made to write to any of those whose names were so published and ask if the statement made was true, so far as he was concerned. The matter is here referred to because of some similar doubt having recently been expressed regarding recent similar statement showing the steady growth of this paper's circulation in the mining world. On two occasions, as cited, were published the names and addresses of *new* subscribers received during short definite periods, as incontestable proof of what had been previously asserted. It was afterwards learned that on each occasion those whose names were so published were the subsequent recipients of certain "journals", who had so secured a desirable list of live men to whom their publications could be gratuitously sent in the hope of thus inflating a bogus "circulation." As such publication resulted in annoyance to those of our patrons, by the receipt of publications that they did not want, the action was not repeated and will not be. It was a case of assertion, and positive proof of the exact truth of the assertion, and as such was a success.

Concentrates.

THE duty on iron ore imported into the U. S. is 40 cents per ton.

NEVER pour water into acid to dilute it, pour the acid into the water.

THE market price of tin has more than doubled within the past year.

UTAH is the only American State that has in force an eight-hour law applying to miners.

'49, California; '59, Pike's Peak; '69, White Pine; '79, Leadville; '89, Cripple Creek; '99, —— ?

THE lines of the Snoqualmie, Wash., Power Co. contain 130,000 pounds aluminum wire, ¼ inch diameter.

DAMOURITE is a variety of mica, similar to the common, light-colored muscovite but containing more water.

TIN occurs in several of the United States, but is nowhere being produced in commercial quantity in this country.

THERE is as yet no coal discovery in the Klondike, though it would be a bonanza find, as coal in the Yukon is worth $50 per ton.

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THE eighth annual convention of the California State Miners' Association will be held in San Francisco on the 23rd, 24th and 25th prox.

THE chemical symbol HCN, or HCy signifies hydrocyanic acid or hydric cyanide (prussic acid). KCN, or KCy is the symbol used to denote potassium cyanide.

A SCIENTIFIC description of the copper deposits of the Seven Devils district, Idaho, written for this paper by Waldemar Lindgren, appeared in the issue of Feb. 4th, '99.

UTAH ore producers complain that local smelters, with one exception, allow but $2 a unit for their copper, when under the ruling price of the metal they are entitled to $2.50 a unit.

A HUNDRED pounds of ore does not furnish a reliable mill test in a mill doing custom work. Should a low grade ore follow a rich run, the result may be imagined. A ton is not too much.

A RUSSIAN OFFICIAL has figured out a time table which shows that, when the Transsiberian Railroad is completed, it will be possible to make a journey around the world in thirty-three days.

THE New England Exploration Co., organized in Boston, Mass., with a $5,000,000 capital stock, is credited with intention to "buy dividend paying mines," and employ "only expert commissioners."

WHATEVER the market price for copper, the U. S. Mint must pay it, as the Federal statutes prescribe 95% copper for the cents and 75% copper for the nickels, without reference to the ruling value of the metal.

THE wear on a narrow mortar of a stamp mill is greater than on a wide one. The wear on screens is also greater in narrow ones. The latter discharge pulp faster through a given sized screen than the former.

SO FAR as known the deepest diamond drill hole in the United States is the one at Lincoln, Neb., being bored under direction of the State Geological Survey. It is now 2463 feet deep, and the intent is to bore 1000 feet farther.

MILLMEN should always look closely to the adjustment of tappets in rapid-drop mills, for the wearing of shoe and die increases the height of drop, and a stamp set to clear the tappet when the shoe and die are new may strike when worn down.

MANY millions of dollars have been taken from the pocket mines of California by the use of hand mortars or spring pole and mortar. A single mine, the Bonanza, at Sonora, produced $1,500,000 with hand mortars, and over $500,000 in a 2-stamp mill.

IN the construction of a quartz mill it is desirable wherever possible to have the rock breaker set on a separate platform or on timbers in such a manner as to be wholly disconnected from the mill frame, thus avoiding the constant vibration caused by breakers.

FOLLOWING the recent reduction in government gold refining charges, it is semi-officially announced from Washington that the bureau of the mint will shortly order a reduction to be made in the charges for refining silver at the government mints and assay offices.

A SUPERINTENDENT in charge of the mining property of a corporation may contract a debt by permission of the board of directors, but the superintendent can not secure the debt by giving a mortgage on the property, even though he be personally the largest stockholder.

ACCORDING to the regulations governing the Paris Exposition, each nation contributing exhibits must come as a nation, and no States or sections are recognized. Labels may show from what part of a country exhibits come, but no special space will be allotted to any State.

IN old style mortars no provision was made for the constant abrasion caused by ore dropping from the feeders onto the lip of the feed opening, and mortars wore through in a comparatively short time. A thick lip is now cast on the mortar, or a steel plate is provided which may be renewed when worn.

THE next miners' rock drilling contest will be at the Festival of Mountain and Plain, Denver, Colorado, which will be held during the week beginning Sept. 25th, at which liberal prizes will be offered and in which a large number of expert drillers are expected to compete. Entries must be made by Sept. 20th.

IT is a good plan to cut the key seat of a cam shaft its full length, excepting that portion resting in the boxes. In a 10-cam shaft that portion resting in the center box should be provided with a nicely fitted steel bar, held in place by counter-sunk screws. All the keys should be fitted with care, avoiding the use of thin metal strips to fix defective keys. A good smith can forge a key to within a small fraction of the desired size, and the machinist can then file it to fit exactly.

ABOUT as big a price for a "prospect" as any told of is that of $125,000 for the "Carr strike," near Custer, South Dakota, recently. The purchaser was, however, unable to meet the deferred payments, and the sale fell through. The property is now reported sold again to the usual "Chicago syndicate."

NIOBIUM and columbite are minerals of a group of the niobates and tantalites and are chiefly salts of metamobic and metatantalic acid. Titanium is prominent in a number of the species. Niobium and columbium are essentially the same thing and are worth $2500 per pound avoirdupois, and titanium $1100 per pound.

"CONCENTRATES" can not guarantee absolutely correct answers to every question sent in, nor any answer to abstruse engineering and electrical problems, or manifestly silly queries. The idea and intent is to supply plain, exact, practical answers to such questions as naturally come up in the daily working life of our readers.

WHERE a hole has been worn entirely through a mortar it may be repaired by forging a plate to fit the hollow about the hole and fitting a rubber gasket between the plate and the mortar. A clamp similar to that in use in closing a manhole in a boiler must be provided, and with this device the hole may be tightly closed.

CYANITE is an aluminous silicate occurring in long, thin-bladed crystals aggregated together or penetrating the gangue. The color is usually blue, though sometimes the crystals have a blue center and a white margin, occasionally green or gray or even black. It is also known as disthene. It should not be confused with cyanide.

Do not feed quicksilver to a battery faster than it is required, nor permit the plates to become too hard by lack of it. Where the value of the ore is variable either condition may occur within a short time. When the value of the ore changes but little throughout long periods, a given quantity may be fed at stated intervals with safety.

IN mining deeds, where the consideration is stock in a mining company, it has been held that revenue stamps shall be affixed to the document in proportion to the par face value of the stock transferred, and not in proportion to its real or market value. The law provides that $1 worth of stamps shall be affixed for each $1000 value in the consideration.

A COLUMN of water at 60° F., 1 inch square and 1 foot high, weighs .433 lbs. Consequently a column 50 feet high would weigh 21.65 lbs. The pressure per square inch in a 6-inch or 8-inch pipe would be nearly 21.65 lbs. But the total pressure would be as much greater in the 8-inch pipe as the area of an 8-inch circle is greater than the area of a 6-inch circle.

THE Melones mine in Calaveras county, Cal., became famous in the early history of mining in California by reason of its production of rich telluride ores and native gold. The name is of Spanish origin, due to the fact that a Mexican there raised watermelons, which he sold at large prices. It was called the Melon Patch and finally Melones—Spanish for melons.

A SINGLE atom of an element may be substituted for one or more of another. This is termed their atomicity or atom fixing power. An element with an atomic fixing power equal to that of an atom of hydrogen is termed a monad; one with twice that power a dyad, with three times that power a triad, with four times a tetrad, and with five times the power a pentad.

THE pressure that tends to keep a check valve shut is equal to the area of its top surface, multiplied by the pressure per square inch in the boiler, and, in order to open the valve and force water through, the pump must produce a pressure per square inch on the under side of the valve which, when multiplied by the area of the under side, will overcome the pressure on the top.

THE variation of the magnetic needle changes constantly, though at an extremely slow rate. It also varies with each change of meridian. The daily variation sometimes amounts to ¼ of a degree, and always to several minutes. It is always changing from one side to the other of the normal variation. The line of variation moves westward at the rate of 3 or 4 minutes annually.

WHEN an ore is supposed to contain lead in an oxidized form, as carbonate oxide or sulphate, its presence may be detected by putting into a test tube a small quantity of the pulverized mineral and adding acetic acid, which dissolves the lead ore. To the solution add a few drops of a solution of potassium iodide when a yellow precipitate of iodide of lead will at once appear if lead be present.

SCARCITY of iron, increased demand for up-to-date mining machinery and the obsolete character of some appliances once considered effective and economical, have occasioned the recent purchase in various parts of Nevada of old mining machinery by San Francisco manufacturers for foundry use in supplying present demands. Virginia City and Eureka have thus been sources of considerable supply.

ONE of the principal causes of the failure to successfully amalgamate the gold in the ores of the Meadow Lake, Placer Co., district of California in the early days was the occurrence of the sulphide of molybdenum. This mineral has found a commercial value within the past two years and is worth $50 to $200 per ton, but is fatal to amalgamation when associated with gold ores. A process of careful concentration might solve the metallurgical problem at Meadow Lake.

CHLORITE is a magnesian silicate and is usually the result of the alteration of pyroxene, hornblende and other iron-bearing minerals, and forms a prominent constituent of the greenstone schists and slates. Rocks of this class characterize extensive rock formations, which are often the carriers of metalliferous veins. Chloride is the name generally given to the chloride of silver, though chlorine combines with a large number of other elements, the most common being its combination with sodium, forming the salt of commerce.

IN California the cost of sinking shafts of two-compartments in the soft crevices is about $20 per foot. A three-compartment vertical shaft in hard slate cost $45 per foot. The cost of a three-compartment shaft in hard greenstone (diabase) averaged $70 per foot for 1000 feet. The average cost of two-compartment shafts in granite in California is $40 per foot. This figure varies somewhat with the amount of water encountered. Some of the harder portions cost $100 per foot and other portions not more than $15.

MICA occurs in veins of coarse granite. Often all the ingredients are coarsely crystallized. These minerals are orthoclase and albite (feldspars) quartz, and mica. Accessory minerals are often black tourmaline, green apatite, black rutile needles often penetrating the mica sheets, and various iron minerals, such as wolframite, columbite, tantalite, etc. The formation should be fairly hard, to produce good mica. The best sheets do not occur close to the surface, as they have been decayed by exposure to atmospheric agencies. It would be desirable, to have solid undisturbed formation, to get the best material. Six feet is a very shallow depth at which to find good mica.

GOLD pockets occur under many conditions—in black slate, in talc, in diabase, at contacts, in limestone and in diorite, but usually where two or more veins or seams converge. There are usually three separate fissures, crevices or veins. First is the vein of quartz proper. This is usually barren except where the pockets occur. Next is the crossing—a seam or small vein or crack—cutting across the vein, and third the gold seam, the latter being important. It strikes nearly parallel with the vein and dips toward it. Where these three unite the pocket of gold may or may not be found. The occurrence of pockets is very uncertain under any circumstances; and, although the searching for pockets has been reduced to almost a science, the element of luck is an important factor.

A DANIELL CELL is a zinc plate immersed in dilute sulphuric acid contained in a porous vessel, outside of which is a perforated copper plate surrounded by a solution of copper sulphate. The reaction between the zinc and sulphuric acid produces zinc sulphate and sulphuretted hydrogen. The latter, however, unites with the copper sulphate. The former goes to keep up the supply of acid in the inner vessel, and the latter is deposited on the copper plate. The consumption of copper sulphate is kept up by a supply of crystals in a receptacle on top. A gravity cell is a modification of the Daniell cell, in which the porous vessel is not used. The two liquids are separated by their specific gravities: the copper sulphate surrounds the copper plate at the bottom, and the zinc sulphate surrounds the zinc plate at the top.

IN '98 there were forty-five dividend paying gold mining companies in the Transvaal, South Africa; the dividends aggregated £5,089,785. The number of non-producing gold mines in that district last year was forty. The mines' total expense was £10,961,812; the output was £16,240,630. Of this amount the Rand contributed 93.20%. The relative expense was as follows: Salaries and wages to whites, 33.82%; food and wages to natives, 26.25%; explosives, 11.85%; fuel, 8.2%; building material, 3.81%; iron, tools, shoes and dies, lubricating, belting, etc., 4.31%; chemicals, 3.25%; lighting, 1.29%; animal food, 0.32%; sundries, 6.9%; total, 100%. The average yield per ton of ore milled was 27.14 shillings. There were 9,034,792 tons extracted; the mills crushed 7,861,089 tons ore. The mills per stamp, per diem, crushed 4.561 tons (twenty-four hours). Stamps weighing 1250 pounds are now in general use.

AMONG the more manifest advantages of gas and gasoline engines are to be noted: Direct utilization of heat energy to drive the piston in a single apparatus; an economy of combustible per H. P. per hour, as heat is not wasted in a furnace or chimney, or doing work upon a heat medium which is not utilized in the engine; no fuel consumed to start motor, or after engine stops; engine ready to start on the instant, without any delay; by direct use of gas or oil in engines advantages of storage energy are reaped; advantage of subdividing power units in a large plant, each of which may receive its supply of motor energy through pipes without loss, and which can be run independently of each other as to time, speed or capacity, so long as the store of gas or oil holds out; storage of energy in the form of gas under pressure enabling great power to be stored in small bulk and with small weight, to be expended in motors as required.

BATTERY plates should be built separate from the mortars. There are various devices for accomplishing this. In some instances the plate frame is permanently fixed at a distance of 30 inches from the mortar, the pulp being carried from a box in front of the mortar to the plate by iron pipes. In some mills the plates are arranged in a series of drops, the upper plate being movable and running back on travellers, over the next section below. Either method removes the plate from contact with the mortar and block, and makes the interior of the mortar more easily accessible, as the workman may stand erect, working to greater advantage than where obliged to kneel on the board placed across the plate. The floor upon which the plate frames rest should not come in contact with the mortar blocks if there is any vibration. In fact, every precaution should be taken to relieve the plates of vibration, as it causes the amalgam and quicksilver to travel downward too rapidly.

AS BETWEEN "smokestacks" and artificial draught, the following are among the advantages afforded by the latter: Rapidity of combustion in the firebox not limited by atmospheric conditions. With a demand for high steam pressure and great capacity in a limited space the forced draught is a necessity, as in warship practice. With artificial or forced draught it is possible to increase the evaporative capacity of a given plant without other change than the velocity of the draught machine. This increase may be either permanent or to meet sudden demands for steam. With natural draught, the chimney must be designed to meet the maximum requirement, and will be partly shut off at other times. It is also possible to burn inferior, cheaper and smaller sizes of fuel with artificial draught, because a high pressure can be maintained which will force the necessary air through a compact body of fuel. Then, too, draught arrangements are more portable than chimneys can be. The plant is more flexible for changes in quality or size of fuel, and the desirable thickness of fuel bed on the grates. Grate bars can be altered more easily, if this should be desirable. Where high stacks are not made necessary, the cost which they entail is avoided or is obviated by a less cost of the draught machine. The troublesome settling of massive stacks is avoided when foundations are difficult or defective. Leakage of air into the setting does not occur with forced draught on the pressure system.

Characteristic Mines of the California Gold Belt.

NUMBER XI.

Written for the MINING AND SCIENTIFIC PRESS.

For many years the Utica–Stickle mine at Angels has occupied the position of the most important mine in Calaveras county. In its early history this property attracted no particular attention and was not considered particularly meritorious. It had several successive owners, each of whom did considerable in the way of development, but until it came into the hands of the present owners was not a paying proposition. With the greater depth and extension of its workings it became evident that the great ore shoot which has made the mine famous did not come to the surface within the limits of the claim, but north of it. Two claims north of the Utica mine quartz croppings were discovered and the vein worked in early days, some coarse gold being obtained, but for some reason the shoot was not followed on its downward trend southerly along the vein to any considerable depth, probably because it split up and was lost.

The Utica–Stickle mine is generally spoken of as lying in the hanging wall of the mother lode, the Madison–Gold Cliff vein being considered the main lode or vein in this portion of the belt. As explained in a former paper on this subject, the central lode of the gold belt is about three miles in width in the vicinity of Angels, and there are numerous large, prominent croppings at various parts of the belt, both east and west of the zone in which the Utica mine occurs. No prominent outcrop marks this vein on the surface, and although quartz occurs abundantly in the lower portion of the mine the fissured zone along the surface is represented by a much-decayed iron-stained amphibolite schist, any portion of which contains gold, some of it in paying quantity.

This broad zone of amphibolite schist, however, contains an object lesson of importance to prospectors searching for deposits of similar type. Throughout the gold belt the amphibolite schist is almost universally, if not wholly, the result of the alteration of diabase and diorite from their normal granular condition to a metamorphic schist, by compression, shearing and the subsequent change of the original minerals to other substances, the most notable being the change of augite to uralite, and by further alteration to chlorite, and the similar alteration of hornblende to chlorite. In some cases the alteration has resulted in producing vein-like sheets of talc schist. These rocks generally retain their characteristic green color, ranging from light to dark green of various shades. At the Utica mine, however, for a distance of nearly 2000 feet the amphibolite schists are porous and stained with the brown oxides of iron due largely to the alteration of the auriferous pyrite which was originally disseminated throughout the schistose mass.

These rocks strike a few degrees west of north and dip easterly at about 80° at the surface, but considerably more than that in depth. The vein, or, more properly, zone, is not well defined, but consists of a broad mass of amphibolite schist (chlorite and talcose schist), throughout which occur many lens-shaped sheets and irregular bodies of quartz, large and small. Much of the schist is very silicious. A portion of the diabase is splintery, the shearing process having not progressed sufficiently to make it a typical schist. The lenses and masses of quartz, the chlorite and talcose rocks all contain gold, and the extent to which these rock masses are gold-bearing usually determines the limit of the ore shoot. The greater portion of the rock within the recognized walls contains sufficient gold to constitute pay ore. Between the masses of quartz and gold-bearing schist there are, however, considerable masses of rock practically barren of gold, from an economic standpoint. In some parts of the lode are seen reticulated seams of quartz, penetrating schistose rocks of considerable extent. This is one of the prominent features of the lode.

Perfect series of transition rocks, from normal granular diabase to typical chlorite and talcose schists, may be found in many parts of the mine.

A very important geological feature in this mine is the occurrence of what has the appearance of being an intrusion of eruptive rock, which has been thrust into the great masses of quartz and amphibolite schist. This rock always accompanies the large pay shoots, and where the best ore occurs there will this intrusive rock be found also. It has a peculiar light grayish brown—almost straw—color, and once observed may readily be determined wherever seen again. It constitutes masses of varying size; some of them are narrow, dyke-like bands, and in other portions of the mine it may be seen in masses 50 feet or more in width. This rock differs so materially from either the massive quartz or the normal diabase or the schistose rocks that it may be readily distinguished. It is always fine, granular and appears to be more acid than the diabase. In physical appearance it greatly resembles granulite (a type of granite). This intrusive rock is much silicified and is abundantly impregnated with auriferous iron pyrite and constitutes, in fact, one of the most important sources of ore in the mine. It usually contains an intricate network of quartz veinlets, besides the large amount of quartz which has infiltrated into the mass. In this rock calcite is also abundant. The ore shoots range from 8 or 10 feet to more than 100 feet in width. The occurrence of the dyke rock described above has also been observed by the writer in mines near Sutter Creek, in Amador county, Cal., and in this latter instance it was also gold-bearing and presented essentially the same physical and mineralogical conditions as those distinguishing it at the Utica mine. As this rock has an apparent beneficial effect on the occurrence of pay ore, it would seem to be a good indication to follow in exploring unknown ground. At one point in the Stickle mine, 1200 feet from the surface, the dyke rock was found as a small vein, about 4 inches wide, contorted like the letter S, and cutting through and across the amphibolite schists, clearly indicating its later origin. At this place there was very little quartz present and not much iron sulphide, and—a more important fact—very little gold, but following this small intrusion upward it led to large and rich ore bodies, and it is not unreasonable to presume that, followed in its downward course, it might lead to other large and valuable deposits below.

The width of the Utica–Stickle ore zone, the complete alteration of the normal rocks, and the abundant evidence of extensive dynamic action, all lead to the conclusion that the forces which produced these effects were deep-seated, and if there were any doubt about it the occurrence of the intrusive ramifying dykes would tend to confirm the belief in the deep-seated origin of these forces. The mineralizing solutions coming from below found easy passage along this broad avenue of crushed foliated rock, and along this same line of weakness the dyke rock forced itself. Whether or not the schists and quartz masses were gold-bearing prior to the injection of the dyke rock there is no way of knowing, nor is it important to know, but as gold occurs elsewhere in the neighboring mines in amphibolite schist, and in the accompanying quartz, where this dyke rock is not found, it may be presumed that the schists were already gold-bearing, but that the mineralization continued after the intrusion of the dykes there can be no question, for it is found silicified, impregnated with pyrite and gold-bearing to a notable extent.

The ores of this mine are free milling to a great extent, though an exhaustive system of concentration of auriferous sulphides is practised, by means of vanners and canvas slime tables. The sulphides are treated by the Plattner chlorination process.

The occurrence of the intrusive rock in the Utica–Stickle mine and its apparent beneficial effect is not an analogy. The great Homestake mine in South Dakota is in some respects structurally similar. There the country rock is hydro-mica and sericite schist, very silicious and inclosing immense masses and vein-like sheets of quartz, very similar to the occurrence at the Utica–Stickle mine.

This formation in the Homestake mine proper varies from 200 feet to 450 feet, and in some of the adjoining mines is much larger. The most striking feature in the similarity of these mines is the occurrence of a ramifying dyke rock in the Homestake. This intrusive is felsite of fine texture and light, ashy gray color, almost white, and containing an abundance of pyrite in microscopic crystals. The felsite is not notably gold-bearing, but it seems to have had a beneficial effect on the ore bodies. The schist and quartz were gold-bearing prior to the injection of the felsite, as evidenced by the occurrence of gold-bearing conglomerate above the vein, which lies unconformably upon the upturned schists, which are of Archæan age. This conglomerate forms the base of the Cambrian series in the Black Hills, and, while containing abundant gold at and near the Homestake mine, contains no pebbles of the intrusive felsite, showing that the intrusion was later. Farther to the northward the Father de Smet mine, on the same zone, contains no intrusive dyke rock, though otherwise similar. This mine paid for a few years and was abandoned, being no longer productive. The Highland mine, lying between the De Smet and Homestake, pays largely and has the dyke rock as well.

Dykes as an accompaniment of veins and ore deposits are a well-known feature to the miner, and they occur in a great variety of form, but the similarity of the occurrence in the Homestake and Utica–Stickles mines is noticeable. Northwest from Angels the gold belt continues, but is not clearly defined. The belt narrows toward San Andreas, where it is less than a mile in width. A number of mines have been opened between Angels and San Andreas, but none of these have as yet developed into large producers.

W. H. S.

KARL KOBRICH, who died at Bozen, in the Tyrol, in May, introduced the diamond drill into Germany, and devised many improvements in boring and underground explorations with the drills. It was said that he had charge of over 500 borings and that the total length of the bore holes put down under his direction was 150,000 metres. It was at his instance and under his supervision that the deep drill hole at Parnschowitz, in Upper Silesia, was made. This is the deepest boring ever made into the earth's surface, the drill having gone down 6500 feet.

Some Experiences of a Working Miner.

NUMBER XXXI.

Written for the MINING AND SCIENTIFIC PRESS.

The P—— Mining Co. had a good prospect, and it led to the sinking of a shaft in what the miners called "pot granite." I have never been able to trace this peculiar name back to its origin; but by experience with granite of this description I have learned that it is a granitic rock in which the feldspars have suffered considerable decomposition through meteoric agencies, and, consequently, is comparatively soft; but in depth it is found sufficiently hard for all practical purposes, requiring skillfully tempered steel to stand. The shaft was sunk several hundred feet and unexpectedly came upon a change in formation—serpentine it was called. The shaft continued and soon entered quartz rich in gold. The shaft continued through the ore shoot, serpentine was found below and sinking discontinued. The ore shoot proved rich and a great deal of gold was taken from it.

The occurrence of this shoot of ore led to a peculiar theory—that the granite was a cap rock, and it was only necessary to sink through it, and below in the serpentine would be found rich shoots of ore similar to that in the P—— mine. I went to the P—— mine and investigated the proposition at the request of a capitalist who had spent a large amount of money sinking a shaft into the granite cap, but had not yet gotten through it and was becoming discouraged. I found the granite traversed by a large dyke of diorite, which in the P—— mine had been sheared and altered into chlorite schist (not serpentine), and within this dyke the quartz vein had formed which contained the gold. The dyke dipped at an angle of 50° below the plane of the horizon, and on its lower side the granite occurred again as above. The nearest slate rocks were nearly two miles away. I told the capitalist his chance of striking a change of formation was very poor indeed; but he was not satisfied and continued his shaft nearly 100 feet deeper. As might have been expected, it was still in the granite.

On the strength of the granite-cap theory, a noted miner got a company to put up a large sum of money, leading them to believe he would sink through the cap and find great veins below. He never got through the cap, either, but spent all the money.

Granite does not occur as a cap-rock, like some porphyries and other intrusive rocks—at least, I have never seen it in that position.

* * *

The bane of the new mining camp is the fellow who arrives in the early days of the rush, pitches his tent, or, more often, his blankets, having no tent, and then starts out to claim the county. With a hatchet in one hand and a leadpencil in the other, he blazes and claims as far as he can walk in a day, or if there be no timber, he builds monuments. He keeps this up for a week or so, and then comes into camp to stay. He always talks a lot, but does no work. He takes occasional trips out among the hills to see if anyone has made a discovery on any of his claims. Not infrequently his industry in this direction is rewarded by finding some one actually working on one of his mines, and a wordy difficulty at once ensues—the more apparent the value of the discovery, the more heated the discussion as to who is the rightful owner. This fellow will do nothing himself, and his intimidating methods prevent others, who would otherwise do something, from working, thus retarding the development of the entire camp. This state of affairs has led to some remarkable location notices being posted. I recall one in particular, whereon the locator defined, in unmistakable language, the boundaries and corners of his claim. Following this were instructions concerning unlocated ground in the vicinity and a request to whom it might concern not to attempt to locate on his ground, or in any manner disturb the stakes, under penalty of being shot. No one ever disturbed any of his stakes or interfered with his claim in any way.

* * *

P—— and O—— were good miners and also wide-awake prospectors, but they had no luck apparently. They worked for wages in various mines and each summer and fall they went prospecting, but could locate nothing of value. One day the news came of the rich strike at Salmon river, and they got together enough money to make the trip, and left D—— for Wood river. For months they toiled in the rugged hills of Idaho. Others found rich ore, but they found nothing. Finally, having spent all they had, they sent back to D—— to friends and begged for enough money to return to the old stamping ground. They went back, arriving penniless and in debt. Most men would have been discouraged by such ill luck, but P—— and O—— were good stayers. They had been at home about a week when on Sunday they took a walk, one of them carrying a little prospecting pick. They went out of town about four miles, having no particular objective point, not prospecting, but merely strolling about on a beautiful day. Noticing a little vein of quartz a few feet up on the side hill, P—— went up to it

and knocked off a piece. It was sprinkled with coarse gold. Here was a strike at last. They dug into it a little with the pick, and broke out about $50 worth of rock—only a few pieces—and then returned to town, secured picks and shovels, axes and other necessary tools, and before night had located the mine. They took thousands of dollars from their strike in a few weeks and sold out for a goodly sum. Their experience simply illustrates the necessity of perseverance. Luck is surely an important element in mining, but to find a rich mine it is necessary to search for it.

* * *

There are a number of ways to equip a mine, and the way some of them are equipped affords an excellent example of how it should not be done. The O—— B—— mine is one of this class. Its mill was built piece by piece at various times. The interior arrangement is not good and the outside is worse. The waste dump is encroaching upon the mill and is likely to crush it; the tailings have to be handled two or three times to get them into the leaching tanks; the sulphurets have to be carried up hill. In fact, everything seems to work the wrong way, and yet the topography of the country affords every opportunity to have arranged an ideal plant, where the ore once dropped on the grizzly at the top of the mill would pass from one operation to another by gravity, requiring no handling and reducing the cost of handling materially. Even if it were so little as 25 cents per ton, it would make a difference of thousands of dollars to this company every year.

The Seven Devils Country.

The Seven Devils range of mountains in Idaho is thirty or forty miles in length and fifteen to twenty miles in width. The Weiser and Salmon river valleys border the range on the east. There are seven distinct peaks in the range, none of which have an altitude of over 9000 feet, but this appears high as the adjacent streams and valleys are but 1000 to 2000 feet above sea level. The growth of timber does not reach to as great an altitude as in Colorado and the peaks stand out clear and rugged, while the lower slopes and foothills are most densely covered with fir, pine and spruce trees. On the west or Snake river side the confines of the range are sharp, generally terminating with the great canyon, which is almost as impressive as the Grand canyon of the Arkansas in Colorado, and more so than the canyon of the Gunnison. Lateral canyons and gulches reach out into the mountains, and where they debouch into the main canyon they have formed frequent extensive beds or bars of sand and gravel that have yielded much placer gold in the past. Some of the washings are so inaccessible that early miners were let down from overhanging precipices and left there for the summer to wash for gold and drawn out again at the close of the season by their friends who meanwhile were otherwise engaged.

Monument mountain, on which the copper deposits or veins are situated, has an altitude of probably 8000 feet and is five miles in length from north to south and three miles in width. The territory over which the copper extends is equal to six square miles and is four miles distant from the Snake river.

The crown and the northern side of the mountain are composed of a gray eruptive granite, considerably decomposed in places. Here and there are found remnants of limestone. Three-fourths of the west and south slopes of the mountains is covered with porphyry, and the foothills sloping away to Snake river are composed of the same material. Between the porphyry and granite is a stratum of varying thickness, in places disappearing entirely. It is next to the limestone or replacing it entirely that the Seven Devils copper vein is located. On the northern end at the Peacock mine the vein crops at an altitude of 6700 feet. The ores are called peacock ores from being of a peacock blue color. They also carry silver and gold in combination with copper. In the Peacock mine a large body of ore has been uncovered by the action of the water in a small stream directed upon it. The lowest estimate of the ore uncovered is 75,000 tons.

The principal group of mines is the Peacock, consisting of the old Peacock mine, the Confidence, Bodie, Standard, South Peacock and Copper Key.

Associated with the ore are great quantities of garnets, also iron, quartz, talc, spar, amphibole and chrysolite.

The Peacock mine occupies the northern terminus of the vein. Its outcrop or exposed ore mass covers about 150 feet of the apex of a ridge and down its northeasterly slope for 350 feet or a superficial area of 50,000 square feet. It is apparently a mass of copper ore in place. Some sluicing for free gold in the detritus had taken place. On the west side of the ore body eruptive rock is disclosed, on the east side granite, on the south a mass of garnets and on the north amphibole and chrysolite. A shaft 25 feet deep passes through a mass of decomposed limestone, oxide or iron, manganese and copper, and carbonate of copper. Going over the surface the indications and excavations made would warrant the conclusion that the ore averaged at least 15 feet in thickness over the 50,000 superficial feet of ore exposed. Of this amount probably one-sixth is bornite that returned an assay of 47 7/10% copper and 15 ounces of silver, and one-third is carbonate and silicate which, sampled, gave an average of 17 3/10% metallic copper.—Salubria Citizen.

Mechanical Haulage by Compressed Air.*

By E. P. LORD.

Mining has been one of the most active means of giving prominence to compressed air. In these days of active competition and imperative demand for decreased cost of production, great economies and improved appliances for cheapening the mining of coal have been absolutely essential to profitable mining. New fields, as soon as developed, have felt at once the necessity of installing the most approved machinery for mining, pumping and haulage; in fact, these improvements have been imperative to keep in business. The mule, which has so long been used for haulage, has been very generally supplanted by more powerful agents—steam, electricity and compressed air. It is to the latter power as applied to the motor for haulage purposes that I intend to principally confine my remarks.

In much work—in mine tunnels, confined spaces, etc.—compressed air has fully demonstrated its usefulness. The work accomplished with it in the Jeddo tunnel at Hazelton needs no reference to it here. Early uses of compressed air hardly presaged the wonderful development and application of this power to-day. For mine haulage it is largely supplanting the steam locomotive, with its attendant disadvantages, and now electricity is about its only competitor. Until this competition manifested itself, air was generally considered a very undesirable power at best, and in many installations, more particularly haulage, it was not thought of. I do not wish to be construed as saying that electricity and compressed air do not very frequently work in mutual harmony. Each has its own field of work, for which it is singularly fitted, and where no question of competition can arise.

Electricity can be used in most cases successfully for haulage. It can also be used for pumping, and made a success as far as operation is concerned, but in many cases at an excess of cost over compressed air. But when you come to cut coal with electricity many operators claim that no such results can be obtained as with compressed air, to say nothing about the increased cost of installation and subsequent operation. I have found it extremely difficult to get any statements from those using electricity for coal cutting, and there is no doubt or question but that there are some veins of coal which cannot be cut with the type of machine which is driven with electricity that could be successfully cut with what is called the punching or pick machine. Where compressed air is superior for transmitting power for coal cutting and pumping, is it not reasonable to conclude that a good deal of consideration should be given to it for haulage?

Some engineers believe that the electric motor is not an economical machine where the use of power is to be variable and intermittent, it being essentially a constant speed machine. If we so block an electric motor that it cannot move, a considerable current of electricity will run through, without doing any work; while a compressed air engine wastes no air or energy in starting, for air only escapes with piston movement.

The average mine engineer will usually show the liveliest interest when approached on the subject of an air haulage plant; but when he is called upon to choose between air and electricity, no doubt he feels that the best known and understood agent is the best and safest in his case, although the compressed air plant, if successfully installed and started, might prove the most economical to his company.

The last few years have witnessed a remarkable development of compressors and compressed air apparatus, due, no doubt, quite largely to the active competition of electricity in the many fields where this power is used. The great improvement made in compressors, together with reduced cost, have led to their more extensive adoption and the enlargement of their uses. In all respects its progress has fully kept pace with that of electricity. The compressor people are now called upon to design and construct machines to develop heat and to develop cold; to move air with a force only sufficient to press gold into a sensitive tooth, and to blow the shot from a cannon. There is hardly a department of any large shop or manufactory that cannot testify to the remarkable economies that this power, ingeniously applied to various machines, has established. There are not less than two hundred distinct and established uses of compressed air, to 90% of which electricity is inapplicable; and in the remaining 10%, constituting the field open more or less to other agencies besides air and electricity, we find air generally has the advantage. Except within the last few years compressed air catalogues have been almost the only literature on this very important subject, while to-day we can hardly pick up an engineering paper without running across some article, paper, or special mention of the great benefits that this new power is establishing for its recognition in the mechanical world.

Compressed air has marked advantages over any other class of haulage, in that it is free to go wherever there is a track laid; the distance run with one charge of air is only limited by the capacity of the motor tanks. Great advancement has been made in the improvements of compressors, pipe lines, pipe connections, motors, methods of charging, etc.; so that for efficiency it is admitted that compressed air runs electricity very close for a long distance transmission. It is equally efficient and safe in fiery and non-fiery mines, and materially assists ventilation by the air given out by the exhaust. Too much stress must not be laid on this, for efficient ventilation must be provided for in any case; but compressed air is now used for driving mining machines in rooms or in butt entries, ahead of the general work and beyond the range of general ventilation. It not only supplies the necessary power but furnishes an ample supply of fresh air, thereby materially reducing the risk to life or property. In the butt entries and rooms where ventilation has been difficult, and where, on account of low roofs, light rail, etc., other classes of power have not been introduced, the compressed air locomotive has been installed with very manifest success.

* Condensed from a paper read before the Anthracite Coal Operators' Association.

Absorption of Gold and Cyanide.

The following experiments were conducted with the view of ascertaining the loss of gold and cyanide caused by absorption. The materials selected were those which commonly come in contact with cyanide solutions. The bulk of material as compared with the volume of solution used is probably larger than ever occurs in practice, but it serves to show that there is a noticeable loss of both gold and cyanide caused in this way:

No. 1, plain pine block ¾"x1½"x6", treated with 450 c.c. of solution.

No. 2, same as No. 1, except given a coat of asphalt.

No. 3, strip of 12-ounce burlap filter cloth 8"x24", treated with 350 c.c. of solution.

No. 4, iron (nine 10" nails), treated with 150 c.c. of solution.

Each of the above was placed in a glass-stoppered bottle and allowed to remain in a dark place for fourteen days; these precautions were taken so that no decomposition of the solution would occur by the action of the air or light. The original solution contains 1.20 ounces gold and 2.4 pounds cyanide per ton of solution.

No. 1 after treatment shows 1.015 ounces gold, 1.8 pounds cyanide, per ton of solution.

No. 2 after treatment shows 1.128 ounces gold, 2.1 pounds cyanide, per ton of solution.

No. 3 after treatment shows .776 ounces gold, .8 pound cyanide, per ton of solution.

No. 4 after treatment shows 1.20 ounces gold, 1.20 pounds cyanide, per ton of solution.

Thus it will be seen that there is a loss of .185 ounce gold and .6 pound cyanide per ton of solution in the case of ordinary pine, while a block the same size and under the same conditions, except being coated with asphalt, shows a loss of .072 ounce gold and .3 pound cyanide per ton of solution.

The largest loss is occasioned by the burlap filter cloth, which causes a loss of .424 ounce gold and 1.6 pounds cyanide per ton of solution. The iron causes no loss of gold and but .2 pound cyanide per ton of solution.

[While the losses indicated in the result of the above-described experiment are large, it is doubtful if, after having absorbed the quantity of gold and cyanide indicated, a much greater quantity would be taken up by longer contact. That is to say, the materials coming in contact with the solutions having become saturated, no further absorption would take place.—ED. M. & S. P.]

How Low-Grade Ores Pay.

In getting up a mining prospectus it is usual to publish assays as taken either from the surface or from different parts of the mine in process of development, and by these assays many are guided in making their investments. Assays that run from $100 up to several thousands per ton of ore are generally the most attractive, and, assuming them as correct, the investor buys the stock, either not knowing or forgetting that few mines ever did approach any such average.

Ores running from $8 to $10 per ton are more or less disregarded, and those showing from $3 to $5 are considered as of no account whatever. It is just here that the investor makes a serious mistake.

If an ore is a smelting one, such as the Le Roi or War Eagle, to make a profit it is necessary that it should show far higher values than a free-milling proposition; but few mines that we ever heard of yielded any great quantity of hundred-dollar ore, to say nothing of thousands. A free-milling ore averaging from $8 to $10 on the plates and in the con-

centrates will not only pay, but pay well, even though the veins be narrow and a large margin left for other possible disadvantages. The best paying mines are those that in Ontario are considered of no value, viz., the low-grade propositions showing from $3 to $4 per ton or less. Among mining engineers and mining men generally it is well known that, given a large body of ore, with suitable facilities for work-it—such as water, fuel, etc.—there is no better paying investment than an ore showing $3 per ton. Among the best paying mines in the world are the large mines in Alaska and South Dakota, and all are low grade.

It is a common error that these ores can be mined so cheaply and profitably because the mines are worked in the open, thus avoiding the necessity of shafts, tunnels, pumps, etc., but this is not the case. They are all operated with shafts, tunnels, etc., as are the higher grade mines in Ontario.

The real reason of their success is not the existence of unusual facilities, but because they are operated on a very large scale. Few of them would pay a profit, or even expenses, were they run with the 5, 10 and 20 stamp mills, which, with few exceptions, seems to be the limit of ambition in Canada. The Alaska-Treadwell operates 660 stamps, the Alaska-Mexican 240, the Alaska G. M. Co. 220, the Homestake and Highland of South Dakota 840 stamps. To all of these mines more stamps are to be added as development proceeds. As showing what can be accomplished with plants such as the above, we append the following table:

Mine.	Capital.	Par value per share.	Present quotations.	Total paid in dividends.	Paid first five months 1899.	Average value ore per ton.
Alaska-Mexican	$ 1,000,000	$ 5	$ 5 50	$ 353,031	$ 36,000	$2 31
Alaska-Treadwell.	5,000,000	25	35 00	4,070,000	150,000	1 63 to 2 50
Homestake	12,500,000	100	.....	7,556,250	437,500	3 00 to 4 00
Highland	10,000,000	100	.....	3,924,718	140,000	3 00 to 4 00

We have dealt with only four of the five mines quoted, as we could not get full returns for the Alaska United G. M. Co.; but as an instance of what it can do, with an ore averaging $3 96 per ton, the last published returns for a forty-three days' run shows a net profit, after paying all expenses, of $23,412.

For the month of June the Alaska-Treadwell mine, working with an ore that averaged only $1 63 per ton, crushed 66,098 tons and a net profit of $75,034 was shown.

The capitals of all these companies are large, and we do not know at what price per share they were put upon the market; but all of them still hold treasury stock, every share of which can be sold at a premium. The Alaska-Treadwell, Homestake and Highland have paid more in dividends than they originally cost, and, in addition, have not only an enormous development, with hundreds of thousands of tons blocked out, but the huge plants are paid for.

There are many of these low-grade ores in Ontario offering better inducements to the investor than those of either Alaska or South Dakota, and we trust, for the benefit of the country, that they will not in the future be so studiously disregarded.

As an additional advantage offered by low-grade ores, the veins have seldom been known to pinch out. Once found, they will last for generations.—Canadian Mining Gazette.

Gold Extraction.

The processes used upon the Witwatersrand gold fields for the extraction of the precious metal have approached nearly to perfection. But J. R. Williams, the newly elected president of the Chemical and Metallurgical Society, said in his inaugural address that there is still room for improvement. It appears from his statement that, on the average, there is still 10% of the gold contents of the ore lost after all the different and delicate processes which are used upon these fields. To reduce that percentage he considers should be the object of chemists and metallurgists in the future. Every pennyweight gained in this direction, or even a few grains per ton, would make a very material addition to profits and act as a stimulus to the further development of the wealth contained in the reefs. Only a few years ago gold ores which on the average would yield an ounce per ton were those only regarded as payable, but now mines which produce ore of half an ounce per ton are regarded as rich, and six and seven pennyweight mines pay a very respectable return upon the capital legitimately expended on their exploitation. In former days tailings and slimes were regarded as rubbish, to be got rid of by any possible means, but the case has now altered, and both these results of crushing are made to yield up a large percentage of the total amount of the gold output. That such a revolution in practice has been brought about by the combined efforts of the chemist, the engineer and the capitalist is unquestionable. And yet science is not satisfied so long as a single grain of gold remains which ought to be won from its matrix. It is, of course, conceivable that perfect extraction would cost more than the results were worth, but if Mr. Williams' estimate is correct, as it doubtless is, as to the quantity of gold recoverable, there is a fair margin for profitable operation in that direction. When regard is paid to the rapidly increasing list of new patents connected with all departments of the gold mining industry in this country for the disintegration of ores and their subsequent treatment by mechanicians and chemists here and in other parts of the world, it is fair to assume that some, at least, of the new or improved processes will be found not only to increase the average yield, but to ensure greater economy in the mode of treatment. It is very satisfactory to learn that the capitalists are fully open to the consideration of new processes, and, it may be assumed, are reasonably ready to give promising processes a fair trial, or to afford reasonable facilities for testing laboratory results upon a commercial scale. There can be no doubt that many a good idea has been lost to the world by want of co-operation between the man of money and the man of brains; but, most fortunately, that has not been the case upon the Transvaal gold fields. That it is so is proved by the readiness with which the large expense of erecting cyanide plants for the treatment of tailings and slimes has been incurred by the chiefs of the mining industry, and that, too, when cyaniding was not considered an essential part of the treatment of gold ore residues. The foresight and enterprise which have been so fully justified in the past are not likely to be lacking in the future. There is still 10% of gold remaining to be won from the ores, and no doubt both chemists and engineers will set their wits to work to gain as much as possible of that which is at present regarded as necessary loss. It is quite evident, also, from the president's address that there is still something to be learned by mine managers. The ores of one mine are not identical with those obtained from others, although they may be obtained from the same reef. Some classes of ore may yield satisfactorily with comparatively coarse crushing, while in others the finest possible pulverization is required to render the gold recoverable. That is a matter for special investigation by those who have charge of the mechanical department of mine work. Mr. Williams points out that careful sampling is very essential, and that when that is done merely by the rule of thumb the assay values are comparatively worthless. The point was forced home by a statement that in a case which came under his notice 102% had been recovered by the mill alone—the sands and slimes having been untreated. The necessity of accuracy with regard to the tonnage crushed was also enlarged upon, and there can be no doubt that there is a sad lack of uniformity of practice in that respect among mill managers. "Have you ever thought what 1% extra extraction means?" asked the president of the society, and then, answering, he pointed out that every additional 1% gained meant £200,000 per annum. To save that sum is an object worth working for, and as an aid thereto Mr. Williams counseled attention to the filling of the cyanide tanks, in order to get rid of the slimes; in the slimes tanks to beware of the sands. He also inculcated the necessity of giving more thought and time to the precipitation of gold, which, of course, means that all engaged in the various processes should trust more to intelligent observation than to mere precedent in regard to working. Cyaniding is a scientific process, and requires to be intelligently used in order to get the best results. Some classes of ore require different proportions of cyanide from others, and to be subjected to different times for the leaching, and it is the business of the cyanide manager to adapt his solutions and times to the class of tailings or slimes which he has to treat.

From Mr. Williams' remarks upon the diversity of conditions to be found in different mines it might be used as an argument in favor of less changing about from one mine to another of mine managers and their managerial staff. It is almost impossible that there should not be a loss to the companies, temporarily at least, resulting from changes of this description. A mine manager who knows that he is likely to be supplanted at short notice has scarcely an inducement to do his best for the mine when he has reason to think he will be superseded by another.—South African Mining Journal.

Heat in Ore Mines.

It has been given out that at a depth of 6500 feet the Calumet & Hecla mine is so hot that men can work only a few minutes at a time without becoming exhausted, the temperature being given at 100° above zero.

The deepest shaft in Calumet, and in the world, is the Red Jacket shaft of the Calumet & Hecla Mining Co. It is a vertical shaft 12½x25½ feet inside of timbers. It is located at the northern end of the mine and directly in front of No. 4 shaft, an inclined one which has followed the belt of copper-bearing conglomerate from surface downward. The vertical shaft encountered the Calumet conglomerate at a depth below surface of 3295 feet, this corresponding with the fifty-sixth level of the mine, and has been carried downward past that point to a total depth of 4900 feet, which will be the bottom of this opening, as from its lowest point the company can secure all the copper in this end of the property.

This big shaft is connected at several levels with the No. 4 inclined one. The fifty-sixth and fifty-seventh are holed, and the sixtieth, sixty-third and sixty-sixth are also connected, the sixty-sixth having been holed through a few days ago. The connections are being made at every third level with No. 4, the levels being 60 feet apart. At the bottom of the shaft the temperature is 85° above zero. The increase per 100 feet is very small, and to thoroughly determine this a careful test of the temperature of the rock has been under way for the past year or more.

Holes have been drilled in the wall rock, and in these slow-registering thermometers have been placed and the holes in the rock plugged up. In a month from the time of sealing the holes were opened and the temperature taken and recorded. This has been going on from the surface to the bottom of the shaft. It is the plan to make the test absolutely accurate, as it is intended for application to the future working of the property at greater depths than yet attained. It is desired to get correctly the heat of the different elevations as well as of the different rock strata. The company will probably issue a bulletin on its findings. As the levels are being connected with the workings of the mine by the crosscuts the circulation of air is growing steadily better, and while a temperature of a little over 80° above zero is a warm one, it can be withstood without having to observe the short shifts of mines located in other parts of the country. The Calumet & Hecla has twelve shafts upon its conglomerate, all of which are connected at many levels.

At No. 3 shaft of the Tamarack Mining Co., where all the shafts are vertical, the temperature at the bottom of the shaft is 82° above zero. This is 4500 feet below the surface. At this shaft the atmospherical condition is improving as they are connecting with the levels at No. 4 shaft. They now have connections at the ninth and tenth levels above the copper-bearing conglomerate lode, and at the eleventh and twelfth, which are below the lode. The thirteenth will also soon be holed through to No. 4, when the ventilation will have been considerably improved. The size of openings in these levels is also small as yet. Often they are no larger than the opening drift, or a drift and cutting out stope. As the openings grow larger the air will be better, a great improvement being noticeable in the past few months.

In no other place in the world where mining has been carried on to a depth exceeding 2000 feet is the temperature of the rocks so low as at the mines in the Michigan copper district. In some of the Comstock mines at a depth of 2000 feet the temperature is 150° above zero, and the mines of the old world after attaining a depth of over 1000 feet grow hot very rapidly. That Lake Superior, a body of water under which the rocks of the Calumet conglomerate dip, and which is only a few degrees above freezing in the summer months, absorbs the heat of the rocks is certain. That the Calumet & Hecla and Tamarack can work to far greater depth than now is certain, but just what the increase of heat will be from a depth of 5000 feet is theoretical. If one can figure by the plan being carried out at the Calumet it will be easy enough, but there is considerable speculation about it.

The present atmospherical condition is far from being as trying upon the miner as has been described. Many of the men working at the bottom of these shafts describe it as "being warm," but they all put in ten hours each day with machines and shovel. This they could not do if the air was as unendurable as has been represented. The men look rugged and strong, being no different in this respect from those employed nearer the surface.

There has been considerable talk indulged in concerning the holding of copper in the conglomerate at greater depths, the claim being made that it decreased as the lode extended downward. Where the Red Jacket shaft of the Calumet & Hecla Mining Co. pierced the lode at a vertical depth of 3287 feet below the surface the conglomerate had a thickness of 16 feet and was well charged with copper. At the sixty-sixth level, which has been encountered, the lode is more plentiful than at the point in levels above. Rock thus far taken out is fairly alive with copper, and will give fully 10% metal. This explodes the claim that copper decreased as the lodes went downward. At the twenty-seventh level of No. 2 shaft, Tamarack mine, richer copper is being found than for several levels above this point. The twenty-seventh is 3918 feet below the collar of the shaft. All of which goes to show that there will be both copper fit to mine and air which can be breathed for a considerably greater depth than already attained in the copper mines of this State.—Ishpeming Iron Ore.

In a paper read by Dr. H. W. Wiley, chief chemist of the Agricultural Department of the United States Government, at the joint convention of the American Chemical Society and the American Association for the Advancement of Science, in Columbus, last week, he says: "All warships under construction in the imperial navy of Russia will be armored with coffer dams packed tightly with cornstalk pith, and cornstalk pith is being sold by the United States to Russia for this purpose." Dr. Wiley also stated that he and his assistants at Washington had succeeded in manufacturing a variety of smokeless powders out of cornstalk cellulose, and finds the powders made from such cellulose far superior to those obtained from guncotton, as they keep better, burn more slowly, and are safer in every respect than the old-fashioned smokeless powders.

Latest Mining and Metallurgical Patents.

Patents Issued Aug. 29, 1899.

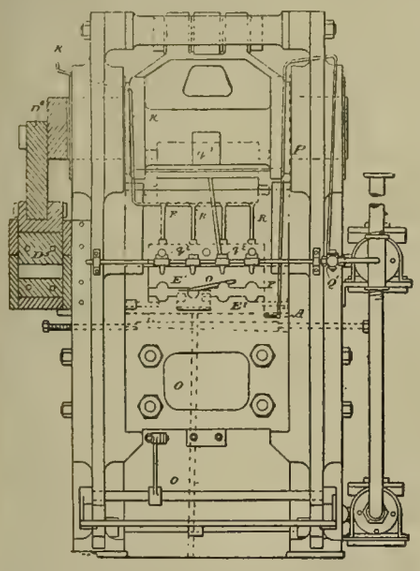
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 631,787; J. Grandmaison, Lynn, Mass.



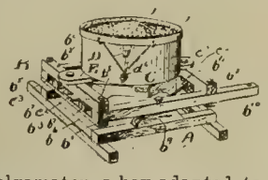
In combination with a ratchet and its pawls, a supporting disk for the ratchet, a resilient crosshead and means for supporting same, a rod or bar interposed between the outer supporting disk and crosshead, and means upon the crosshead and outer supporting disk for engaging the bar to prevent a relative rotation of the crosshead and supporting disk. The combination with the drill-receiving socket and a drill, of a tongue arranged to engage the drill in the socket, a yoke for supporting tongue, and connections between the tongue and its yoke whereby it may be advanced into the socket or retracted therefrom by a movement of the yoke.

ROCK DRILL DRESSING AND SHARPENING MACHINE.—No. 631,914; W. Wanliss, Johannesburg, South African Republic.



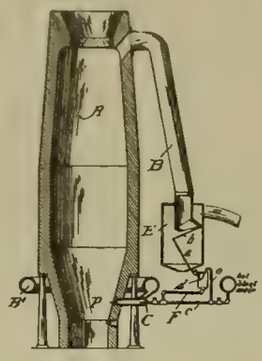
In a drill-sharpening press, the combination with the dies and operating levers therefor, of means for clearing away scale from and cooling dies, consisting of fluid jets in proximity to the dies, pipe connections for supplying fluid thereto and a valve controling the flow of the fluid with operating connections to the operating lever whereby the movement of the operating lever controls the flow of the cooling fluid. A combination with the sharpening die, of a pair of adjustable rods attached to the front of the machine, a saddle movable on rods, means for securing saddle in any desired position on the rods, and a movable gauge carried by the saddle arranged to be withdrawn when the drill is in position for sharpening to allow the drill to be moved back a desired distance before pressure of the sharpening die is exerted.

CONCENTRATING AMALGAMATOR.—No. 632,032; J. L. Wees, Oreana, Idaho.



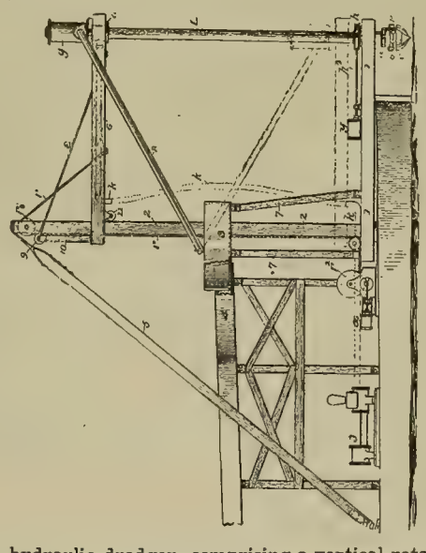
In an amalgamator, a box adapted to receive ore and amalgamate metal therein, having provision whereby the shaking of the box causes the ore to travel therein, and a frame for shaking the box, which frame is of quadrangular form, two of its sides supporting the amalgamating box and the other two being pivoted to a base, frame being adapted to change in shape whereby the box is shaken. In combination, the base A, the quadrangular shaking frame B made of four sides pivoted together, two of sides being pivoted to base, the crossbeam C pivoted to the other two sides of shaking frame, and an amalgamating box supported by crossbeam. A shaking-frame consisting of two simple beams b' b^2 and two composite beams b^3 b^4, said beams being pivoted to form a quadrangle, in combination with an amalgamator supported by two opposite beams of the frame, and a base which pivotally supports the other two beams of the frame, the crossbeam C having plates c' c^2 projecting from its ends and resting on members of the composite beams b^3 b^4, and pivot pins c^3 pivoting plates to composite beams.

BLAST FURNACE.—No. 632,147; C. S. Robinson, Sharpsville, Pa.



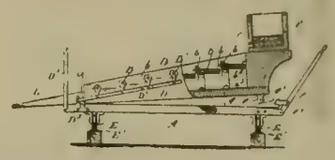
In combination with a furnace, a flue-dust chamber or collector connected therewith, a supplemental chamber connected with the main chamber to receive dust therefrom, means for applying pressure to the top of supplemental chamber, an injector discharging into the furnace, a source of pressure connected therewith and a pipe between the injector and the supplemental chamber. A flue leading therefrom, a dust-collecting chamber connecting with the flue, means for separating the dust and air within the collecting chamber, a supplemental chamber d connected with the main chamber to receive dust therefrom, means for applying pressure to the top of chamber d, an injector discharging into the furnace and a suction pipe between the injector and chamber d.

HYDRAULIC DREDGER.—No. 632,126; P. Kirk, Kirkland, Wash.



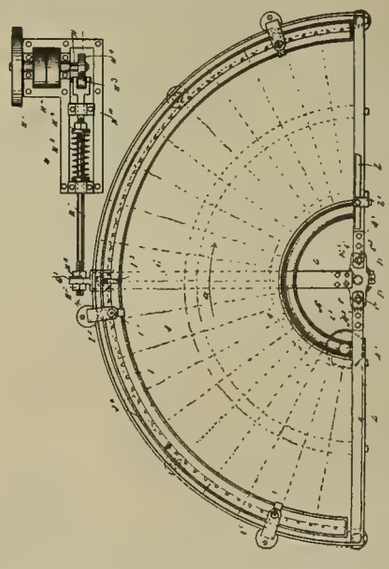
A hydraulic dredger, comprising a vertical rotary mast 2 with receiving box 3 and lower horizontal arm 1 rigidly connected together, an upper horizontal arm 6 braced and provided with hoisting mechanism as described and sliding vertically on the mast, the double-tube hydraulic pipe L mounted on the upper arm and provided with an inlet head a for water and a supply pipe with flexible connection, the receiving cylinder g mounted on the upper end of the inner tube of pipe L and having swiveling discharge pipe s, a ratchet collar embracing the pipe L and connected to it for a rotary movement therewith, but a vertical slip movement therethrough, and a boring head with hydraulic jet nozzle arranged on the lower end. The combination with a double-tube hydraulic pipe bearing a boring head at its lower end, and a hydraulic jet nozzle within it, pipe having an external feather running longitudinally the distance of the vertical adjustment, a ratchet collar embracing pipe and having a groove fitting the feather, and a double-acting oscillating pawl for rotating the ratchet collar and hydraulic pipe. An inlet head a having an inlet opening on one side and an annular chamber surrounding the outer tube and communicating with it, a stuffing-box at the upper end fitting the inner tube, and a stuffing-box at the lower end fitting the outer tube. The combination with an inner and outer tube; of a head block with central upwardly projecting nozzle, block being connected to the lower ends of tubes and having two sets of passages, one set communicating with the space between the tubes and the receiving end of the nozzle, and the other set alternating in position with the first set and opening from without the head laterally into the suction chamber of the nozzle and the interior of the central tube. A hydraulic boring head having lateral inlets for the dredged material made adjustable as to size and arranged to be opened by a reversal of the boring head to release obstruction.

ORE CONCENTRATOR.—No. 632,109; H. G. Grannett, Colorado Springs, Colo.



An ore concentrator, comprising a frame having a series of inclined slats therein, pivoted at their lower edges, each having a riffle extending along its pivot edge, and with its upper edge in line with the pivots, slats being placed in successively lower planes, so that the overflow from one is received by the next, and the riffles extending from the feeding end of the slats a part only of their length and being of successively greater length. Wheels under the frame, a track extending longitudinally of the slats, mechanism attached to the frame to reciprocate it, and means for simultaneously giving the slats a slight oscillating motion on their pivots. Mechanism attached to the frame to reciprocate it, cranks upon the slat pivots, a common connecting-rod for cranks, and a power connection to rod for simultaneously giving the slats a slight oscillating motion. A frame formed in two parts hinged to each other at one edge, a roller on one part at its opposite edge, a wedge block engaging roller, a lever controlling the wedge block, frame having a series of inclined slats therein, pivoted at their lower edges and each having a riffle extending along its pivot edge, and with its upper edge in line with the pivots.

CONCENTRATOR.—No. 632,075; J. C. Waters and Richard C. Waters, Romley, Colo.



In a concentrator, the combination of a table, a verticle post on which the table is mounted to swing, the table having a segmental form and having a flange at one end, the other end of the table being adapted to discharge the concentrates, a gauge mounted at other end of the table to regulate the discharge thereat, means for supporting the outer portions of the table so as to permit the movement thereof, and a curved trough extending around one edge of the table adjacent to the post, to receive the tailings. A flange secured to one edge of the table at one side of the trough, the opposite edge of the table being adapted for the discharge of the concentrates, a gauge mounted at opposite edge to control the discharge thereat, a second and curved trough located above the outer edge of the table and discharging therefrom, and a partition situated in trough to divide the same. A second curved trough located above the table at the outer edge thereof and serving to discharge upon the table, the second trough being provided with a partition dividing it into two parts.

The Concentration of Ores.*

Quartz ores contain valuable minerals, which are usually of high specific gravity: for example, galena, carrying lead, or copper pyrites, carrying copper associated with light-weight minerals: for example, quartz, calcite, etc., which are of no value.

Since the smelting process is expensive, ores that are smelted without concentration may cost more than the metal contained in them is worth. To overcome this difficulty and to substitute profit for loss, the processes of concentration of ores have been developed.

There are two steps in concentration: the breaking up of the rock to sever the valuable minerals from the quartz, and the subsequent separation of these values from the worthless portions.

For coarse breaking, Blake, Dodge and Gates crushers are used. Each machine has special qualities which adapt it to its work.

For fine crushing a great variety of machines is employed, among which are steam stamps and gravity stamps, which break the ore at a blow, and rolls and roller mills, which break the ore by rolling pressure. All of these machines find appropriate places in one or another of the mills, according to their fitness for the work to be done and the preference of the manager. For example, the gravity stamp is almost universally used for crushing gold ores; the steam stamp is the only machine now in use for crushing the native copper of the Lake Superior region; rolls are always universally employed for lead ores and sulphide copper ores; and the Huntington and Bryan mills are much used for the fine crushing of the various ores.

The preliminary separators include the grizzly, or bar screen, the drum screens (trommels), the hydraulic classifiers, and the spitzkasten. The screens separate the materials which come to them into coarse and fine, and a series of screens, with sizes ranging from very small spaces in the first screen to very large in the last, will give a series of products ranging from the finest down through all the sizes to the largest. Each of these sizes is kept separate from all the others and sent to its proper place in the treatment.

The hydraulic classifier subjects the sands which pass through the finest screen to an upward current of water in a confined space, and the particles which have sufficient weight to settle down through the current can go out through a discharge spigot below, while those which cannot do so go over and try their luck in the next pocket of the classifier, where an upward stream of less force awaits them, and so on to the third and the fourth pocket. The overflow passes on to the spitzkasten, which has three or more pointed boxes, each larger than the last; in this the particles settle from the carrying current of water which passes over the surface to the discharge end of the box, and no upward current is used. The second is wider than the first, and so drops finer particles; thus here, too, a series of graded sizes is made.

The final concentrators deliver the dressed ore ready for shipment to the smelter. These consist of picking tables, jigs, vanners, shaking tables and slime tables. They all turn out finished concentrates for the smelter. The waste, on the other hand, from the coarser machines may require recrushing to recover certain included or attached particles of the valuable minerals, called middlings, which failed to be severed from the quartz in the first crushing. These recrushed middlings are then washed again. Waste from the finer sizes is refuse.

On picking tables rich minerals above 1 inch in size may be picked out by hand for the smelter; the rest goes back to the crushers.

The jigs take the sizes next below that treated by the picking table, each of the sizes having its own jig, down to nearly the last of the classifier products. The jig treats the ore on a sieve by the action of an up-and-down movement of water. When screen-sized quartz and galena, on an immersed sieve, are subjected to an upward current of water which loosens up the ore, the galena, being the heavier, drops below the quartz, and a separation is effected. As the ore is fed continuously to the jig, the light quartz passes off by the overflow, while means are provided for drawing off from the sieve the accumulation of galena as fast as it forms.

Vanners are used to make the final separation of the last products of the classifier or the first of the spitzkasten, or both.

The slime tables, which treat the two or three last products, including the finest mud, are generally circular tables of about 17 feet in diameter, with a slight inclination from the center towards the circumference, and they revolve slowly and continuously in one direction, so that if the fine slimes from the spitzkasten are fed on one side, at the center, and clean water on the other side, the water will in both cases flow down and over the margin of the table, carrying with it the grains that are most affected by the current. The large grains of quartz are more affected than the small grains of galena, for two reasons: First, they project up higher into the water film, where the water is moving faster; and, secondly, the quartz is of less specific gravity, and, when other things are equal, it will be moved more rapidly than galena.

*Condensed from a lecture by Prof. R. H. Richards of the Massachusetts Institute of Technology, before the Society of Arts, Boston.

Note on Gold Precipitation by Zinc Dust.*

By GEORGE A. PACKARD.

It has been with interest that I have read the valuable papers and discussions appearing in the Journal of the Society during the past year relative to various methods of gold precipitation from cyanide solutions. In the United States we still adhere to the precipitation by zinc, and the one or two plants where electrical deposition has been attempted in the past, having no Von Gernet to guide them through the tortuous pathway to success, have returned to the old method. It is true we have sometimes dipped our shavings in lead acetate, when we have had copper in our ores and tailings, but so far as the writer has been concerned this has been solely for the purpose of eliminating the difficulties attendant upon the presence of copper, and not with the view of being able to precipitate from weaker solutions. Personally, with solutions down to 0.08% KCy, the writer has had no difficulty in precipitating the gold down to four or five grains (left in the solution) with the old extractor boxes, when proper attention was paid to the rate of flow and the alkalinity of the solution. We have not tackled slimes yet, and in most plants get along very well with a weak solution of the above strength.

There is, however, one innovation in the precipitation by zinc which, though possibly not unknown in South Africa, has at least escaped mention in the discussions; and that is the precipitation by zinc dust, a method which has been in practical and successful use in some of the larger plants in the United States for about three years. The method was doubtless developed from an effort to use Mr. Sulman's process of precipitation by zinc fume, but the apparatus employed bears no resemblance to that described by him in the "Journal of the Society of Chemical Industry." Probably the largest plant using this method of precipitation is that of De Lamar's Mercur mines at Mercur, Utah. This mill treats 500 tons of ore a day, the oxidized ores going direct to the tanks, after crushing, while the clayey ores are dehydrated in one roasting furnace, and the arsenic, antimony, and sulphur removed from the baser ores in others, before cyaniding. The solution from the leaching tanks, of which there are ten, 25x50x5 feet deep, passes to three storage tanks, each 20 feet in diameter and 12 feet deep. From these it is drawn into the precipitating tanks, three in number, 14 feet in diameter by 8 feet deep. Here the zinc dust is added and the solution is agitated by the admission of compressed air at the bottom of the tank. The solution is then pumped out through a filter press, and goes to the sump tanks to be used over again. At this plant the solution is not allowed to settle before pumping out, the former manager, H. A. Cohen, claiming that by lessening the time of contact with the zinc in the tanks they secure the maximum precipitation with a minimum loss of cyanide. Other managers, however, allow the dust and precipitate to settle before drawing off, and claim that the loss of cyanide is as infinitesimal as in the old zinc boxes. At the De Lamar mill there are five eighteen-frame filter presses, the frames being 24 inches square. As the pipe through which the solutions are drawn off is 8 inches above the bottom of the precipitating tanks, much of the precipitate accumulates in the bottom of the tanks and is cleaned up without going to the filter presses. Mgr. Cohen stated that the strong solution used at that time contained about 0.3% KCy, and the zinc consumption amounted to about one-fourth of a pound per ton of ore treated.

At other plants this method of precipitation has been used for solutions running as low as 0.05% KCy, containing from 3 dwts. to 5 dwts. gold per ton on going to the tanks, and showing after precipitation two grains gold per ton as the maximum. A peculiarity observed here has been that the strong solutions, containing from 0.2% to 0.25% KCy, retain more gold, averaging about five grains per ton, after precipitation, than the weaker. The most pleasant feature about this method is that all of the plants using it report that their bullion extraction fully equals their assay extraction.

Whether this method of precipitation would be of value in South Africa I cannot know, but from my own experience, in this country, with the difficulties met in treating ores carrying copper-containing minerals, and my observation of the ease with which the impurities arising from these are eliminated from the solution by zinc dust precipitation, it would seem that the method might be an improvement upon the zinc-lead process, even if it would not trench upon the field of the Siemens-Halske process.

*Condensed from the Journal of the Chemical and Metallurgical Society of South Africa.

Notes on the Occurrence of Quicksilver in Canada.*

By A. J. COLQUHOUN.

The principal quicksilver producing countries so far have been Spain, Austria, Peru, California, China, Russia, Mexico and Tuscany. These countries have all added their quota to the world's production, and I predict that in the future, when Canada has the benefit of the capital and brains required to make a financial success of the working and treatment of low-grade cinnabar ores, which has been the case in Russia and California, will take her rank among the foremost in this important industry. For the benefit of the prospector, it will not be out of place to describe the ores from which quicksilver is produced.

Cinnabar.—This is the chief ore from which nearly all the quicksilver of commerce is derived. In color the mineral is cochineal red with a lead-gray and scarlet-red tarnish, but has an unmistakable scarlet-red streak identifying it from the ochres or iron oxides, which, although brilliantly colored, often give a dullish brown streak with the penknife. The composition is 82.6% mercury and 13.8% sulphur. Native amalgam is of rare occurrence, but in the mining of quicksilver ores is met with in Mexico. Mercury iodide is also rare and is met with in Mexico, having a reddish-brown color. Selenide of mercury has been found by many of the searchers for this metal, and the writer has identified some crystals from the mercury properties of Hardie mountain, Copper creek, B. C. The ores of South America are dark steel gray in color. Cinnabar was first found about four years ago as float on the north side of Lamloops lake at Copper Creek, but, owing to the ignorance of the original finder, the specimens lay around the Savonas Hotel until an enterprising and learned prospector identified the ore, which resulted in the location of the group of claims now owned by the Cinnabar Mining Co.

The formation in which the cinnabar occurs in this section of the country consists of basaltic and dolomitic dykes traversed by veins of quartz and calcite in which the ore is found in some instances in a pure state, also finely disseminated through the gangue associated with pyrites and other foreign elements. These dykes and deposits have a general direction of N.N.W. and S.S.E. through what appears to be diabase porphyries, but it is impossible to determine the true nature, owing to the surface decomposition. To the north of the company's properties cinnabar is also found in altered conglomerate on Hardie mountain, and in fine-grained sandstone to the east on the Caledonia it is found disseminated in fine scarlet spots. Associated with the cinnabar we also find copper sulphide and carbonates, and on the Hardie mountain, as aforementioned, selenide of mercury, which invariably carries a gold and silver assay.

During my trips to the Kamloops district, last summer, I discovered a deposit of cinnabar fifteen miles south, proving the southern extension of the belt; so that, considering the Criss creek deposits to the north, we can state that the belt has been traced for thirty miles. Notwithstanding the fact of the existence of large bodies of medium furnace ore, 0.56% to 2% and over, exposed by the development of the Cinnabar Mining Co., and other deposits of high-grade ore hitherto untouched, they have not made a success. It seems a pity that, through the fault, ignorance and gross mismanagement of the concern, the whole district should be held back in its progress. About $50,000 has been thrown away in work and the erection of a furnace, tramways, etc., and has only produced 128 flasks of quicksilver; of this amount, 121 flasks were produced by means of cast iron retorts and 7 flasks by the Granza furnace.

Tuscany.—At Monte Amiata the cinnabar-bearing tufa carries from 0.35% to 30% and upward. The Carmak Spirck roasting oven is in use and is said to treat 0.4% ores at a profit. In other parts of Tuscany the ore occurs in bedded marls and limestones in a very pure state, also scattered through a network of fissures filled with calcite and averaging from 2% to 30%. Here they treat the ore by washing in rectangular boxes with rakes, and retorting the resulting mineral with an admixture of 20% lime to desulphurize and liberate the mercury.

Peru.—The famous Huancavelica cinnabar mine has given a yield of 104,045,200 pounds of mercury, valued at $67,629,380, at a cost of $10,587,000.

In conclusion, it is evident from the data given that low-grade ores, of even ½%, can be profitably worked, and British Columbia only awaits the advent of a concern which can put this latent industry on its feet again by the employment of competent men who understand the business and are capable of overcoming the many difficulties attendant on the treatment of the different grades and classes of ore to obtain the best results. The district surrounding Savona is of peculiar interest to the geologist and miner, especially the occurrence of native copper and other copper ores in the tertiaries of Copper creek, and I believe another year will see both cinnabar and copper mines in full working order.

*Condensed from transactions of the Canadian Mining Institute.

Mining Summary.

ALASKA.

Over 600 miners are reported to be successfully beach mining at Cape Nome, "making $25 a day," but so much lying has been done about that whole northern country that all statements therefrom must be doubly discounted.

The Alaska Treadwell M. Co. reports a July run of 540 stamps for 29 days, crushing 59,699 tons ore, value $94,026 and 1319 tons sulphurets, value $52,553; gross value of bullion $155,750; working expenses $48,500.

ARIZONA.

MOJAVE COUNTY.

At a depth of 300 feet the drill in the railroad company's well at Yucca encountered a seam of coal.

The Tennessee mine and mill employ fifty men. The mill is turning out thirty tons of concentrates daily.

PINAL COUNTY.

Arizona *Star*: The new cyanide plant at Mammoth will be ready for operation October 1. Workmen are putting the steel tanks together.

YAVAPAI COUNTY.

(Special Correspondence).—On the 27th of August the Eclipse Mining Co., near Jerome, sent to Prescott another bar of gold. A 5-stamp mill has been working at the Eclipse four months, during which time it is claimed $10,000 in gold has been shipped. The daily capacity of the mill is four tons. There are 300 tons of tailings at the mill which are said to average $12.

The United Verde smelter continues to extend its plant. A new refinery building is in course of construction; a new tilting furnace, another addition to the present converter building, and steel coke and coal bins are in contemplation. A 500-ton auxiliary electric crane has been ordered, making three for use in the smelter. Two locomotives have been ordered for the United Verde and Pacific Railway, narrow gauge railroad.

Surveyors are laying the pipe line from Allen's Springs to Jerome. Four miles of 4-inch and nine miles of 6-inch steel riveted pipe will be used in this line.

Jerome, Sept. 2nd, '99.

The Crowned King Company in the Bradshaw mountains, southeast of Prescott, have started their mill after a shutdown for repairs. The mine is running with a full force. The rich ore has spread through the vein. A strike is reported at the Big Belt mine. The mine has been worked and managed by R. Harrington, who has thirty men working since they put in the new hoist. They are sinking and drifting and struck the rich ore in the 300-foot level. The Star mine is owned by the Harringtons, who have a large force at work. They are drifting to cut the ledge 1000 feet below surface.

Prescott *Courier*: The Octave Company, in Weaver district, at the Johnson mine, are driving tunnels, shafts and running levels. They have, in fourteen months, made 6,000 feet of openings on the vein, and have a large quantity of ore in sight on the dumps and in the mine. They are also working on the Peterson group by contract, driving three tunnels of 1,000 feet each. On the Rumor property, the company have men sinking a shaft on the vein. There is a 10-stamp mill, which is being used to sample ores from the Leviathan and other mines on the Leviathan lead, owned by D. Genung. On this the company has twelve men sinking and drifting.——The Planet Saturn (Fool's Gulch) Company are short of water for the 10-stamp mill. Their deepest shaft is 1,000 feet.——E. Gallispie & Co. are working on the Devonshire group, owned by W. Partridge, and have a shaft down 300 feet, and are taking out shipping ore.

Prescott *Journal-Miner*: The mine formerly known as the Ridenour copper property, is now the possession of a Boston company. W. H. Ferguson, of Prescott, is superintendent. A wagon road reaches to within three miles of the camp. From there a trail descends 2,000 feet to the mines. A pack train delivers the copper ore on the platform above, whence it is hauled to the railroad and shipped to Denver. Thirty men are employed at the mine. Every shaft, tunnel and cut is on a vein of ore. The ore deposit is at a contract and averages 3 feet in width, and lies in a bed of soft limestone and sandstone. Mr. Ferguson, since April, has shipped seven carloads of ore, which has realized a net profit of from $2,100 to $2,400 per car.

YUMA COUNTY.

The output of La Fortuna mine, eighteen miles northeast of Yuma, is reported to be $75,000 monthly.

CALIFORNIA.

Amador.

The Bunker Hill Consolidated M. Co. has been incorporated at Amador City; capital stock $200,000, $5 subscribed.

Sutter Creek *Record*: The new shaft at the Kennedy is down 500 feet and progressing 22 to 23 feet a week.——The Baliol shaft at Sutter Creek is below 450 feet. Another 100 feet will be sunk before drifting is resumed and the mill started.——G. E Wallace, Supt. Alder Creek G. M. Co., will let a contract to sink 200 feet on the Gownanus claim in Plymouth district.——The Bunker Hill Con. G. M. Co. has been incorporated with a capital stock of 200,000 shares; Pres., W. F. Detert; Supt., C. R. Downs; B. F. Taylor, E. C. Voorheis, W. J. McGee. One hundred thousand shares of the capital stock go to the owners and incorporators of the mine and the balance will be sold as a working capital.——Supt. Truscott of the Oneida mine, north of Jackson, states that the north and south drifts at the 1900 level are run 125 feet in each direction on a vein 5 to 6 feet in width of fair-grade milling ore. The old shaft which was sunk in former days to 1350 feet is being pumped out and repaired. From the new shaft 400,000 gallons of water were pumped in seven days. Regarding the building of a mill, it has not been decided whether to begin upon it this fall or not. Since beginning operations, the Oneida Co. have expended $250,000.

Butte.

A. B. Chambers has thirty-five men at work on his ditch on Berry creek. When completed, work on a 40-stamp quartz mill will begin. The ledge he is developing is 100 feet wide. The ditch will carry 300 inches of water and develop power for the mill.

W. P. Hammon has negotiated a sale of dredging ground near Oroville. Two new dredgers to be operated electrically will be put thereon. Gold dredging in that vicinity has proved profitable.

Calaveras.

The Mokelumne River Dredging Co. has been incorporated in San Francisco; capital stock $10,000, all subscribed.

A recent mill test of 100 tons ore from the Melones mine, taken from the upraise, gave a value of approximately $4 per ton.

Del Norte.

Crescent City *Record*: At the Union copper mine the miners have uncovered a ledge several feet wide, and are taking out five tons of ore per day. A shipment will be made to the Selby Smelting Works near San Francisco. The last shipment yielded ten per cent copper.——The Myrtle creek hill copper prospects of McGowan & Crawford are turning out well.——In the Copper King a deposit 8 feet wide has been uncovered, and a shipment will be made. A cable has been stretched across Smith river to the county road for transferring the ore.——On the west side of Preston Peak, there are extensive mineral deposits which are being explored.

El Dorado.

Placerville *Republican*: The Placerville Slate Co. owns forty-three acres on the northern edge of Placerville, facing Big Canyon. A gravity double-track tramway is operated at an expense for water of 30 cents per day. The company is filling a large order for the Mountain Copper Co. of Shasta county, who are having all of the roofs at their plant at Keswick changed from metal roofing to slate.

Kern.

Work on the Butte mine, under the new management, is being pushed vigorously. They have struck rich ore, running as high as $2000 per ton. This ore is sacked in the mine. A few tons have been milled at the Red Dog mill in Johannesburg.

The Randsburg railroad is hauling a great deal of machinery and mining supplies, nearly all going into the Panamint country, the Slate range and the Argus country. A number of new mills are going up in these sections, and desert mining never was more prosperous than now. The men who own the mines are putting their own money into their development. One old mill building now standing in old Panamint represents, including machinery, an outlay of $100,000.

Bakersfield *Californian*: The Santa Fe is looking for cheap fuel. Boring in the Elwood well, suspended a few days ago, has been resumed. J. B. Treadwell, Southern Pacific agent, has taken a lease on the river bed across the Means ranch. This strip of ground was overlooked. The news from the Sunset and McKittrick districts is of an encouraging nature. In the latter district the Shamrock is completing a well. The oil in this well is the thinnest found. Fresno oil men visited the Sunset wells recently.

Randsburg *Miner*: The Yellow Aster mill at Randsburg is crushing 150 tons daily. The capacity has been increased lately, though no addition has been made to the number of stamps.——The Wedge mine from a clean-up of 47 tons, got $3300 a few days ago at the Red Dog mill. The ore is coming from the 200, 350 and 450-foot levels. The main shaft is down 506 feet.——There is more real dry washing being done than ever before and with good results.——It is reported that the Joyful mine will begin operations September 1st. This is one of the properties under the management of Mr. Stebbins of Ballarat.—— The main shaft in the Standford group is down 400 feet and they are sinking a winze from that level. The ore in the last milling averaged $30 per ton.

Kings.

The White Creek Oil & Mineral Co. has been incorporated at Hanford; capital stock $250,000, $96,000 subscribed.

Los Angeles.

In the Sierra Nevada mountains, near the canyon of the Tejunga, are large veins of magnetic iron ore. Similar ores occur on the summit of Mount Gleason, near gold-bearing veins, and in the Soledad canyon. The latter deposits are near the railroad, but none of them are developed.

Mariposa.

It is reported that all but about $10,000 of the $300,000 last levied on the stockholders of the Merced G. M. Co., whose mines are at Coulterville, has been paid in.

The region ten to twelve miles east of Coulterville was at one time an active mining section, and a great deal of gold was taken from the mines there. The important mines were the Martin & Walling, Banderita, Marble Spring, Ferguson, Rutherford, Cranberry, Red Cloud and Hasloe. Besides there were many of less importance but of promise. The district is reviving under the stimulus of numerous successes elsewhere and the cheapening of processes and methods.

The Hite Cove M. Co. has been incorporated; capital stock $100,000, $5 subscribed.

Mariposa *Gazette*: The Mariposa Commercial & Mining Co. have let a contract to E. Hale for 400 cords of wood. They have also purchased all the lumber of the Red Banks Co. The company have reopened 500 feet of the Pine Tree mine tunnel and have retimbered 50 feet of shaft at Princeton. Next week they expect to put men to work on the Josephine. There are large bodies of ore exposed in crosscuts on the English-Trail level of the Josephine mine, and the Princeton is but 600 feet deep, though having produced $400,000. Boarding houses are being built for the accommodation of men at the latter place, which is midway between the towns of Mariposa and Bear Valley.

Nevada.

The mining properties of P. Campbell in Yuba and Nevada counties will be sold by Court Commissioner Garthe in Nevada City next Saturday by order of the Superior Court and decree of foreclosure of mortgage for $21,727.71. J. W. Kelley of Grass Valley is the plaintiff. According to estimates the bank, which is from 150 to 200 feet in height, averages $1 per ton.

Grass Valley *Telegraph*: Good ore is being taken out of the Kentucky Ridge mine on Deer creek, near Kentucky Flat. There is a vein in the tunnel from which $35,000 has been taken. Another tunnel is being run on a 6-inch vein which will strike the main ledge at 45 feet. The mine has been paying expenses by the hand mortar process. The owners are T. A. Kohler, C. Smith, J. Castine, and Kendrick brothers.

Placer.

(Special Correspondence).—Clark & Brown have struck a rich pocket in the old California mine at Meadow Lake. Old timers say that in 1865-66 they could see the strings of gold as the ore came through the rock breaker; but, when they came to clean up the mill, they only had $2 50 total, and the camp was deserted. The black-eye the camp received at that time has stayed with it until now. Clark & Brown have taken out hundreds of dollars and are still taking out gold. There is no question but that the ores carry gold, silver and copper.

The old U. S. Grant mine, at Carlisle, at the foot of Old Man mountain, where the first gold was found in this district, and the extension, the Kentuck, have ores that will run from $12 to $30 per ton. A 3-stamp mill will be put up at Old Man mountain and will make runs for the miners. There is not a custom mill or any other mill in running order in the district.

Cisco, Sept. 1st, '99.

The Red Point drift mine near Damascus, on the Forest Hill divide, is to have a compressed air haulage plant. The power will be furnished by the water flowing from the workings, which are in 14,000 feet. The compressor will be located 660 feet lower than the mouth of the tunnel. H. C. Behr, who is the constructing engineer of this plant, figures on the development of 38 H. P. after making necessary deductions for loss. The haulage will be done by storage engines, which will be charged as often as required, along the line, which eventually will be five miles in length. Large blowers will be put in and air forced to the face. J. A. Ferguson is Supt. The compressor will be operated to 750 pounds pressure per square inch.

Colfax *Sentinel*: During the past week a 14-foot ledge has been encountered in the lower tunnel at the Herman mine on the Deadwood ridge, four miles east of Westville. From a test run in the mill it is found to yield from $25 to $40 per ton. Over 700 feet of backs can be stoped. Dr. O. L. Barton is Supt.——The ledge at the Drummond quartz mine on Shirt Tail canyon, near Forest Hill, was struck in the new lower tunnel this week. A shoot of ore in the Drummond mine returned many thousands of dollars some years ago, having been worked to a considerable depth through a shaft.——The tunnel at the Oro & Mountain View drift gravel mine, above Iowa Hill, is in 2100 feet. E. M. Armstrong is Supt.

Plumas.

W. E. Duncan Sr. has completed the hydraulic elevator at his mine.

Riverside.

F. Bates has taken the Santa Rosa mine, west of Perris, and will resume work. The main shaft is down 500 feet. The mine has a 20-stamp mill and cyanide plant. It was worked in early years by Mexicans to the water line for a distance of 1000 feet. More recently the mine was reopened and equipped but closed down after running about a year.

Thirty-five men are employed at the Gavilan mine on the San Jacinto Estate. A 10-stamp mill has been running steadily for a year.

Riverside *Press*: The Iron Chief mine, owned by Stevens Bros. of San Bernardino, has shipped bullion regularly for the past three years. It is near Eagle mountain on Colorado desert. The ledge varies from 7 to 14 feet, and is opened by a 150-foot shaft and levels. A new shaft is being sunk on the upper end of the property to connect with the old shaft by underground tunnel. They have a mill and cyanide plant and a 25-mile pipe line from Cottonwood springs to furnish the water supply. The mine is forty miles from Walters station on the Southern Pacific.——The Gold Canyon mill has been running on the ore from the mine, but owing to much flour gold a cyanide plant will be put in. The mine is eight miles from the mill, and water will be piped from the springs at Dos Palmas. The ore body is 4 to 6 feet wide, and has an average value of $17 per ton. The owners are W. A. Doran of San Diego, E. G. and G. B. Fish of San Bernardino, E. B. Stanton, E. B. Chappeller and C. C. Doran of Riverside.——About three miles east of Winchester are deposits of asbestos, magnesite and talc. This property has been developed to some extent. The asbestos is easily accessible. The magnesite deposits have been little developed.——In Menifee valley a paying industry has developed in the shipment of white quartz to Los Angeles, where it is ground and used in the manufacture of fire brick.——Mrs. Alice Crain has an antimony claim south of Winchester.

San Benito.

At the New Idria property a discovery is reported. The San Carlos part of the mine is situated a mile from the New Idria section. A tunnel in the San Carlos section was started in May and driven 300 feet until it struck vein matter. By drifting and crosscutting ore of an average higher grade than in the New Idria section has been found.

San Bernardino.

In Silver Mountain district, near Oro Grande station; at West Camp, ten miles from Oro Grande; near Fish ponds, four miles from Daggett; in Panimint range, and near Resting springs are silver-lead ores. Some of these prospects are of promise, but have little development. The most extensive development is in the Resting springs district.

The Tecopa M. & S. Co., a Los Angeles corporation, proposes to resume work on the Tecopa mine, ninety miles from Vanderbilt.

San Diego.

At the Stonewall mine, Julian district, eighteen men are working over the tailings.

The kaolin deposit in El Cajon mountain, twenty miles east of San Diego, has been bonded by G Holcomb for $100,000. A 95-foot shaft is locally reported to pass through 85 feet of a kaolin deposit. Kaolin is worth $19 per ton in eastern markets.

Santa Barbara.

Santa Barbara *Press*: Mr. Cody of Montecito is drilling an oil well on property recently purchased by him on the beach at Miramar.

Los Angeles *Herald*: A strike of semi-liquid asphaltum has been made at the P. C. Higgins rancho in Carpinteria. A deep oil well was being bored there, but at a depth of 1250 feet a stream of asphaltum was tapped. Nothing was thought of this at first, but now the thing is serious in more than one way. The first strike was made three weeks ago. At that time the asphaltum rose a few feet in the 5½ inch pipe. But since then $2000 has been expended in efforts to drill, but not once has a drill touched bottom. At 10 o'clock Tuesday night the asphaltum stood 40 feet deep in the well, but Wednesday morning it rose rapidly, and at 8 o'clock the depth was 160 feet. The asphaltum is like soft mush and will need little or no refining. It is worth $30 per ton. The questions now are how to get the asphaltum out of the well and how to keep on boring. The well is the only one of the kind about there. Mr. Humphreys, Montecito, who has sold land on the beach for oil rights, says no compromise could be made, as money had passed between him and the oil men on the transaction. He also said that he had between 800 and 900 feet more of similarly located land. Mr. Humphrey sold Cody & Nelson, who have made themselves prominent by pushing the matter of oil drilling on the beach.

Shasta.

J. Wilson has made a strike 6 miles west of Furnaceville. The rock is rich, $200 being taken out the day following the discovery.

George Barber of the Buckeye region has taken from a small streak in the ledge of the Cleveland mine some very rich quartz. The Cleveland is in the Quartz Hill region, near the original Quartz Hill mine and is the property of W. M. Hiatt.

The sale of the Gold King quartz mine in Mule Mountain section was consummated last week through A. G. Boggs, J. B. Cooke of Colusa buying the mine from J. G. McDaniel. There is a shaft, tunnel and several drifts on the property. The ledge carries quartz and ochre.

It is locally reported that Lewisohn Bros. of New York City are to give up their bond on the Golinsky-Clendenin property in the Backbone district, being the result of the visit of J. P. Channing, the representative of the firm, who does not believe the result of the development will justify the purchase of the property at $160,000. Work is discontinued. The property is on the sulphide belt in the Backbone district and consists of 320 acres of land.

Redding *Free Press*: Captain J. R. DeLamar has bought from J. W. and T. M. Popejoy the Hogue-Worley water ditch and rights. The ditch takes water from the west side of Horse creek in the vicinity of Copper City.

Sierra.

United States Circuit Judge Morrow on the 6th in San Francisco rendered a decision in the case of Henry Skinner, plaintiff, against the Garnett G. M. Co., defendant. Skinner is a miner and was employed by the defendant company in its property at Hepsidian. Skinner and forty-one other employes, whose claims were assigned to the plaintiff, worked for the company from January 1 to December 14, 1897, without any pay and sued for $3981.50 with interest and $500 attorney's fees. The case was taken to the Circuit Court, as the corporation is organized under the laws of the State of West Virginia. Judge Morrow, in his decision, allowed the claim of the plaintiff.

Siskiyou.

Eastern capitalists, through Mr. Monroe, are bonding and purchasing a large group of gravel claims on Beaver creek. An appropriation of 20,000 miners' inches of water of the creek has been made and the work of ditch construction is to be commenced.

The Siskiyou Gold & Copper M. Co., which has acquired title to a group of fifteen claims, including the Mabel mine, at the head of McKiney creek, have been surveying the group. One and a half miles of road has been completed from the group to the mill site. The development work in the four tunnels is progressing and ore of high grade extracted.

Mining machinery is being conveyed to the property.

The Wheeler & Russell mine employs seven men. The vein, though small, is rich. The owners talk of the erection of a milling plant before winter.

The Little Tiger property, consisting of seven claims, adjoining the Cape mine, recently completed a survey of the property. The two crosscut tunnels are being extended and the mill started up on Monday.

The Doney mine has been bonded by an Eastern syndicate, represented by F. Leich.

Rose & Nightkirk are engaged transporting their new mill to their property on Ash creek.

At their mine on Sterling mountain Brown & Argle have taken out $5000 this season. The largest piece of gold was worth $300.

Another shoot of high-grade ore has been found in the mine of Miner & Co.

A rich vein of free-gold ore has been exposed at the Cherry Hill mine.

The crosscut tunnel at the Little Wonder mine, owned by Ironsides & Wadsworth, has been extended 300 feet in.

The Schroder mine shows an increased value of sulphide ores, and the mill has been shut down awaiting the addition of a concentration equipment.

Yreka *News*: The Davis group of eight claims, six miles southwest of Montague, has been sold by the owners to Dr. G. W. Dwinnell of Montague for $41,000. The deposit or vein, as far as uncovered, is 40 feet wide, has a northeast course and outcrop for 300 feet in length. The ore is decomposed and consists of sulphide of lead, iron and copper with arsenic. The development work consists of a shaft 25 feet and a tunnel 40 feet, the face of which is high-grade ore.——The owners of the Knownothing mine have bonded their property to G. W. Grayson of San Francisco. Mr. Stanley is Supt. It is the intention to sink the shaft 100 feet and then put up hoisting equipment.——Rich ore is being extracted from the Lanky Bob. One arrastra is being run.——At the Brown Bear mine developing work is proceeding.——A vein 3 feet in width has been discovered by Mr. George near the King Solomon mine. The force employed is twenty-five, and the mill is crushing pay ore. During Mr. Fletcher's absence Mr. Bowerman is acting Supt.——At the Carlock & Morrison mine a concentrating plant has been built. The vein is 17 inches wide.——At the Gray Eagle mine the main working shaft is being sunk 100 feet.——An adit from the Turk ground is to be run 500 feet to connect with the shaft. The mill has five stamps and an addition is contemplated.

Yreka *Journal*: In the Oro Fino and Quartz Valley mining districts quartz mining is active. Two mills are running, one at the Morrison ledge and the other at the Thornton ledge. Turner, who is opening the Allen mine, is taking out fine quartz, and will put up a mill. Men are scarce and the companies have been obliged to send away for help.——G. W. Foote, who recently secured the Merrimac mine on Humbug, has found the ledge again, which contains rich quartz, 4 inches in width.——The miners at the Golden Star or Spencer mine have struck the ledge at the old works, to which a new lower tunnel has been run. The directors of the company have levied another assessment, it is supposed, to put up a mill for crushing at Humbug.——Considerable work is in progress on quartz mines in the Ash creek section of Cottonwood mining district, on Klamath river, below Hornbrook. A road has been built up the creek, including branch roads, and a great amount of prospecting has been carried on.

Trinity.

The Copper Hill, four miles west of the Cleveland Con., was bought two months ago by Dr. M. M. Shearer and four others. Seven men are at work. A tunnel driven 100 feet below the croppings has reached a depth of 70 feet. Reports from Selby show 12% copper, with gold and a small quantity of silver.

Watson & Foster of the Globe mill recently discovered a ledge 18 inches in width that extends 150 feet on the Van Matre gulch side of the ridge, four miles below the Globe. The assays run $40 to $150 per ton.

Tuolumne.

American Camp district is in the northwest corner of the county, about 10 miles from Columbia. The formation of the district is mica schist, grano-diorite quartzite, limestone and other metamorphic rocks. The veins are from a few inches to several feet wide and carry a high grade of sulphide ores beside free gold. Owing to lack of roads and rugged character of the country the development has been retarded.

At the Santa Ysabel mine, Quartz mountain, the upraise between the 4th and 5th levels is developed 40 feet, and the ore is improving in grade. In the drift on the 5th level the ore has widened to 15 feet.

Union-Democrat: At the Dreisam mine, at Arrastraville, sinking has been discontinued and the mill is crushing ore from the 200 level taken from the Yellow Jacket shoot. It is high grade and free milling. From the crosscut tunnel the quartz has been drifted 200 feet.——A rich body of ore is reported to have been opened in the Grizzly, near Carters. The gouge has turned to quartz, which carries free gold.——The working shaft of the Goldwin has reached a depth of 215 feet, with sinking progressing. The vein is 5 feet wide in the bottom, worth $8 per ton.——At the Buchanan, south of Carters, sinking on the north vein was discontinued at 700 feet, and miners are driving a crosscut for the Buchanan vein. This vein is large.

Yolo.

A San Francisco company is putting in a large plant and will soon begin sinking oil wells on Sulphur creek.

COLORADO.

BOULDER COUNTY.

A deal was closed at Denver on the 6th inst. by which an English syndicate purchases for $2,500,000 cash the properties of the Big Five Mining Company at Ward. The properties include the Niwot, Dewdrop, Columbia and other well-known gold producers.

At the Giles mine leasers are taking out good ore from the 250 east level and the company is running a crosscut south from the 450 level.

The Puzzler Mill management are contemplating enlarging the mill and treating custom ore.

The Struggler shaft has been put in shape and sinking commenced. Two eight-hour shifts are working, which will be increased to three.

CLEAR CREEK COUNTY.

Idaho Springs *Gazette*: The owners of the Chamberlain at a depth of 30 feet have a 4-foot vein of milling ore that will run $10 per ton, and a 6-inch streak on the foot wall that will run $150 per ton in gold. This property lies at timber line on Chesapeake mountain, and the vein will be cut at a depth of 800 feet in the Chesapeake tunnel. Paralleling the Chamberlain is the Great Divide, which has been prospected. The vein is 10 to 12 feet wide and assays at 60 feet $2.50 to $15 per ton in gold and silver. The Chesapeake tunnel will also cut this vein at a depth of 1000 feet. West of Chesapeake mountain on Alice mountain are large veins of low-grade ore. The most promising is a vein 20 feet wide that assays $10 per ton gold. The Aureo lode has a shaft 40 feet deep on a 5-foot vein. These locations belong to a Pueblo company, which will do extensive development work.

DOLORES COUNTY.

Rico *News-Sun*: J. M. Hall and J. D. Clarke, who are working the Hope on Nigger Baby hill, have in the breast of the drift a 3-foot vein of spar impregnated with copper and galena.——Crecelius & Ditchfield have out half a carload of manganese ore. They are working the Cobbler vein of the Pittsburg property.——J. Spurlock has a new vein on the Grand View which shows manganese ore.——McGill, Jolley and Hughes have a 2-foot vein of high-grade gold-silver ore on their Newman lease.——The Saw Pit Gold Mining and Milling Co. filed location notices on the Seymour Nos. 1, 2, 3 and 4 lodes, Saw Pit placer and a mill site. The company will build a mill.

Rico *News-Sun*: The Saw Pit M. & M. Co. has ordered the machinery for its new power plant and mill to be erected in Navajo basin. The county will co-operate with the Saw Pit Co. in the construction of a wagon road from the meadows into the basin.——During August the mines of Rico shipped fifty-eight carloads of high-grade ore, making a total since the beginning of the year of 282 cars.

GILPIN COUNTY.

Central City *Register-Call*: A deed has been recorded conveying from E. C. Lindemann to the Lindemann Tunnel M. & M. Co. the Lindemann tunnel, on the south slope of Stewart mountain, Hawkeye district.——In the Perigo section there are five stamp mills in operation.——In Gamble gulch men working under lease have been successful in sluicing. The water supply this season has permitted sluicing operations on a larger scale and for a longer period than in former years.——Fifteen men are working in the Gold Dirt mine, on the 500 east and west levels, where a good sized body of ore is opened. Daily shipments of mill ore amounting to thirty tons are going to the Perigo mill in Gamble gulch and the Peterson mill in Lump gulch. Jenkins, Lightbourn & Co. have let a contract to sink a shaft east of the Gold Dirt shaft.——The War Eagle is being subleased from the Tonawanda Leasing & M. Co. by W. C. Stanley, who is making shipments to the Stanley mill in Lump gulch.——At the Perigo fifty men are employed, the miners working on the subleasing system. The leasers are taking out ore to keep twenty-five fast-drop stamps supplied in the Perigo mill, a tonnage of 75 tons per day.——E. C. Lindemann is running the Douglas mill at Wide Awake, keeping twenty slow-drop stamps going on oxidized ores from the Lindemann Nos. 1, 2 and 3.——At the Stewart mine the retimbering of the shaft is under way.——Prof. Lindemann has started up the Lindemann tunnel. The tunnel is being run from Stewart gulch to cut the Stewart vein. The tunnel is in 70 feet and Mr. Lindemann will put in an air compressor. Three veins have already been cut.——W. Kelly and G. Kanarum of Black Hawk have taken a three-year lease and bond on the Kentucky Belle claim, in Gregory district. The shaft is 80 feet deep. Machinery will be put in to expedite developments.——G. W. Mabee is sinking a shaft on the Linden, on Gunnell hill. The shaft is down 65 feet and the machinery, formerly on the Baxter, is being installed.——Sinking operations at the Cook mine, on Bobtail hill, are in progress. The shaft is down 830 feet. It will be put down to 1000 feet. One hundred men are at work.——Mgr. H. P. Lowe of the Topeka mine reports that during the week the working force will be increased. A new and larger plant of machinery will be installed, consisting of a 120 H. P. gear hoister, two 80 H. P. boilers and a six air drill compressor.

GUNNISON COUNTY.

Gunnison *News*: The Carbonate is making a steady output of eight tons of ore daily. A small dyke or "horse" has been replaced by ore.——The ore of the Whopper is being concentrated at the Scofield mill. There is a hundred tons on the dump. The Scofield concentrator has been running for a week on ore from La Plata, Burt and other properties. Plans are being projected to put in power that will enable work to be continued through winter.——The Black Queen mine is reported sold under contract to W. Miller of New York, and H. P. Barbour of Denver. The sale includes the Black Queen, Fargo, Legacy and Last Chance. The three first named are patented. The plans of the new management embrace equipping the mine with machinery and a concentrating mill is to be built, the mine and mill connected by a tramway, and a new power plant put in.

LAKE COUNTY.

Carbonate *Chronicle*: At the Hibschle shaft on the S. Small millsite, Leadville, F. Schmidt is superintending developments. The shaft is in the parting quartzite 100 feet, and sinking to get into the white lime. No exploration in this horizon has been done in this section of the camp. The shaft is 300 feet deep.——Geo. W. Cook has returned from Chicago. He has contracts for all the manganese that Leadville can produce, and states that shipments would be increased as much as possible. At the Chip property on Fryer hill preparations are being made for a large output of manganese. The new plant is in position. The manganese comes from the 200 level.——The Lent shaft of the Seneca, under lease to Col. Cook and Mr. Parker, is operating at the 120 level. They have plenty of manganese in sight, and are making shipments.——Drifting continues from the 1100 level of the Greenback, and the drift will be continued to the Mahala line where air connection can be made. The Greenback is making some water, which is handled without interfering with the hoisting. The shaft is arranged for two cages, and one of these is fitted with a tank carrying 300 gallons of water. It is sent down into the sump. This enables 150 gallons per minute to be hoisted 1,100 feet at a cost less than pumping. The bailing operations do not interfere with the regular working of the mine.——The Maid of Erin and Henriett tonnage for August will reach 3,000 tons, which includes oxidized iron, lead carbonate, iron and copper sulphides and zinc. There are twenty sets of lessees on the ground; most of them are shipping. The Maid and Henriett mine was at one time abandoned.——The Resurrection has started work on its new shaft in the Big Evans flat. It is a three-compartment shaft, 4½x13. A plant of machinery will be placed in position.

MINERAL COUNTY.

Silver Plume *Standard*: Creede is active again. The large shippers have put on men and are making increases daily. Miners laid off because of the strike are being put back to work. Ore shipments are double what they were two weeks ago.——The Mollie S. is being worked regularly.——Attention is being directed towards Sunnyside. All available properties have been leased and development is going on. Since the improvement in Corsair ore attention has been given other mines on McKenzie mountain.——The Amethyst has a new hoisting plant, boiler, etc. A number of men recently laid off have been put back to work.——The Commodore is mining 125 tons per day and clearing its bins of ore stored there during suspension.——Bachelor No. 2 has made its first shipment since the close down.

MONTROSE COUNTY.

Prof. Paulet, chemist for the Rare Metals M. Co. of Denver, has gone to Paradox, where the company has bought a uranium mine and started work.

Denver *Mining Record*: The Huntsman Copper Mining Co. announce the discovery of a new ore body in the lower tunnel being run to crosscut the original discovery 200 feet distant. At a depth of 100 feet they have a new body of ore, the values of which equals that being shipped from the upper workings.——L. Antles and G. R. Propper, owners of the Corsair group at the head of Miner's basin, have a 6-foot vein of copper and gold ore that averages $8 in gold and 20% copper.——In Mill Creek basin Denver men are to erect a 20-stamp mill. They have two free milling veins.

OURAY COUNTY.

Ouray *Herald*: The Rare Metals Mining & Manufacturing Co. of Denver have, through their agent, A. Lamson, secured leases on a number of wolframite prospects, also on a mill for concentrating the ore. L. Arbi will be in charge of the mill at Gladstone, San Juan Co., and Mr. Lamson will have charge of the mining. Both wolframite and huburnite are found near Gladstone.

SAN MIGUEL COUNTY.

Ophir *Mail*: J. H. Brink, one of the owners of the Gertrude group, states that the principal work is a tunnel 800 feet long, starting on the Saginaw and running through the Gertrude and Gold Standard. Plans have been made for the erection of a mill, including pipe line and flume. The pipe line will be 1,000 feet in length and the flume 2,000 feet. The fall will be 257 feet.

Telluride *Journal*: The Palmyra group of claims has been sold to the Four Metals Company, of which J. Morton of Pueblo is general manager. The Palmyra group includes the Palmyra, the St. Julien, the St. Louis, the Maud S. and the Como lodes, with two mill sites, upon which are two small lakes, affording good water facilities; the surface ground is covered with timber. It is estimated that there are 20,000 tons in sight. Throughout the workings the ore has an average width of 3 feet. The ore carries gold, silver, copper and lead, and numerous mill runs of several hundred tons show the ore to run on an average $16 per ton. The new owners will extend the tunnel 500 feet farther, which will give them a depth on the vein of 1,500 feet. The Four Metals Company will erect a large concentrating and amalgamating plant and an air compressor, to be operated by electricity taken from the wires of the Telluride Power Transmission Company.

SUMMIT COUNTY.

Breckenridge *Journal*: The Cashier gold mine is located in Brown's gulch and consists of four claims. It has a large body of low-grade ore, developed by two 350-foot tunnels, one above the other. They are connected by a winze. The company is building a mill for treating the ore. The mill will have twenty quick-drop stamps and a provision made for the addition of twenty more. The mill will have a capacity of eighty tons per twenty-four hours.

TELLER COUNTY.

Dr. S. R. Bartlett has the Fleming, on the west slope of Bull Hill. The purchase price is reported at $12,000. Two tunnels have been driven on the property 800 and 400 feet, respectively, and several small shafts have been sunk, the main one 50 feet. A number of veins have been opened up, but for the most part low grade. At the bottom of the shaft a vein has been opened which runs $40 to the ton.

The insurance losses by the Victor fire were distributed among forty-five companies, no company losing more than $25,000.

The total gold output of Cripple Creek for August was 33,650 tons of ore, value $1,328,000.

New strikes in the Cripple Creek region are of almost daily occurrence. Some of them are in well developed mines, the finds being made in the course of regular development, and in some cases are anticipated, but the greater number are made by leasers at comparatively shallow depths. The work being done tends to show that a preconceived idea of the value or worthlessness of any particular part of the mining territory is not based upon conditions as they are proven to exist, and that a vigorous policy must be maintained in prospecting.

The Herrington lease on block 1 of the Hart group has opened a large body of ore and it is thought they have one of the Damon veins. The strike was made at a depth of 50 feet.

The second strike of pay ore has been made in the Golconda in the crosscut from the bottom of the shaft at 433 feet. The vein is 2½ feet wide and averages $25 per ton. A plant of machinery is on the way and consists of a 50 H. P. gasoline engine, air compressor and drills. The Golconda is under lease and bond for four years to the Philadelphia & Pittsburg G. M. Co.

Victor *Record*: Attention is being paid to Signal and Gold Quartz hills, some distance west of what has thus far been considered the gold belt. On the Ollie claim, located on Signal, and owned by the Ollie G. M. Co. of Creston, Iowa, a shaft has been sunk 115 feet.——Fifty tons of mill-grade ore are being sent daily to the cyanide plants from the Granite mine, on the south slope of Battle mountain. Large ore bins are being built.——During August 1000 tons of ore, averaging $40, was sent from the Keith & Grube lease on the Vindicator.——A carload of ore, assaying ten ounces per ton, is being sent daily from the Wallace mine at Independence.——Twenty tons of medium-grade ore were sent out recently from the Huff lease on the E. Porter Gold King. It went to the National sampler at Goldfield.——From the Independence mine, during August, 3000 tons of ore, valued at $256,000, were shipped.——The Columbia claim, sold by Reed & Eaton, will go to a company at Colorado Springs.——It is reported that the Margaret, north of the Pinnacle, has struck a body of ore 5 feet wide that will run $150 per ton.——Within a day or two work will be started on the fifth level in the Jack Pot at a depth of 483 feet. The fourth level was driven 100 feet above. The total output of the mine for August was $100,000.

IDAHO.

ADA COUNTY.

The receipts of gold at the Boise United States Assay Office during August were larger than for any other month in the history of the office, the total being $243,820.

BLAINE COUNTY.

At Hailey the Crœsus shaft is to be sunk to the 1000-foot level, the single compartment being enlarged to a double compartment from the present 450-foot level to the surface.

Hailey *Times*: A Boston company will take water from the Malad river, near its mouth, and pipe it across the Snake for placer mining on the south bank of that river. The undertaking will cost $100,000. It is said they have good property. Surveyors have already been over the route making preliminary surveys.

CUSTER COUNTY.

It is reported that in the Lucky Boy mine at Custer, the ore has been encountered, according to survey, on the 800 level. The company is controlled by W. S. McCornick, N. Treweek and A. Hanauer of Salt Lake. It gives the company 200 feet of stoping ground along the dip of the vein in which the ore shoot varies from 5 to 15 feet. Twenty stamps are dropping. In thirty days, Col. Treweek says, the battery will have been increased to thirty stamps. In the meantime the new cyanide plant, through which 1400 tons of tailings are to pass under the direction of M. Bamberger, is approaching completion, while the tramway to the mill will be ready in a few days.

IDAHO COUNTY.

Spokesman-Review: Men from the new camps on Snake river report that recent developments have opened large deposits of sulphide copper ores on both sides of the river in the Imnaha district. A large body of ore was found on the Delta group last week. A ledge 40 feet wide was exposed in a contact deposit that cuts the mountain for half a mile. The Delta group is bonded to the Exploration Copper Co., composed of New York men, represented by L. Eaves.

Weiser *Signal*: E. P. Emerson of Baker City has deeded to the Boston & Seven Devils M. Co. the Little Idaho, Eighty-Eight, Copper Dyke, Harvard, Bodie Fraction, Admiral Dewey, and one-third of Bob Fitzsimmons mines, water right on Deep creek located by J. Walton, and the Massachusetts mill site. The deed bears $685 in revenue stamps, though the consideration named is but $1. Add Colo

OWYHEE COUNTY.

The Hoosier Mining Co., near Silver City, proposes putting in a cyanide plant.

A new stamp mill is to be built at the Cumberland mine, on War Eagle mountain. Jas. Shaw is manager.

An important mining enterprise, known as

the Sinker creek tunnel project, is to be started. This tunnel is to cut through War Eagle mountain from a point on Sinker creek. It is stated that R. J. Anderson, representing Philadelphia capital, has secured agreements with the owners and will run the tunnel. He has made contracts for the purchase of most the claims, and work on the tunnel will begin within thirty days. The War Eagle mines are among the richest in the State. They all closed down at the time of the California Bank failure and have never been started up since. California people were formerly the principal owners. The tunnel, which will be several thousand feet in length, will cut the mountain 2500 feet deep and 1000 feet below the deepest workings of the mines.

SHOSHONE COUNTY.

Colorado miners are arriving at Mullen by the carload.

MICHIGAN.

HOUGHTON COUNTY.

The Calumet & Hecla Co. have started sinking the fifth shaft on the Osceola lode.

MISSOURI.

JASPER COUNTY.

The value of the output of ore in Joplin district for last week was $230,141, zinc ore $45, lead ore $27. The Chitwood Hollow land, the property of the United Zinc & Lead Co., led the district in production last week.

There was produced by the New York Zinc Co. in the six days ended August 26, 184,000 pounds of zinc ore and 24,000 pounds of lead ore.

Joplin reports that the combination among zinc miners there to demand $46 per ton for ore carrying 60% of metal will be fought by refineries. Representatives of several large concerns are now in Colorado contracting for a supply of ore, which will enter into competition with the Missouri product, with presumably favorable freight arrangements with railways.

The American Zinc, Lead & Smelting Co. have purchased the Center Valley lease together with seventy acres in fee, for $191,000.

MONTANA.

CARBON COUNTY.

At Carbonado the Carbon Coal Co. has taken up its mine tracks and pulled the pumps. The company suspended coal mining three months ago, but a diamond drill was put to work and the announcement made that mining operations would be resumed Sept. 1, with a reduced scale of wages. The members of the Carbonado Miners' Union held a meeting and voted not to accept the reduction in wages, and work was not resumed.

DEER LODGE COUNTY.

The Gold Coin properties and mill employ sixty men. The company has acquired six additional claims and is securing patents for them.

GRANITE COUNTY.

Butte *Miner*: J. F. Boyd, a watchman at the Granite-Bimetallic mines, has been arrested charged with stealing $50,000 in silver bullion during the past fourteen months.——Galvanized iron pipe is being made for the Granite-Bimetallic Co. at Granite, which is to be used in the mill for carrying the dust from the battery to a bin, doing away with the dust and saving silver. This is an experiment by the company in a portion of the mill to give it a test. A pipe extends from each mortar to the floor above, where it is connected with a larger pipe, into which the dust is sucked by a blower.

LEWIS AND CLARKE COUNTY.

At the Belmont mine, near Marysville, J. H. Longmaid is Gen. Mgr. and Supt., and F. Longmaid foreman. The mine has been opened by four tunnels on Belmont mountain, all of them aggregating 1½ miles in length, with a depth of 500 feet. The ore is free milling gold quartz and averages $8 per ton. The formation is granite, with intrusive dykes of porphyry. Preparations are being made to sink on the vein, and a station for the hoist underground is complete, 500 feet from the mouth of the lower tunnel. The hoist will have a capacity for sinking 500 feet and raising 100 tons of ore per day. Two 50 H. P. boilers will furnish steam. The mill is being erected. The power for running the 20-stamp mill and cyanide plant is furnished by a separate 100 H. P. engine and boilers. Seventy men are employed in the mine and thirty in the cyanide and stamp mill—100 in all. One hundred tons of ore per day are treated; 60% of the gold is saved on the plates, the tailings flowing to vats, where they are settled and removed to the cyanide vats. As soon as a sufficient supply of water can be obtained, these tanks will be flushed. All the water used in the mill comes from the mine. There are 11,000 tons of tailings in the sand dump.

SILVER BOW COUNTY.

In digging a basement for a building in Butte, R. Rochester struck a vein which gave assays of $100 in silver and $100 in gold to the ton. In the first week Mr. Rochester made $1700 and has more than paid for the cost of the building. In excavating the cellar for the Thornton block, corner of Broadway and Wyoming, a lead of rich ore was uncovered. The old miners say it is the richest lead ever shown in Butte at the top of the ground. The find is above the Smokehouse lode. J. A. Murray of the newly organized Smokehouse Co. wants to sink an inclined shaft on the vein.

A flume is being built from Storm lake to Silver lake for the Anaconda Co. to secure an increased water supply. The source of Silver lake has been found to be Storm lake, but water was lost through seepage. It is to obviate this that the flume is designed. It will be fourteen miles in length.

It is proposed now to start up the Parrot plant to work tailings of the Parrot Co. Tailings have been accumulating for years, some of them very rich. It is believed tailings will average 5% copper besides other metals, and will keep concentrators going for three years.

NEVADA.

LINCOLN COUNTY.

The management of the April Fool Mining Co. at De La Mar, headed by W. Thompson of Butte, will enlarge the mill.

LYON COUNTY.

The first tank of the Logan and Hulley cyanide plant, in Como, is filled. The tailings are from the Logan and Hulley mine, and contain from $10 to $12 in gold.

STOREY COUNTY.

The Truckee River General Electric Co. has finally closed contracts with the Comstock companies, north and south, for electrical power to be furnished the mines on substantially the same basis as that already published—$7 per H. P. The company is building a paper mill at Floriston, Cal., 400 yards west of the Nevada line, and has acquired title to four miles on both sides of the Truckee river. It proposes to build a large power plant to furnish light and power for the paper mill, the Comstock lode, and the towns of Reno, Carson and Virginia City. H. Fleishhacker, San Francisco, is the secretary.

WHITE PINE COUNTY.

The gold dust sent to Salt Lake from the Ely Mining Co.'s mill gives a valuation of $62 per pound.

NEW MEXICO.

COLFAX COUNTY.

The Memphis mine of Bitter creek had a successful run on its ore at the Confidence mill at Elizabethtown. The concentrates are very rich and Mr. Pooler will negotiate for a plant to concentrate the product at the mine.

GRANT COUNTY.

The Cleveland group of five mines at Pinos Altos was sold on the 6th inst. by G. H. Utter of Silver City to H. D. Selleck of New York City for $50,000.

SAN JUAN COUNTY.

Nineteen teams of horses and mules passed through Mancos last week, hauling mining machinery and supplies for the placer grounds on the lower San Juan river. The gold to be saved "is of the finest flour."

SANTA FE COUNTY.

In the case of the New Mexico Mining Company, Judge McFie has discharged Receiver Elkins and approved his report. The New Mexico Mining Company is owner of the Ortiz mining grant, twenty-five miles from Santa Fe. The grant was confirmed by act of Congress, March 1, 1861, for 69,000 acres. Of the original grant 15,026 acres were sold to the Cerrillos Coal & Iron Co., leaving 54,000 acres in the grant as now constituted. S. H. Elkins was appointed receiver of the grant in May, '96. He now turns the property over to S. G. Burn, who takes charge of the property in the interest of Thomas A. Edison, who is reported to be the purchaser of the property for about $3,000,000. It is stated to be Mr. Edison's intention to build a large reduction plant, at which to treat the gold ore from the new Ortiz mines by his new electric process.

TAOS COUNTY.

Santa Fe *New Mexican*: The Ester is one of a group of six claims near Red River which are owned by J. M. & G. L. Moad, L. E. Wade and P. B. Coffelt. They are considering the erection of reduction works in connection with their properties. The ores are copper, gold and silver.

OREGON.

BAKER COUNTY.

Baker City calls for a United States assay office and makes a showing that justifies the demand.

JACKSON COUNTY.

The Ashland quartz mine, near Ashland City, is sold to Montreal and Spokane men. The company is incorporated as the Montreal & Oregon Gold Mines and will commence development work. H. Mattern is local manager until October 1st. C. G. Griffith is managing director. The selling price is reported to be about $120,000.

The Gold Bug Mining Co., Mount Ruben, is reported to have sold its properties to C. D. Lane and A. Hayward of San Francisco, a ninety-day bond for $1,000,000 being given, with an initial payment of $100,000. The property was owned by J. P. Jones of Nevada. There is a 5-stamp mill in operation. The report is locally denied.

JOSEPHINE COUNTY.

G. F. Wheeler of Grant's Pass, receiver of the Siskiyou Copper M. Co., operating near Waldo, says that the carload of copper ore shipped to the Selby Smelting Works at San Francisco turned out so well that 100 tons more will be shipped to the same establishment as soon as possible.

SOUTH DAKOTA.

(Special Correspondence).—The Carr mine, discovered last May by two cowboys out hunting cattle, has been sold to N. Treweek and associates through the agency of E. C. Johnson of the Mining Exchange at Hill City, S. D. The property comprises 130 acres, with mill site, water right, timber, etc, and is located eight miles southwest of Custer, in Nugget gulch. This is the richest free gold strike ever made in the Black Hills. The ore averages $1360 gold per ton, after the specimens have been picked out. Charles Carr was attracted one afternoon by a red "blowout" 50 feet above, on the side of the gulch, and examined it. He broke a piece of rock and saw what looked like a kernel of yellow corn imbedded in the quartz. He concluded it was gold. He and his brother borrowed picks and shovels and returned the next day and opened up the ledge. Subsequent development has opened several other rich veins 3 to 5 feet in width. Indications seem to show the probability of a very large ore body below. Soon after being discovered the property was sold for $125,000. The purchaser was unable to meet the deferred payments and the sale was not consummated. Nicholas Treweek, the purchaser, has been foreman of the Homestake mine for the past seventeen years. The future services of Mr. Treweek have been secured by a syndicate of Chicago capitalists, who during the past year have drained the underground lake in the Uncle Sam mine on Elk creek, famous as a producer fifteen years ago, and have developed it into a rich free gold mine.

Custer, S. D., Sept. 1st, '99.

LAWRENCE COUNTY.

The Golden Reward chlorination works, recently destroyed at Deadwood by fire, are to be rebuilt, with double the capacity of the former plant. A plan to fit the new works for both chlorination and cyanide is being considered by the company. A fourth furnace has been blown in at the pyritic smelter, formerly Deadwood & Delaware, but now owned by the Golden Reward Co.

UTAH.

IRON COUNTY.

A good strike is reported in the Ophir, at Stateline. In the west drift ore has been encountered that shows seventy ounces silver, with gold. It is the intention of the owners to equip the proposition with machinery, including a steam hoist.

JUAB COUNTY.

The Centennial-Eureka mine, recently sold, has paid $2,130,000 in dividends. It is reported that there is in sight in the mine ore worth $5,000,000, gross value.

J. H. Stallings, Supt. of the Tesora at Silver City, reports that the water is under control, and the management will sink the shaft another 100 feet, at which point drifting will commence. The high-grade shoot of copper sulphides varies from 20 inches to 3 feet in width, showing 18% to 36% copper, 26 ounces silver and $2 gold.

E. P. Jennings, Supt. Dragon Iron mine, at Tintic, reports the new shaft down 240 feet. At 500 feet drifting underlying the iron outcrop will commence. At the Alaska, of which Mr. Jennings is also Supt., drifting is now going on both ways from the shaft.

The Sacramento M. Co.'s steam hoisting and ventilating plant has been supplanted by electricity. The new plant was used for the first time on the 3d inst.

Pres. Merrill of the South Sunbeam mine at Silver City reports a strike in that property. A vein of ore 4 feet thick has been cut, which assays 50 to 100 ounces in silver and some gold. Before the main vein was encountered three or four stringers were struck. Large quantities of mineralized and whitish talc have been uncovered. The owners propose putting in, as quickly as possible, pumping and other machinery.

Tribune: The management of the Grand Central at Tintic has an arrangement with the Bingham Copper and Gold Mining Co. at Bingham that will afford the former a market for its low grade silicious ores that, with the Bingham sulphides, makes a perfect smelting combination. In the Grand Central, the ores constitute a milling proposition, with good auriferous values and some silver. Under the arrangement these may now go without alteration to the smelter that will be erected by the Bingham Copper and Gold Mining Co. Of the silicious ores there is a large volume. A site will be selected for the proposed smelter this week and the plans now in the hands of Mr. Walters will be submitted in a few days.

SALT LAKE COUNTY.

Engineer Fisher, who drafted the plans for the Highland Boy smelter, is working on the plans for the smelter to be located upon the property of the Santa Fe M. Co.

In the development and exploration of Galena ground, the shaft is to be sunk 200 feet. It is now down 125 feet, to which depth it is being enlarged and retimbered. A steel gallows frame will be put up.

A large number of copper mining locations have been made on Antelope island, in Great Salt Lake, and assays are high. It is claimed that a wide mineralized ledge can be traced the entire length of the island, which is fourteen miles long.

Bingham *Bulletin*: A strong flow of water was struck at the Kremlin group Monday. A new pump will be necessary. The 200 level is in 200 feet ore.——At the De Lamar-Wall group concentration operations have been completed. Everything cleaned up, the concentrates shipped and the men paid off. The mill has been closed and turned over to its owners, Rogers & Sons, who expect to start it up on ore from some of the United States Company's holdings on which they have a lease. How long the close-down at the De Lamar-Wall will last is not known.

TOOELE COUNTY.

The Mercur mill will be increased to 600 tons daily capacity.

It is reported that important discoveries have recently been made in the Geyser-Marion.

SUMMIT COUNTY.

Float was picked up near Park City last week which was assayed by W. D. Clays at Bingham, giving the following: No. 1, 12,890 ounces silver and $12 gold; No. 2, 1526 ounces silver, $2 20 gold and 12 5% copper.

Park *Record*: The Daly-West mill has closed down for repairs. Two new jigs have been put in and other improvements made to increase the output.——At the Ontario the work of rebuilding the furnace has commenced and the mill put in readiness to resume work on Ontario ore.——The sinking of a 500-foot shaft on the Putnam ground has commenced under the supervision of D. C. McLaughlin.——Ore hauling to the old Anchor concentrator has ceased, and, after a cleanup, the machinery will stop and the mill will be dismantled. The machinery will be taken to the new mill, where it will be used in connection with the new machinery.——The Weber & Kearns mill is through with its work and hereafter the Silver King mill will take the ores that have kept the former mill in operation.——The mines of the Park district ship 1500 tons of ore weekly.

WASHINGTON.

In Okanogan and Stevens counties nearly a thousand teams are reported hauling freight from the head of navigation on the Columbia river to the Methow, Okanogan, Slate Creek, Camp McKinney, Republic and Colville mining districts, from 40 to 102 miles, the latter being the distance to the Camp McKinney mines, across the boundary in British Columbia. Considerable development is on the Colville reservation, thrown open two years ago.

OKANOGAN COUNTY.

The 10-stamp mill of the Okanogan G. M. Co. is running. Mgr. Edgecomb of Loomis figures that he can mine and mill the ore by the cyanide process for $2 per ton. The company owns the Similkameen Falls, and proposes to use them in generating electric power.

Mgr. Boyd of the Palmer Mountain tunnel has received instructions to put a double shift on the tunnel, increasing his force to nearly fifty men. The big No. 12 ledge will be drifted on east and west, and other drifts will be continued with day and night shifts. Mr. May is considering machinery for reducing and treating the ores.

FERRY COUNTY.

It is reported the Republic M. Co. will build a custom mill.

The Princess Maud, in the winze, which has been sunk 125 feet, has a body of ore that runs $125 to the ton. There are streaks of sylvanite in the vein which runs $1400 in gold and silver to the ton.

The Northwest smelter has made a rate of $4.50 per ton for freight and treatment to the Rossland, B. C., mine owners. The Trail, B. C., smelter rate has been $6.

WISCONSIN.

There will be an increase in the output of the zinc mines in the southern part of the State. The Mineral Point Zinc Co. is building new furnaces and putting in new equipment of hoisting machinery, preparatory to extending its workings. The oldest zinc mines in the west are in this district, and though some of them have been operated in an indifferent fashion for years, the present demand for metals has caused a revival and led to the investment of new capital.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence) —Redman & Outhett have prepared an exhibit of the Kamloops district ores for the Paris Exposition. The exhibit consists of gold, silver, copper, lead, molybdenite, cinnabar and iron ores. The Board of Trade is having an exhibit prepared for the Spokane Fair. N. C. Wallace of Toronto is expected in Kamloops to look over the Iron Mask with a view of resuming work thereon. Mr. Nastell of Tacoma, Wash., has resumed work on the Cyclone mine, five miles south of Kamloops. The Glen Iron mines at Cherry Creek, thirteen miles west of Kamloops, have been bonded to a Pittsburg syndicate. Shipments of ore from the Gordon claims are being made to the Trail smelter. The Cinnabar mines on Hardie mountain, on the north side of Kamloops lake, are being worked under superintendency of J. F. Wells. The ore averages 2% quicksilver. The company intends erecting furnaces. O. S. Batchelor has bought Mr. Dillon's interest in the Last Rose of Summer. The sale of the Chieftan group of copper-gold properties on Coal Hill to the Mines Contract and Investigation Co. of Toronto is reported. The same company has a bond through J. T. Robinson on A. Noble's Pole Star. H. Bostock has purchased the Drayman from Jas. Blair.

Kamloops, B. C., Sept. 1st, '99.

A smelter of fifty tons daily capacity has begun work at Van Anda, on Texada Island. There is great activity on the island and the neighboring coast, and the district will this year for the first time add to the metal yield of the province.

Smelting and transportation charges have been reduced to a figure so low that $10 ore will now afford a profit to Rossland miners.

MEXICO.

A Mexican paper tells of "the uncovering of a solid mountain of native ferro-nickel manganese at Durango." "Tradition has it that this enormous mass of native metal is an aerolite that fell from the sky centuries ago. It is more than 300 feet high, half a mile wide and more than a mile in length, and is estimated to contain more than 500,000,000 tons above ground. It is worth $480 a ton." A pretty story.

SOUTH AFRICA.

During the month of June the output of the Witwatersrand was as follows:

	Ozs.	Dwts.	Value.
From Mill	38,690	4	£1,051,099
Concentrates, etc	11,161	7	37,182
Tailings	139,469	7	470,189
Slimes	8,658	8	30,183
Banks	784	5	2,700
Total	445,763	11	£1,591,353

GENERAL SUMMARY.

	Ozs.	Dwts.	Value.
Witwatersrand	445,763	11	£1,591,353
Lydenberg	10,117	11	34,821
De Kapp	8,532	13	30,679
Klerksdorp	2,798	7	8,652
Banks from other districts	60	3	210
Grand total	467,272	5	£1,665,715

THE YUKON.

There are no new discoveries around Dawson, and the old ones are being worked out. The properties are passing into the hands of aggregated capital, and considerable machinery is going in. The newest steam thawer is reported a success.

Industrial Notes.

—Stockton is now the electrical city of California.

—A telephone line from Denver, Colo., to Cheyenne, Wyo., is now in operation.

—Steel rails have again advanced to the following prices: New York $32, Chicago $31, Pittsburg $30.

—The customs receipts at San Francisco for August were $758,601.63, the largest amount ever received.

—Eighteen miles of heavy narrow gauge road will be built this season from Morenci to Guthrie, Arizona.

—Jerome, Arizona, proposes to spend $60,000 for water from the Verdi river. The water is to be raised 900 feet.

—The United States for its Asiatic mails last year paid $23,000 to American steamships and $14,000 to foreign steamships.

—It is reported that the Carnegie Co. in the last few days withdrew offers on structural iron and steel and advanced prices $5.

—Oil has been discovered ten miles southwest of Trinidad, Colo., and a company has been formed in Colorado Springs to develop it.

—The Nevada Power Co. has organized at Reno, Nev., to transmit power from a canyon east of Reno to the Comstock for pumping, etc.

—The Utah Valley Ry. Co. will extend its electric line from Salt Lake City to Bingham, power to be had from the Telluride Co., Provo.

—The Cripple Creek Railway Co., capital stock $1,000,000, has organized at Denver, Colo., to build a railroad from Canyon City to Cripple Creek, thence to Denver.

—W. S. French of Alma and W. S. Wilson of England, who own the W. C. ranch near Alma, N. M., have bought 120,000 acres of the Maxwell land grant. The price paid per acre is 70 cents.

—The proposed establishment of fortnightly American mail service from San Francisco to Shanghai would bring Berlin and Paris within twenty-eight or twenty-nine days of Shanghai.

—Under present industrial conditions a tin mine would be of greatest value. North America is the greatest consumer of tin, yet there is no producing tin mine of any consequence in its entire area.

—Paymasters in the Philippines have asked for shipment to them of coin instead of notes, alleging that the ants of that country had almost entirely destroyed $300,000 in paper money. During the last year more than $7,000,000 has been paid to the soldiers in the Philippines.

—President J. C. Osgood, of the Colorado Fuel & Iron Co., says that the steel works at Pueblo will be enlarged, probably to three times the present producing capacity. The C. F. & I. Co. will increase its capitalization from $13,000,000 to $25,000,000 at a meeting called for on the 25th, at Pueblo.

—The Telluride Power Transmission Co., owning the electric plant at Provo, Utah, purposes to increase the plant and to double the power. When the Provo plant was first constructed the company generated 1200 H. P., but this was doubled shortly after it was in operation. Before the company increased its capacity, every bit of the increase of power was engaged and contracted for, and the works at present are crowded to their full capacity. The water power which operates the plant has an energy of 6000 H. P., and it is the intention of the company to go to the limit. The company has gone into the development of electric power very extensively and have several plants in Colorado, Utah and Montana. The plant is operating mills at Mercur, thirty-five miles away, and the highest voltage known—40,000 volts—is utilized to transmit the power.

—The Colorado Electric Power Co. has a contract with the Woods Investment Co. to run a 258 H. P. motor in the new Economic Gold Extraction mill at Victor, erected by E. Woods, until the Economic Extraction Co. can install generators of its own. The company also has a contract with the Arequa sampling works mill, near the Elkton mine in Arequa gulch, for 250 H. P. These two concerns are the largest users of electricity in that district. Other large users are the Taylor & Brunton sampler, 75 H. P.; the Cripple Creek sampler, 50 H. P.; Rio Grande sampler, 50 H. P.; Tornado mine, 75 H. P. compressor; Lillie mine, 100 H. P. compressor; Moon-Anchor, 100 H. P. motor of electrical pump; Damon, Wildhorse, Blue Bird, Los Angeles, Ingham, Matoa, Lafayette, each 30 H. P. hoists; Deadwood, 15 H. P. hoist; Gold King, 10 H. P. hoist.

—Statistical information regarding the manufacturing industries of San Francisco shows that during the year ending March 1st, '99, the number of manufactories was 1846, the number of employes 32,104, and the value of the product for the twelve months named was $77,189,116. Among others there are 5 manufacturers of air compressors; employes, 80; value, $300,000; artificial stone, 31; employes, 310; value, $400,000; architectural iron, 7; employes, 70; value, $175,000; barbed wire and wire nails, 2; employes, 75; value, $110,000; belting, 9; employes, 45; value, $160,000; brass foundries, 10; employes, 400; value, $850,000; car, 4; employes, 80; value, $150,000; coppersmiths, 12; employes, 50; value, $100,000; cordage and rope, 2; employes, 250; value, $700,000; electrical machines, 3; employes, 200; value, $250,000; electric lighting companies, 5; employes, 600; incandescent lights, 100,000; arc lights, 5000; horse-power and motors, 10,000; coal used annually, 50,000 tons; value of products, $2,000,000; electric supply, 17; employes, 160; value, $310,000; elevator, 3; employes, 80; value, $150,000; foundries and machine shops, 40; employes, 4000; value, $5,000,000; gas works, 3; employes, 1000; value, $3,000,000; gas engine, 5; employes, 150; value, $150,000; glass works, 25; employes, 175; value, $1,300,000; iron fence, 4; employes, 22; value, $40,000; japanning and galvanizing, 3; employes, 40; value, $110,000; jewelry and silverware, 29; employes, 162; value, $805,000; lead pipe and shot, 1; employes, 50; value, $500,000; linseed oil, 1; employes, 60; value, $170,000; marble works, 26; employes, 100; value, $100,000; paint, 7; employes, 65; value, $575,000; pumping machinery, 11; employes, 60; value, $210,000; rolling mill, 1; employes, 30; value, $100,000; shipyards, 6; employes, 400; value, $1,500,000; solder and babbit, 3; employes, 35; value, $80,000; type foundries, 3; employes, 110; value, $70,000; wire and wire rope, 2; employes, 200; value, $1,000,000; water wheel, 2; employes, 60; value, $275,000.

Personal.

TAYLOR D. MCLEOD of Yuma is in Los Angeles, Cal.

JAS. D. HAGUE has left Nevada Co., Cal., for New York City.

JAS. FARRELL is the new superintendent Red Line Group, B. C.

BERNARD MACDONALD is examining mining property at Rossland, B. C.

A. W. TENNANT of Santa Fe has bought the Cerrillos, N. M., smelter.

F. F. THOMAS, superintendent Gwin mine, Cal., is visiting San Francisco.

EDGAR P. RATHBONE announces his future headquarters will be Cascade, B. C.

GEORGE MITCHELL, of the Cobre Grande, Cananea group, Mexico, is in New York.

R. A. JONES succeeds W. R. Jones as superintendent of Gold Bug mines, Glendale, Or.

DR. THOS. BOYSON of the Kennedy, Cal., mine, has returned from Virginia City, Nev.

PAUL JOHNSON is still examining smelter sites between Midway and Boundary Falls, B. C.

G. H. EVANS has returned to Breckenridge, Colo., after a brief business visit to San Francisco.

F. H. DEAN of Cripple Creek, Colo., is in San Francisco looking for California mining investments.

H. M. CROWTHER will have charge of J. R. De Lamar's Gold Mountain mine in San Bernardino Co., Cal.

GEO. A. RICE, of London, England, has recently been investigating the copper mines of Shasta county, Cal.

W. M. KELLY succeeds P. Y. Murphy as superintendent of the Anaconda C. M. Co.'s lower works smelter.

MARK E. CAREY has returned to Albany, Or., with $25,000, the result of seven years' effort in South Africa.

CAPT. DE LAMAR this week goes to Bully Hill, Shasta county, Cal., to inspect his newly acquired copper property.

BERT HALL is at Ballarat, San Bernardino Co., Cal., operating the mill and cyanide plant for the Jail Canyon Co.

GEORGE W. HULL, at one time owner of nearly the entire Jerome, Arizona, townsite, is in the East on legal business.

J. H. LEWIS, has gone to London to bring the attention of the Government to the claims of American miners on Atlin lake.

CHAS. F. HOFFMAN, an Oakland, Cal., mining engineer, is expected back from West Australia, via London, next week.

J. H. MCKENZIE has been appointed manager of the Mariposa Commercial and M. Co., vice Capt. Thomas Mein, resigned.

J. H. HURSTE, of Kingston, N. M., has gone to Magdelena, Mexico, to take charge of the mining company's operations there.

JOS. LEITER, of Chicago, is in Colorado, and is there credited with intention to "corner" the asphaltum industry of that State.

JNO. F. MCDONNELL has been re-elected for the thirteenth time financial and recording secretary of Virginia City, Nevada, Miners' Union.

F. A. PROVOT, mine engineer of the United Verde Copper Co. at Jerome, Arizona, is again at his post after a severe siege of typhoid fever.

H. M. GORHAM, superintendent of the Cholar, Potosi, Savage and Crown Point mines at Virginia City, Nev., is at Santa Monica, Cal., convalescent.

J. W. NEILL, of the U. S. M. Co., has returned to Salt Lake City, from Butte, Montana, where he gave expert testimony in the Parrott suit.

MESSRS. CORAM AND HOLMES, who recently bought the Garner group, Calaveras county, Cal., have come to San Francisco from Boston to see their property.

C. H. MACKINTOSH, of Rossland, B. C., formerly Governor of the Northwest Territories, a prominent mining man, is in San Francisco with a view to buying mining properties.

EDWARD HARDACK, who has been in South Africa for five years, has been appointed to a position with the Simner & Jack M. Co., near Johannesburg, at a stated salary of $20,000 per year.

SECRETARY HAY has sent instructions to the American Consul at Pretoria, directing him to protect all American citizens and interests in case of war between Great Britain and the Transvaal.

W. S. KEYES of San Francisco goes to Butte, Montana, next week to give expert testimony in the Parrott suit. R. W. Raymond and Clarence King will also testify, the case lasting through September.

A. F. HOLDEN, of the U. S. Mining Co., will be manager of the Centennial-Eureka, Utah, property. When the Centennial-Eureka option was secured, $2,400,000 worth of ore was blocked out. The U. S. Co. will build a smelter of 800 tons daily capacity.

F. W. PECK, the commissioner-general of the United States at the Paris Exposition, has the endorsement and support of the mine owners and business men of Colorado Springs and Cripple Creek, Colo., in his project to send the Paris exhibition a pyramid of gold bullion worth $1,000,000.

A. J. WALSH of Butte Co., Cal., is now in charge of the Evans hydraulic elevator work at the Risdon Iron Works, San Francisco. During a recent inter-mountain trip, Mr. Walsh installed six Evans hydraulic elevators at Breckenridge, Colo., one at Ingold placer mine, Boulder Co., Colo., and two at Wyoming gold mine, Dubois, Wyoming.

A. EKMAN, who is preparing California's mineral exhibit at the Paris Exposition, says the exhibit will be a fine one; that as space is limited only the finest specimens from California's mines will be shown and that, except a few small cases of specimens of particular interest and merit, the exhibit will form a part of the national mineral exhibit.

FRED C. MATHYAS, who for several years has been a field assistant of the State Mining Bureau, has been appointed to collect the mineral exhibit to be made by the Southern Pacific Railroad Company, in connection with a display of the resources of the State of California, at the Paris Exposition in 1900, which will be under the direction of W. H. Mills of the land department of the company. The company will erect a special building for this display, which will include all the resources of the State, agricultural as well as mineral.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MORTUARY MONUMENT.—W. A. Hawthorne, Chittenden, Cal. No. 631,890. Dated Aug. 29, 1899. This invention relates to a device for indicating the last resting place of deceased individuals, and a means connected therewith for containing the ashes of the deceased person when cremation has taken place. It may also be so arranged as to exhibit a counterfeit presentment of the face or figure of the person of the deceased. It consists of a base having a vertical tubular standard supported thereon, and tubular arms connected with the upper end of the standard having end caps adapted to receive medallions, the tubular portion also serving as a container for the ashes when desired.

VAPORIZOR.—M. L. Cooper, Modesto, Cal. No. 631,952. Dated Aug. 29, 1899. The object of this invention is to provide an apparatus for heating air and to vaporize such substances as it may be desired to apply or distribute in such a condition. It consists of a hollow casing with inlet and outlet pipes and a closed chamber with partitions, forming a sinuous passage through which the air is transmitted, a heater beneath said chamber; a flexible, non-conducting conveying pipe, through which the heated air is transmitted to the point of application, a holder connected therewith and nozzles applicable to the end of the holder, with an interposed non-conducting section to prevent the heating of the holder.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING AUGUST 29, 1899.

631,932.—BIT STOCK—W. L. Baumgardner, Watsonville, Cal.
632,098.—MACHINE GUN—E. M. Capps, San Diego, Cal.
632,044.—EGG BEATER—S. E. Chapman, Napa, Cal.
631,952.—VAPORIZER—M. L. Cooper, Modesto, Cal.
631,847.—RAILROAD TRACK CLEANER—Dart & McMurry, Seattle, Wash.
632,110.—RUBBER CEMENT—M. B. Grout, North Yakima, Wash.
631,890.—MONUMENT—W. A. Hawthorne, Chittenden, Cal.
632,126.—DREDGER—P. Kirk, Kirkland, Wash.
632,128.—WATCH PLATE—E. Krabenbuhl, San Rafael, Cal.
632,222.—BOX—V. M. Malatesta, S. F.
632,194.—ELEVATOR—A. W. Morey, Owyhee, Ogn.
631,939.—ENVELOPE—Nellie P. Pakard, Centralia, Wash.
632,227.—HAMMER—C. E. Perry, S. F.
631,968.—FIRE ESCAPE—D. B. Rees, Union, Ogn.
631,835.—SHOE JACK—H. Waters, Bisbee, A. T.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Catalogues Received.

IN green and gold comes Catalogue No. 33 of the M. C. Bullock Manufacturing Co., Chicago, devoted entirely to the diamond drill as manufactured by the Bullock Manufacturing Co., minutely described in technical detail, profusely illustrated with prices, descriptions and explanation of everything in connection therewith. The instructions for operating diamond drills, setting diamond bits, etc., are of practical value to any present or prospective owner of one of those valuable mining appliances. A copy will be sent to any address upon request by the M. C. Bullock Manufacturing Co., Chicago, Ill.

CATALOGUE No. 12. Hercules Gas Engine Works, 305 Market Street, San Francisco, Cal.: A handy little pamphlet copiously illustrated and giving details of hoisting engines made for miners by the manufacturers of the Hercules gas and gasoline engines, with testimonials from satisfied purchasers. The catalogue will be sent free to any address.

Books Received.

"*Heat and Heat Engines.*" A study of the principles which underlie the mechanical engineering of a power plant; by F. R. Hutten; 8vo. xxi. and 553 pages; cloth, $5; profusely illustrated; John Wiley & Sons, New York. The scope of this work is an ambitious one and appears to be comprehensively treated. The book is of unusual merit and deserves the following from the preface, which indicates its character and value:

"The effort has been made under another title, 'The Mechanical Engineering of Power Plants,' to discuss the steam-engine and the steam boiler with their accessory apparatus, so as to enable students and others to make an intelligent selection of successful designs for a set of conditions which might be imposed. The object of the author was to make the reader familiar with accepted solutions of the power-house problem in all its details, but no attempt was made to discuss the questions of design of such apparatus. It was intended that the student should ask at the end of his study of that book: What are the principles of physics and dynamics upon which these machines depend; and how do engineers proceed when called upon to design such power-house engines?

"This book, under the title of 'Heat and Heat Engines,' has been prepared to answer these questions in part. It discusses the energy resident in fuels, and the methods of its liberation as heat for power purposes; the transfer of such heat to convenient media whereby it can be used in heat engines; the laws and properties of such media, and the design of cylinders of the necessary volume to give a desired mechanical effect or horsepower. Then, this point having been reached, and relations being established for the mutual variations of temperature with pressure and volume in such media when operated in a cylinder with a piston, it becomes easy and natural to go further and discuss the air compressor and its compliment, the air engine; and to extend this discussion to include the problem of mechanical refrigeration. The hot-air engine using a permanent gas as a medium naturally leads to the gas engine and the oil engine; and the engine using steam as a medium leads naturally to those other media, such as naphtha, alcohol and ammonia. The chapter on the Injector as a heat-absorbing and energy-transforming device closes the book.

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"This treatise tries to occupy a middle ground. It might wisely be used as a groundwork for subsequent treatment of heat phenomena by the analytic or mathematical method after the student has become familiar with the physical facts of which the equations of thermodynamics are condensed statements.

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"This is the result of trying to treat thermodynamics without the calculus, and the result should be to turn the student to further and exhaustive research in the higher field. At least, this is the author's desire.

"Equations could not be avoided, nor the use of logarithms; but the use of the temperature-entropy diagram for the graphical representation of relations has been abundantly permitted. The appendices also open doors into departments of further research and knowledge beyond the scope set by the limits of the text."

Commercial Paragraphs.

GEO. E WOODBURY will move from 141-143 First street to 223 First street, San Francisco, Cal., on the 15th inst.

THE Mine & Smelter Supply Co. of Denver, Colo. has a contract with the Diamond R. M. Co. of Neihart, Montana, for a 100-ton concentrator.

AT Hanover, N. M., a large Gates crusher, requiring two railroad cars to transport it, has been received by the Colorado Iron & Fuel Co.

THE Risdon Iron Works of San Francisco have an order for pumps, hoisting works and other machinery from the Boston & Seven Devils Copper Co.'s South Peacock mine, Cuprum, Idaho.

THE Cochrane feed water heater and purifier, and the Cochrane separator are meeting with great success. Parke & Lacy, 23 Fremont street, San Francisco, are the Pacific Coast agents.

THE Denver Engineering Works Co., Denver, Colo., are building and equipping a mill for the Mountain Pride, Colo., G. M. Co., to be operated by steam, and one for the Ault-Viberg, Colo., Co., to be operated by electricity.

Recently Declared Mining Dividends.

T. F. T. M. Co., Cripple Creek, Colo., $35,000; Sept. 5.

Swansea M. Co., Tintic district, Utah, $5000; Sept. 9.

South Swansea, Tintic district, Utah, $7500; Sept. 5.

Sacramento M. Co., Utah, $5000; Sept. 1. Total, $133,000.

Raven M. Co., Cripple Creek, Colo., $10,000; payable Sept 20.

Empire State-Idaho M. & D. Co., 2½% (an increase of ½%); payable Sept. 15.

Montana Ore Purchasing Co., extra dividend, $1 per share; payable Sept. 27.

Breece Iron M. Co., Leadville, Colo., 5 cents per share, $10,000; Sept. 1. Total under Penn Co. lease $30,000.

Mead G. M. & M. Co., regular quarterly dividend No. 4, at the rate of 40% per annum on issued stock of the company; payable Sept. 11.

Boston & California G. M. & M. Co., regular quarterly dividend No. 3, at the rate of 6% per annum on issued stock of the company; payable Sept. 15.

Broken Hill Sulphides.

By CLEM. A. HACK.

One of the most difficult and seductive problems of the last few years has been that of the economical treatment of refractory sulphide ores at Broken Hill, New South Wales. As the stores of oxidized ores have been reduced the various mines have been compelled to fall back upon the sulphides, which are found in enormous quantities. Much time, energy and money have been expended in endeavoring to devise a process by which these ores may be economically treated, so as to pay for for their raising. Numerous suggestions have been made for treating this class of ore in the crude state direct, the most notable of which are the Turner and Ashcroft processes, but none of these have been proved upon a commercial scale. It has been found that it is best to first subject the ore to exhaustive concentration, whereby the percentages of the richer minerals are largely increased, while those of the deleterious are decreased, so as to render the ore more suitable for smelting. It is, therefore, to this mechanical concentration, and not to the chemical treatment, that the mine manager looks more particularly for improvement and invention to enable him to lower his working expenses, and thus cheapen his treatment of the ore.

The crude ore, as raised from the mine, consists of a mixture of galena, blende, rhodonite, garnet and gangue. The galena is the most valuable, being a sulphide of lead, and carries the silver; the blende is sulphide of zinc, containing a small percentage of iron; garnet and rhodonite are silicates of iron, manganese, etc., while the gangue is mostly quartz. The mechanical treatment at Broken Hill is carried out in jigs, and depends for separation upon the difference in the specific gravity of the various materials contained. The products from this treatment are concentrates containing most of the galena, with a much lower percentage of blende, rhodonite, garnet and gangue; middlings of blende, rhodonite, garnet and a percentage of galena; and tailings of gangue with other materials in varying quantities. As regards the concentrates, the chief difficulty is the presence of the zinc as blende, for this greatly interferes with the smelting, and the object sought is to eliminate the zinc to such an extent as not to exceed 10% to 15%.

But the zinc blende itself is about the same specific gravity as the rhodonite, and these two, therefore, are usually found together in the concentrator products. It is the presence of this rhodonite occurring with the blende in such quantities that renders the zinc up to the present practically untreatable. There are thus to be seen at Broken Hill large dumps of these products, containing valuable metals, awaiting the ingenuity of some intelligent reader to suggest a suitable method of treatment.

Great interest has lately centered round a proposed method of treating these products by means of magnetic separators. These magnetic machines, of various patterns and designs, have long been known in America and Europe, but have been confined more particularly to the treatment of low-grade iron ores. The idea is not in itself new, for as far back as 1792 a patent was granted to a Mr. W. Fularton for the separation of magnetic material from non-magnetic, by subjecting them to the influence of magnets, but this was long before the advent of electro-magnets. Great success has attended the efforts of P. J. Weatherill, of New Jersey, in the treatment of low-grade iron ores, and he has found that by the application of wedge-shaped pole pieces he is enabled to obtain a magnetic field of such great intensity that materials thought before to be non-magnetic become susceptible in varying degrees to the lines of magnetic force. These wedge-shaped pole pieces act somewhat in the same manner as a nozzle to a hose, and serve to condense the lines of magnetic force. By subjecting the material to magnetic fields of varying intensity fractional separation has been obtained of the different constituents, according to their degree of magnetic susceptibility. Thus it has been found that rhodonite can be separated from blende, and blende from quartz or gangue, and it is to magnetic separation that we are now hopefully looking for a successful solution of the problem whereby large bodies of zincy products may be worked up to a sufficient richness in zinc to be worth treating. But it is in the commercial treatment upon a large scale that the greater difficulties are generally met with. The distance through which the lines of magnetic force extend their influence is very small indeed, and therefore the line of demarcation between the separator products is correspondingly small, and must be capable of very fine adjustment. Further, the ore must be fed into the magnetic field in such a manner that there will be very little other force exerted against and contrary to that of the magnets. The ore must also be fed in such a way that all the particles will come directly under the influence of the field within which they must be retained as long as possible. Besides, the products must be delivered into their respective hoppers continuously, so that there will be no clogging, and the magnets will be always free to exert their influence. It is to these last mechanical details that the attention of the inventive public is earnestly invited.

Railroad Building by Music.

A wise foreman of a construction gang of Southern darkies knows that he can get about 50% more work out of them if he can keep them singing, when the picks and shovels will invariably keep time with the music. The same custom seems to prevail among the African aborigines.

Building a railroad in the Soudan is not carried on to the sound of the voice of an Irish "boss" directing a gang of Italian laborers. As becomes the milder atmosphere of the tropics, a railroad in those regions is built to the "lascivious pleasing of a lute" or the African equivalent. The "sofas" are the working people, and the "griots" are the musical ones. The "sofas" will not work unless the "griots" play. So every gang of men has its orchestra. The "griots" play on flutes and rude harps the peculiar "rag time" tunes of Africa, and the picks and shovels of the "sofas" go industriously as long as the music lasts. In the Soudan it has been found impossible to get work out of the natives in the construction of railroads unless music was furnished.

To every gang of forty or fifty men there are assigned two harp players and a flute player. As long as the music keeps up the black laborers do not seem to feel fatigue. Generally the musicians get tired before the laborers do. The music produced by these cheerers of labor would not be inspiring to a white man, for it is filled with peculiar plaintiveness. To the Africans, however, the tunes seem to be an inspiration. To the sound of music the steel rails are penetrating the Congo region and forcing their way through the Soudan.

A case somewhat similar to this is the custom in the Cuban tobacco factories. In the big room where the cigar makers work is always a reader. He sits up on a platform and reads novels to the workmen as they manipulate the tobacco. Again, on board ship a sailor will work as well again if he is permitted to "shanty"—that is, sing a working song, the rhythm of which keeps time to his labor. But in the building of railroads music is a new factor. Cecil Rhodes' "Cairo to the Cape" road will be literally fifed and harped through Africa.

WITHIN a few miles of New York City last week, in less than nine minutes, the engineers of the Pennsylvania Railroad removed the draw of an iron bridge across the Passaic river weighing about 500 tons and replaced it with a new one of steel that weighs 1000 tons.

Abuse of Machinery.

"There would be fewer kicks about mining machinery," said an old-time machinery salesman, "if the purchasers would treat it properly, but the fact is there are too many successful miners who think that, because they have been successful, they know it all, and in saving the salary of a competent man lose many times as much as they save. You would be astonished to learn how many intelligent miners go to pieces when it comes to machinery. They seem to forget that the parts of a machine are fitted together accurately on a perfectly level base, and if they do not have a solid foundation they are sure to come to grief.

"I never sell a compressor, even of the smallest size, that I do not insist upon a solid cement foundation, with proper bolt holes, and sometimes have to spend a good deal of time explaining the necessity for it. Even then our instructions are frequently not carried out, and the result is a break-down, a bill for repairs and a vigorous kick against the machine.

"Only a short time ago we sold a big compressor to a company and furnished blue prints so that the bolt holes could be left in the proper places in the foundation. After we had shipped the machine we received a bill for damages because the holes in the frame did not fit those in the foundation. They had left the holes in the foundation too small, and, instead of having to set the bolts with fresh cement, had to enlarge the holes, and they wanted us to pay for their mistake.

"A friend of mine, in visiting a prominent mine in a certain district, as soon as he entered the shaft house, noticed a peculiar pounding that told him something was out of order. He at once started to locate the trouble, and in a few minutes found it in the compressor. The engineer sat at the big hoist, perfectly unconcerned, and the visitors continued their investigations to definitely locate the difficulty. The dial plate on the air receiver showed that the compressor was making air all right, the indicator marking ninety pounds pressure. But while they looked, the air drills in the workings were started and the pressure at once went down to twenty pounds. Some time after their visit a new management took hold of the property and at once proceeded to make necessary repairs. They found that one side of the compressor foundation was more than half an inch lower than the other, causing the air cylinders to leak, and that the drills and connecting pipe were out of order, thus accounting for the loss of air. It cost several days' work to put the machinery in shape.

"One potent reason for so much trouble with mining machinery is the fact that so many mining engineers imagine because they are thoroughly conversant with the opening and operation of mines that they know all about machinery. Many of the best engineers in the country, when submitting specifications, are so rigorous in their requirements as to prices and methods that the machinery houses are placed at a disadvantage and the way is left open for reckless dealers to introduce inferior machines. No end of trouble arises from this fact. Competition has reduced prices to a close margin, and when a sale is made below these margins, it may be relied upon that the loss is made up in some way, either by shaving the weight or by defective or coarse workmanship.

"One of the heaviest purchasers of mining machinery in Colorado never attempts to cut down prices below a reasonable margin. He is thoroughly posted regarding the character of the different machines in use and their prices, and it is impossible to impose upon him, but he knows just what he wants and pays a fair price without grumbling. The consequence is that he pays less for repairs in proportion to the number of men employed than any other large enterprise in the State. There is no other business in the State in which it is more important to have the best machinery and to give it the best care."—Denver Republican.

A Natural Motive Force.

An Arizona miner has suggested the feasibility of running mining and milling machinery by means of windmills. He says:

Arrastras and stamp batteries can be run with windmills. Fuel is expensive in many places, and a high velocity of wind prevails about three-fourths of the time. A 16-foot power mill will run a 2 stamp battery, 600-lb. stamps, and pump the water. A good practical plant for the prospector is a 5 stamp battery, with stamps of 600 pounds each, amalgamating plates, battery feeder, a 6-foot concentrator, a water tank, force pump and pipes of proper size. The pump can be placed in a well 500 feet distant from the mill, if desired, and a rope run from the windmill to the pump to drive it. A 20-foot windmill erected on a strong wood tower, the shafting can be placed in the tower and the battery set about 12 or 15 feet distant. Any kind of a roof or shade that will keep out the sun and rain will do. With such a mill, ore can be worked by the free gold amalgamating and concentrating process at an expense not exceeding $1 per ton. In our mining district there are thousands of tons of ore and waste on old abandoned claims, a large percentage of which will yield by this process from $3 to $9 per ton and upwards. Erect windmills and small batteries and work these old dumps. They are nearly all free-gold ore, and a concentrator will not be necessary.

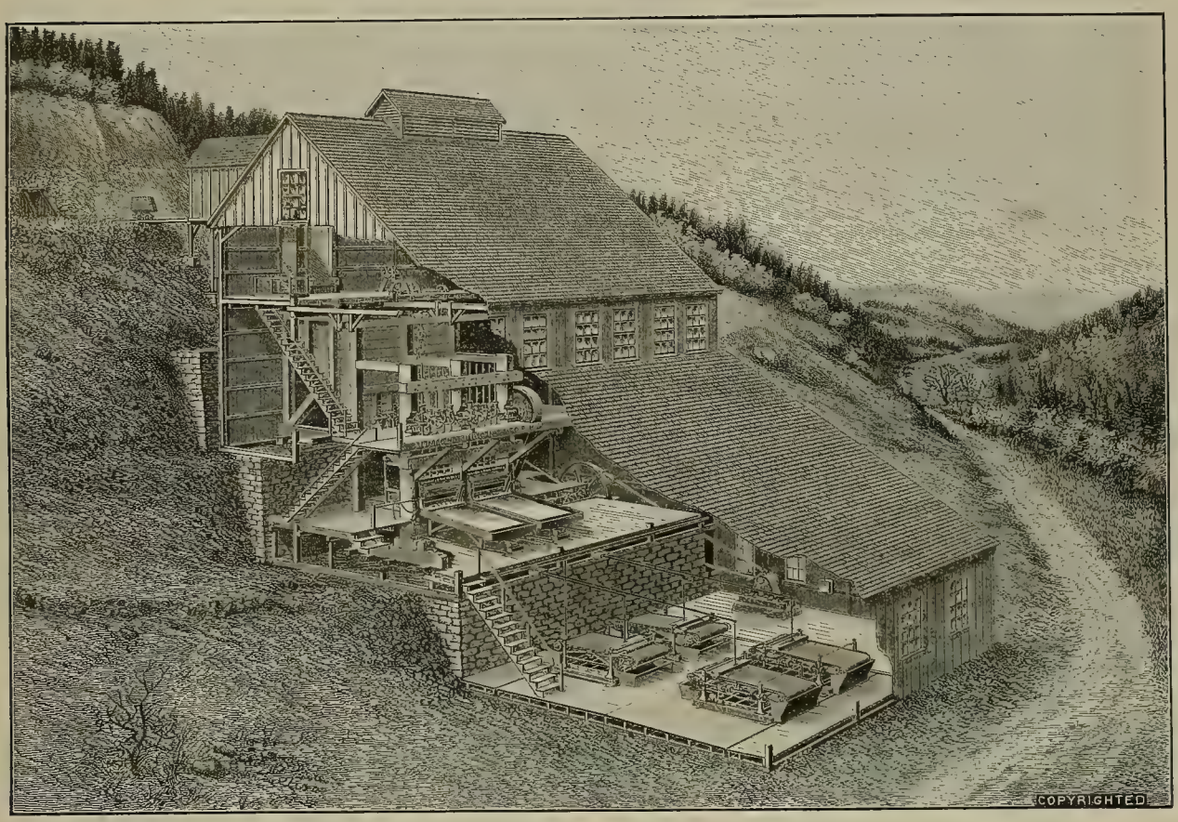
A Substitute for Platinum.

Seeing the growth of the electric lighting industry and the advance that has taken place in the price of platinum, the demand for some reliable substitute for the latter is becoming more urgent. Its value in connection with incandescent lamps, etc., is due to the fact that its co-efficient of expansion is identical with that of glass. Consequently, when an incandescent lamp becomes heated, both the glass and platinum expand equally and simultaneously, obviating any risk of the glass breakage or of the separation of the materials. It is now claimed that M. C. E. Guillaume of Switzerland and M. L. C. Dumas, a Frenchman, have discovered that an alloy of nickel and steel can be obtained to take the place of platinum in this connection. By varying the proportions of either metal an alloy results with almost any desired co-efficient. When only a small proportion of nickel is employed, a co-efficient of expansion between that of iron and that of nickel is obtained. With 23% of nickel the co-efficient of expansion of brass is reached. As the proportion of nickel is then increased, the co-efficient of expansion progresses until, when the nickel reaches 37%, it becomes practically nil. Beyond that an increase again takes place until, with 45% of nickel in the alloy, the co-efficient becomes equal to that of platinum, and the result becomes of importance to the electrical industry.—Industries and Iron.

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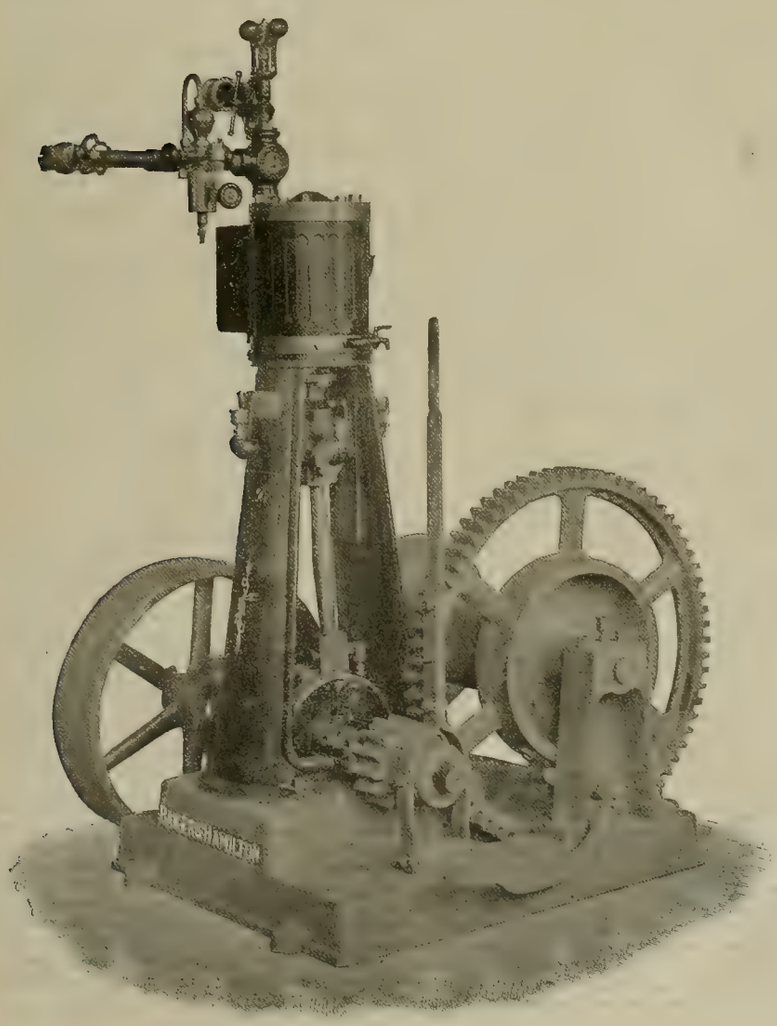
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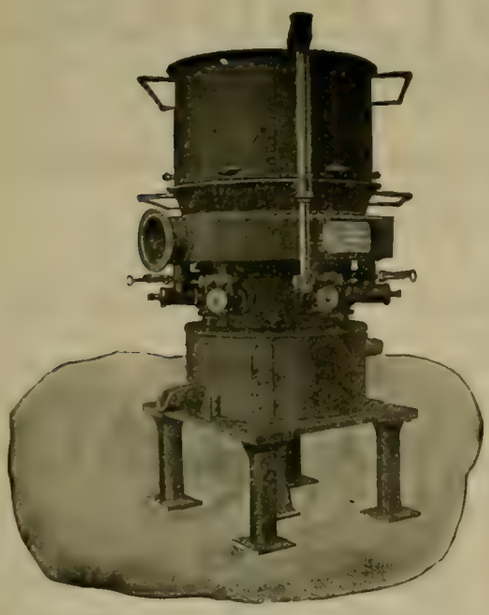
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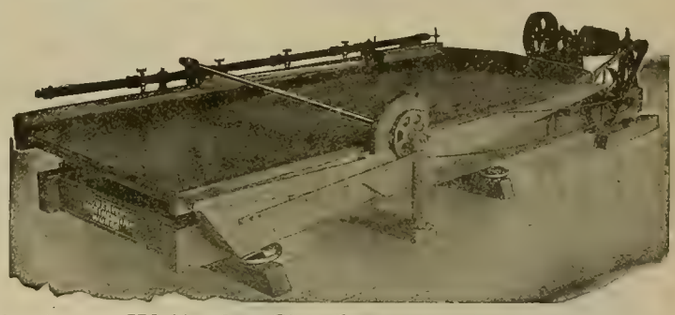
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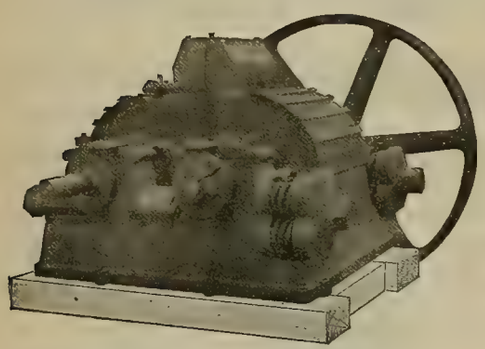
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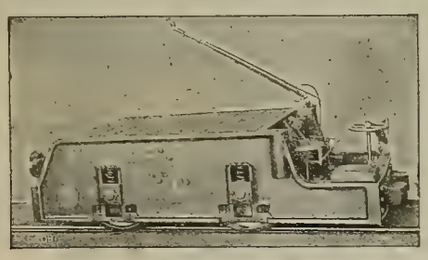
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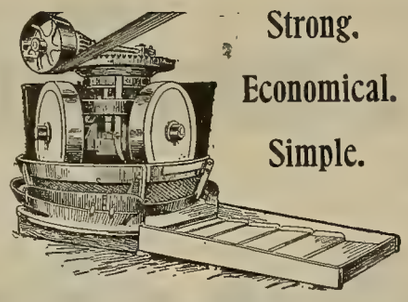
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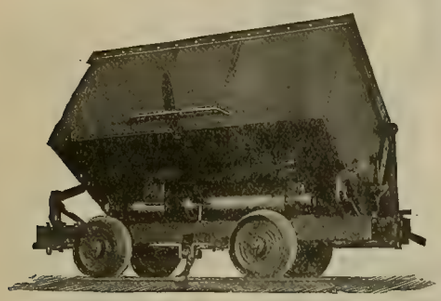
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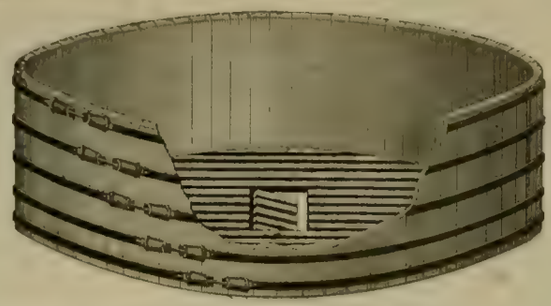
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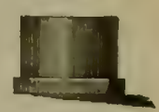


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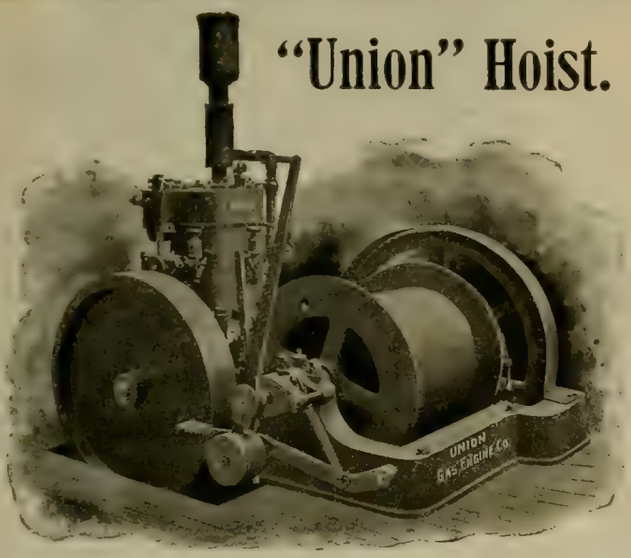


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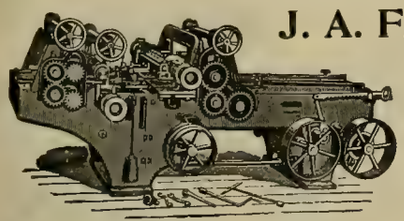
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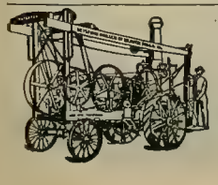


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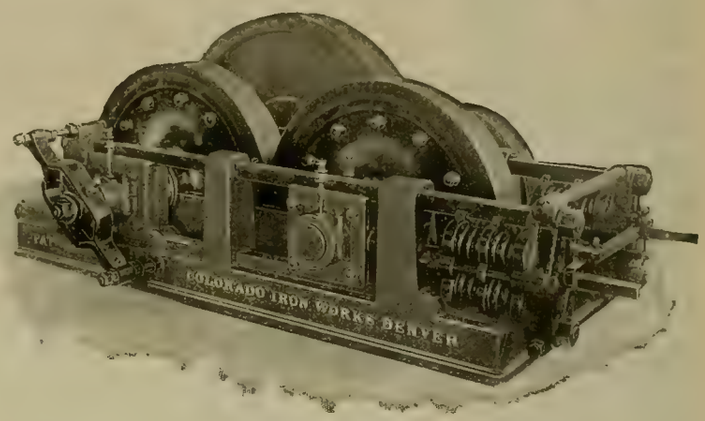
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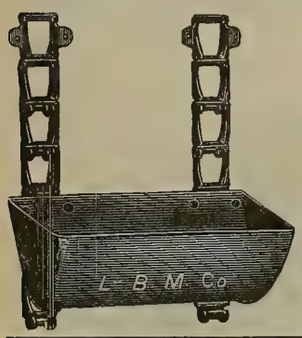
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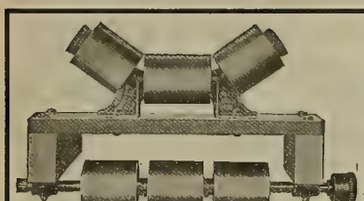
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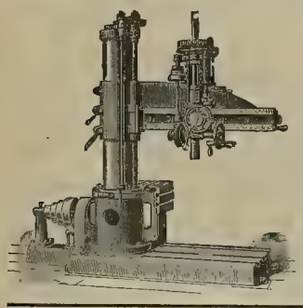
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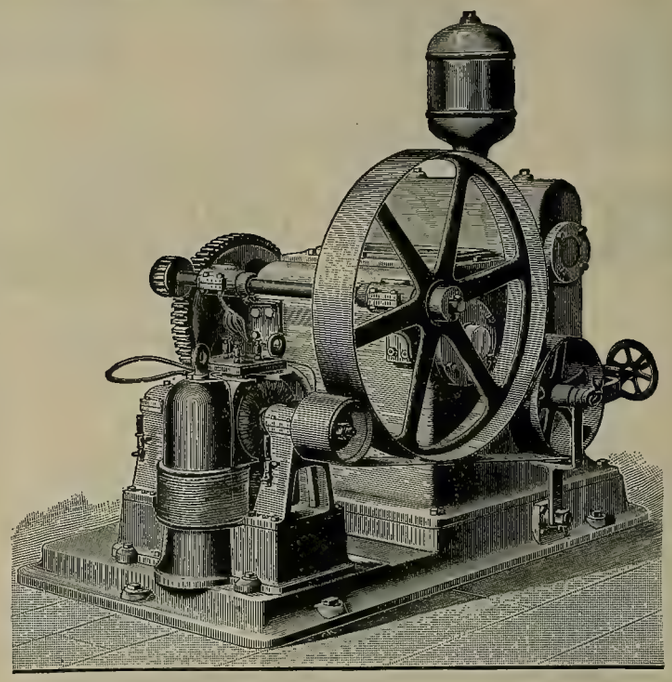
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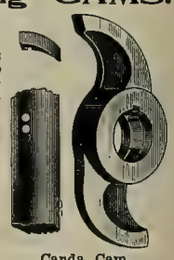
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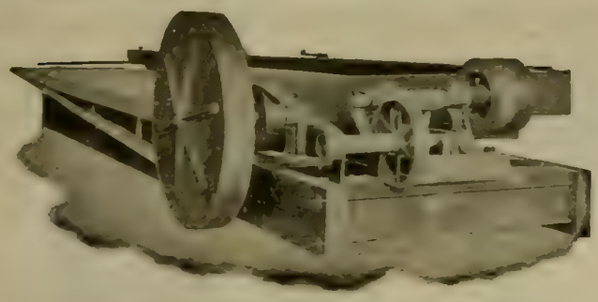
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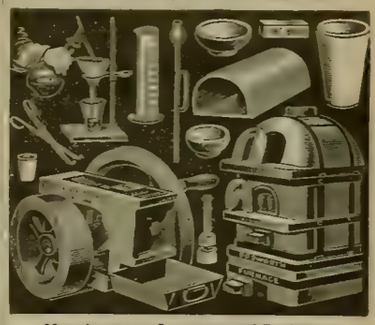
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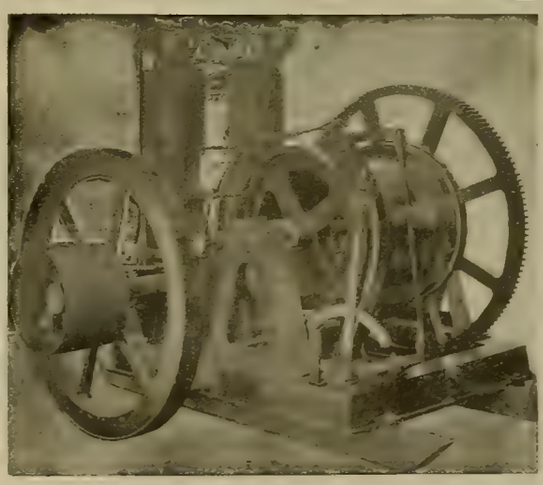
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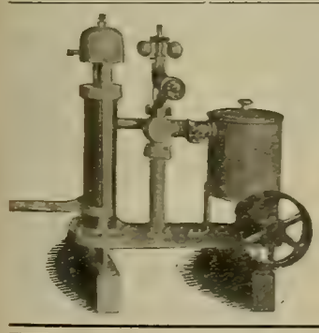
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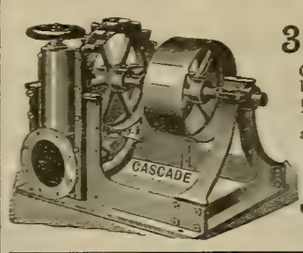
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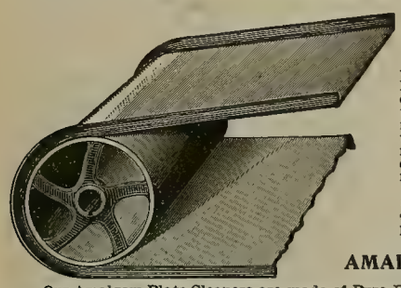
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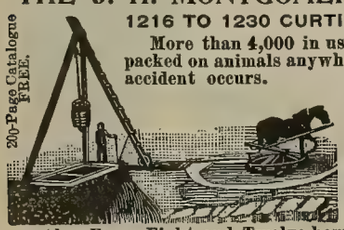
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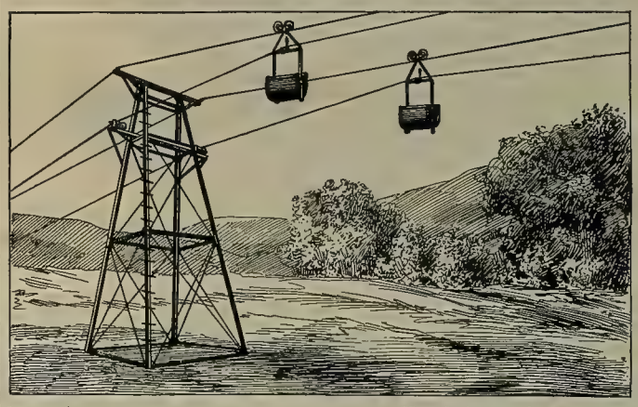
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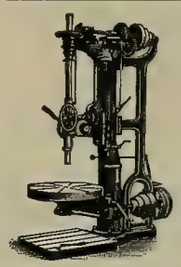
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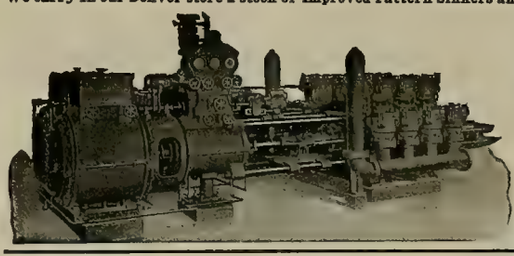
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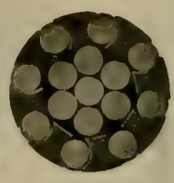
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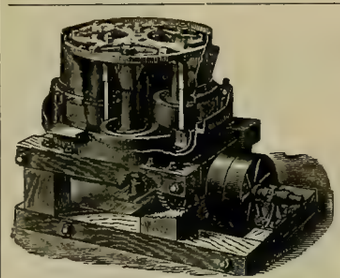
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CONCENTRATORS and ORE CRUSHERS.

Mining Machinery of Every Description.

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Mining Screens

A SPECIALTY.

Diagonal Slot,
Straight "
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Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

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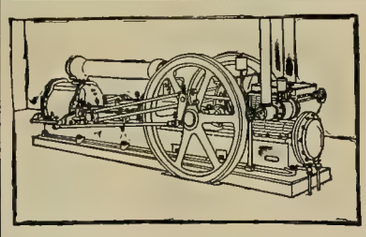
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All miners who have used the TRUAX

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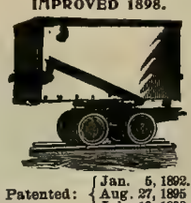
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Dealers Wanted in Mining Sections to Handle the Truax Ore Cars.

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PNEUMATIC PROSPECTOR.

Size 6x11x14 in. Weight only 10 lbs.



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NO WATER NEEDED.

Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

THE PNEUMATIC SEPARATOR.

Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.

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(M'ARTHUR-FORREST PROCESS.)

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MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

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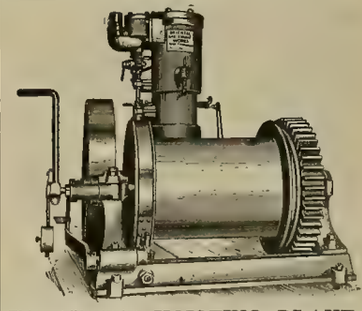
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It is strong and exceedingly simple and durable, being entirely under the control of the operator, by the use of a single hand lever for hoisting, while the lowering is governed by a foot lever and brake.

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Rock Drills,
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The INGERSOLL-SERGEANT Drill Co.,
Havemeyer Building, NEW YORK.
San Francisco Agents, PARKE & LACY CO.,
203 Fremont Street.

Market Reports.

SAN FRANCISCO, Sept. 7, 1899.

SILVER.—London, 27 5-16d; New York, 59¼; San Francisco, 59½; Mexican Dollars, 48@48¾; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.62½ asked; brokers' price, $4.40. Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6½c.

COPPER.—New York reports Lake unchanged at $18.50; brokers' price, $18.50. Local—Mill copper plates, 23¼c.

There is practically no change in copper within the week. The anticipated higher prices do not obtain. The continued successful substitution of aluminum for copper in electrical equipment is having an effect, evidently, as it is now seen that a substitute for copper has been found.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Firm for spot and easy for futures; $32 bid; $32 25 asked; pig, 36@39c per lb.

The world's visible supply of pig tin Sept. 1 was 1255 tons less than Aug. 1. Decrease in visible supply at London was officially given at 703 tons, but other sources of information make decrease 1015 tons. Stock in United States of pig tin on Sept. 1, exclusive of Pacific coast, as stated by Metal Exchange, is 2298 tons. This is believed to be an overestimate. Reliable estimate of United States stock is less than 1000 tons. Production of tin is not increased, while consumption is growing. Decrease in stocks will, it is believed, cause higher prices.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Demand strong and active. Local, $45.50; export, $40.50@41; carload lots, special rates.

The foreign demand for quicksilver and a light supply are forcing the price upward. A number of old mines have recently been reopened in California and new ones are heard of, but the demand is fully up to the supply. W. B. Buckminster says of the quicksilver properties under his management: "The price of quicksilver has advanced $1.50 per flask in the last ten days and the stock is the smallest I have ever known. I cannot see how stocks are going to be increased, notwithstanding the fact that our mines control the output in this country. I look to see quicksilver sell at $50 a flask, but I do not want the price to advance to a point where every prospector would be scraping the ground, looking for quicksilver properties, as has been the case in copper by reason of the large advance in that metal."

PLATINUM.—London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.85; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CHEMICALS.—Cyanide of potassium, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¾@2¼c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drusm, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c per 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

COKE.—Foreign, $13; domestic, $12 per ton.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia.)	11¾	12½
6 and 9 thread (½ and 5-16 dia.)	12¼	13
Bale Rope (3 and 4 strand)	11	12
Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 7, 1899.

9:30 A. M. SESSION.

100 Best & Belcher	.60c	800 Potosi	.34c
400 Challar	.41c	200 Sierra Nevada	.85c
100 Con. Cal. & Va.	$1 70	300 Utah	.14c
200 Crown Point	.23c	250 Yellow Jacket	.30c
100 Ophir	$1 15		

2:30 P. M. SESSION.

100 Potosi	.22c	100 Sierra Nevada	.81c
500 Yellow Jacket	.32c	100 Mexican	.51c
100 Alpha	.06c	100 Hale & Norcross	.32c
100 Union Con	.43c	100 Con. Cal. & Va.	$1 70
50 Caledonia	.69c	100 Occidental	.22c
300 Overman	.18c	100 Belcher	.36c
200 Challar	.41c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, MONEY loaned, mines, MINING companies organized, their property exported, financed and managed, MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
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There's money in it for you if you don't delay until the boom strikes.
It's coming—coming sure. **A QUICK DECISION RIGHT NOW** may make your fortune. Prospectus free, including "inside information."

UNION-CONSOLIDATED OIL & TRANSPORTATION CO.,
322-323 Parrott Bldg., San Francisco, Cal.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

DIVIDEND NOTICE.

MEAD GOLD MINING AND MILLING COMPANY.—A regular quarterly dividend, No. 4, at the rate of forty (40) per cent per annum on the par value of the issued capital stock of the company has been declared, payable Sept. 15, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close Sept. 11, 1899.
G. GALL, Secretary. J. C. JENS, President.

DIVIDEND NOTICE.

BOSTON & CALIFORNIA GOLD MINING AND MILLING COMPANY.—A regular quarterly dividend, No. 3, at the rate of six (6) per cent per annum on the par value of the issued capital stock of the company has been declared, payable Sept. 15, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close Sept. 11, 1899.
G. GALL, Secretary. J. C. JENS, President.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

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Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

An Assayer and Mining Engineer, experienced in working with cyanide as well as amalgamating and bullion melting, competent to take charge of mill or reduction works of any kind, wants employment. Address E. G. KNAPP, Attorney, Mills Building, 6th floor, San Francisco, Cal.

WANTED—To purchase working gold mine with mill and machinery; give full particulars. **FOR SALE**—Fine hydraulic proposition in Calaveras county. Developed and undeveloped quartz mines on mother lode. Purchaser may deal with owner direct. W. F. Aram, room 40, 8th floor Mills bldg., S. F.

WANTED.

Second Hand Huntington Mill or Mills, Must be in Good Condition and Five-Foot.
Address, stating lowest cash price and location, MINER, P. O. Box 503, Oakland, Cal.



THE JEFFREY MFG. CO.
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JEFFREY WATER ELEVATOR.

Best and Cheapest Pump for Irrigating and Drainage Purposes.

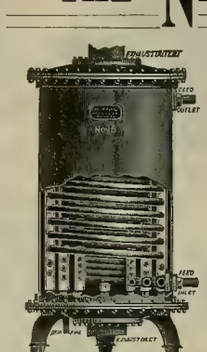
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ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Sailor Consolidated Mining Company will be held at the office of the company, 318 Front St., room No. 7, San Francisco, California, on MONDAY, the 18th day of September, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. M. C. LUND, Secretary.
Office—318 Front St., room No. 7, San Francisco, California.

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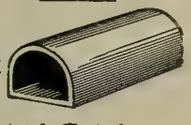
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Assessment Notices.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 29) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209-11 Claus Spreckels building, San Francisco, California.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors held on the 9th day of August, 1899, an assessment (No. 8) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 18th day of September, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 11th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment (No. 7) of One Dollar per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary

Office—320 Sansome street, room 24, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 19th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of September, 1899, an assessment (No. 14) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 14) levied on the 19th day of July, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

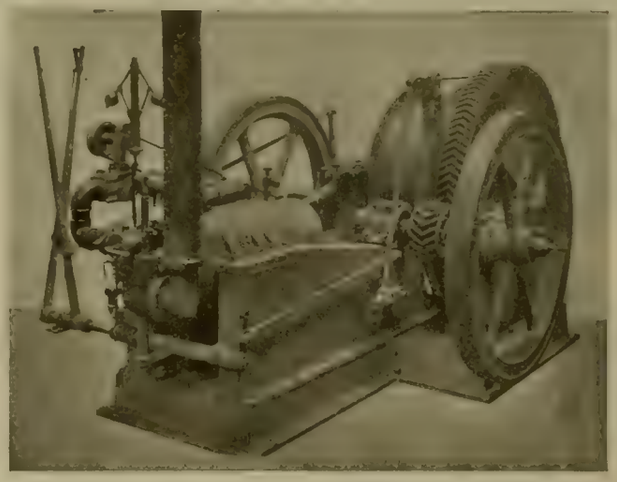
Name.	No. Cert.	No. Shares.	Amt.
Chas. Peach	23	2,000	$200 00
F. Brey	28	1,250	125 00
M. Raschen	66	250	25 00
Fred Britten	147	150	15 00
George Britten	148	50	5 00
Henry Voil	150	150	15 00
H. Gumbel	160	1,250	125 00
H. Gumbel	161	500	50 00
Chas. Gumbel	162	380	38 00
H. Helfrich	166	250	25 00
N. Prost	186	100	10 00
N. Prost	199	100	10 00
N. Prost	203	50	5 00
F. M. Freund	270	200	20 00
F. M. Freund	271	200	20 00
F. M. Freund	272	200	20 00
H. Goldsmith	278	42	4 20
Chas. Peach	299	388	38 80
N. Prost	308	100	10 00
H. Gumbel	345	500	50 00
H. Gumbel	346	500	50 00
H. Goldsmith	353	148	14 80
Wm. G. Loewe	365	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of July, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office 237 Twelfth St., San Francisco, California, on MONDAY, the 25th day of September, 1899, at the hour of 5:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

AUG. BERBER, Secretary.

Office—237 Twelfth St., San Francisco, California.

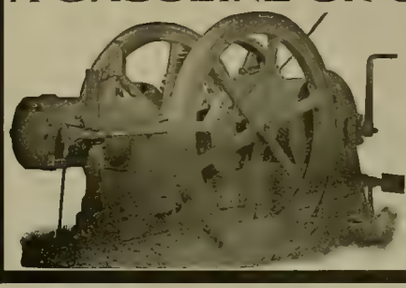
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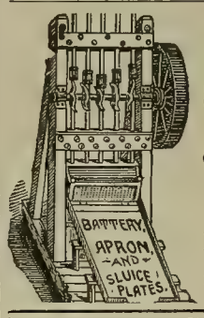
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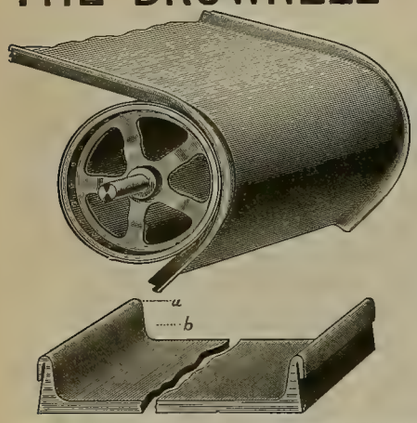
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SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb. 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintdenent.

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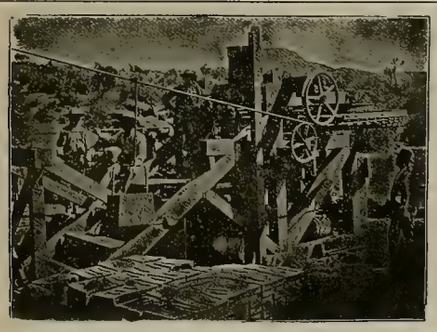
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February 19, 1897.

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No. 2045.— VOLUME LXXIX. Number 12. SAN FRANCISCO, SATURDAY, SEPTEMBER 16, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Scenery of British Columbia.

The picturesqueness of the scenery in British Columbia is illustrated in the accompanying engravings. Most of the smaller streams rise in the higher mountain ranges, being supplied by the heavy fall of snow in winter, and during summer by numerous never-failing springs. The streams have cut their sinuous ways deep into the rocky strata and these gorges and canyons constitute a most attractive feature of that province. Bull river was the scene of a placer excitement in the early sixties, when the discovery of rich diggings a mile above and below the Old Pack bridge, made the stream famous and a number of moderate fortunes were realized. Bull river is at all times a good-sized stream, swift and broad until it enters the canyon, where it is confined to a width of about 30 feet by perpendicular walls of quartzite. Through this gorge the river drops nearly 300 feet in a succession of falls and rapids in the distance of a mile. The stream rushes along, lashed into foam where sharp-angled turns obstruct its passage. Near the bridge it leaps over a precipice 80 feet in height, forming a beautiful cataract which sends up a cloud of mist in which is hung a beautiful rainbow on each clear day. Below the bridge the canyon deepens until its abrupt walls are 200 feet high, though scarcely half that distance apart. Suddenly the canyon widens into a charming valley surrounded with gently sloping hills densely timber clad. The Bull River canyon is considered one of the most beautiful bits of scenic grandeur in British Columbia.

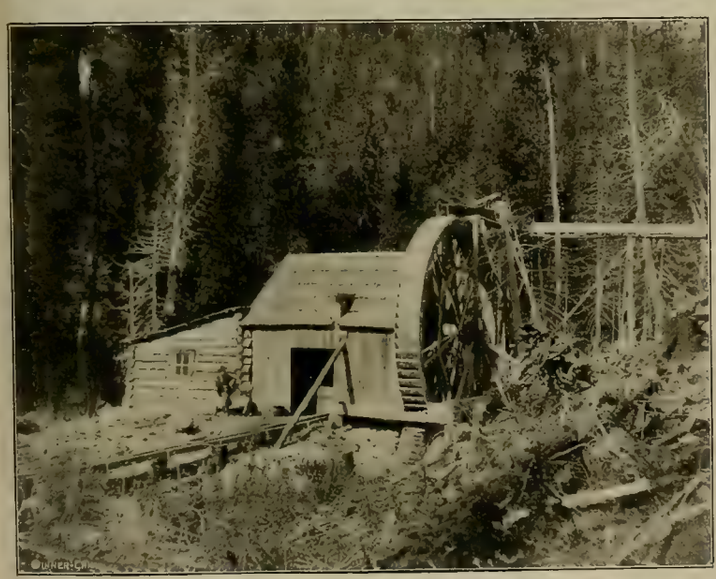


SAND CREEK, S. E. KOOTENAY, B. C.

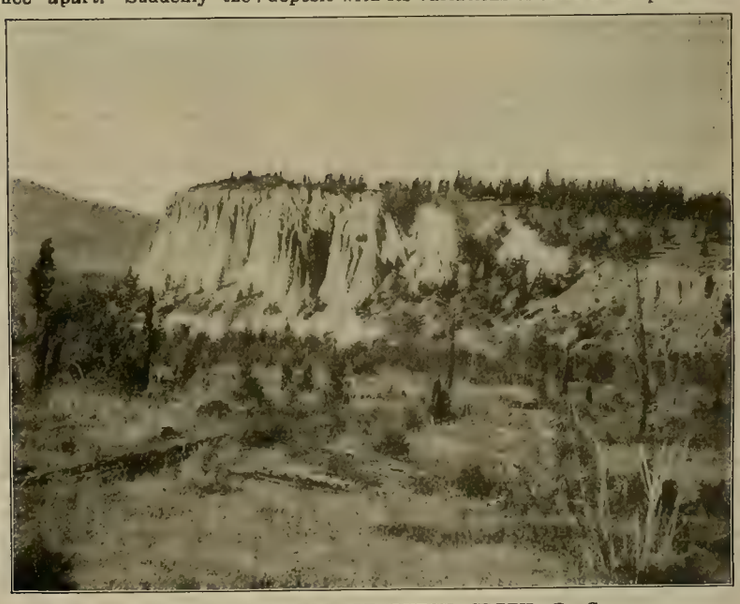


BULL RIVER CANYON, S. E. KOOTENAY, B. C.

Sand creek is also a picturesque stream, cutting its way down through twisted and contorted metamorphic rocks. The illustration shows it to be quite as wild and rugged as the canyon of Bull river. Along the former streams are numerous promising mineral locations, in which sulphide ores occur carrying copper and silver. Another type of scenery, wholly different from the deep, narrow gorges above described, is found at the mouth of Dutch creek, where recent erosion has cut deep into the alluvial banks, leaving that strange type of earth sculpture familiar to the hydraulic miner, who in a few months or days imitates the work of nature which has required centuries, and changes a smooth, sloping hillside to an abrupt, precipitous bank in which the character of the stratified deposit with its variations of color are exposed. The Dardanelles claim is on Wild Horse creek, ten miles from Fort Steele. The tunnel is 2200 feet above the creek. Ore has been hauled on a "go-devil" to the arrastra illustrated on this page.



DARDANELLES ARRASTRA, WILD HORSE CREEK, B. C.



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San Francisco, September 16, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Sand Creek, S. E. Kootenay, B. C.; Dardanelles Arrastra, Wild Horse Creek, B. C.; Bull River Canyon, S. E. Kootenay, B. C.; Cut Bank, Mouth of Dutch Creek, B. C., 309. General View of Congress, Arizona, 312. At the 1850 Level, Congress, Arizona, Mine; Bottom of Shaft at 1750 Feet, Congress, Arizona, Mine, 313. The Folsom, Cal., Sawmill—First One in the World Run Wholly by Electricity; Another View of the Sawmill at Folsom, Cal., Run Wholly by Electricity supplied by the Folsom-Sacramento Electric Transmission Plant, 316. Topics for Coal Miners, 317.

EDITORIAL.—Scenery of British Columbia, 309. The Leasing System; The Limitations of Liquid Air; The Selection of a Mill Site; Miscellaneous, 310.

MINING SUMMARY.—319-320-321.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 324.

MISCELLANEOUS.—Concentrates, 311. Republic District, Washington; The Congress Mine, 312. Metamorphism of Rocks, 313. Rand Deep Levels; Volume and Head of Water, 314. Latest Mining and Metallurgical Patents, 315. Folsom-Sacramento, Cal., Transmission Plant, 316. Telegraphing Without Wires; Topics for Coal Miners; Observations on Rock Drilling; Double-Barreled Tunnel; Largest Steel Shaft, 317 Prominent Achievements in Metallurgy; Electrolytic Separation of Cadmium From Iron; Output of Iron Mines; A Delicate Instrument; The Assay of Foreign Lead Ore; An Old Wagon Bridge; The Oldest Iron Steamship; Rare Brazilian Sand Used for Incandescent Mantels; Thirty-three Miles of Aluminum Cable; Underground Working of Leadville, Colo., Mines, 318. Industrial Notes; Personal; Recently Declared Mining Dividends; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Books Received; Obituary, 321-22.

COLORADO county officials assist the mining industry in that State by constructing roads into isolated districts at public expense. The mine owners derive a direct benefit from this enterprise, of course, but the public benefit is not so far removed as to be undiscernable.

ANOTHER attempt is to be made to work placer mines in Arizona adjacent to the Colorado river by pumping water from the river. It is expected that the engineering features will be handled with more effectiveness than that which characterized a similar installation at Picacho a few years ago.

FAILURE to recognize the important and well-established fact that all veins have pay shoots and relatively barren portions has more than once resulted in failure. All pay shoots do not reach the surface, but the greater number of them do. When developing a vein the pay shoot should be sought and explored.

GOOD, developed and going mining properties are in demand everywhere, but the call for undeveloped and unpromising prospects, and mines having large development and equipment which no one has yet succeeded in making a paying proposition, are slow of sale. A few mines are offered at a cost below their probable value, but the reverse is usually the case.

PROSPECTORS are about to make another effort to discover the "Pegleg" Smith mine, supposed to be somewhere in San Diego Co., Cal. Several men have already lost their lives in the fruitless search for this ignus fatuus, and now others no less foolhardy are about to attempt it. The "Pegleg" story has been printed and told for years, and there is little doubt that it originated in a newspaper office, and has no foundation in fact.

A GLASS manufacturer at Anderson, Indiana, illustrates what keen observance and constructive intellect can do. Passing recently through his factory he saw a glass globe on an electric arc light crack, a small chip fall therefrom on the carbon, and almost immediately a drop of liquid glass fall to the floor. He at once built a vat with sides and bottom made of carbons, over which could be turned lateral and longitudinal currents, ran the sand through, and, according to an Indiana paper, "the molten glass is being turned out in as many seconds as it required hours for the old fuel to make it."

The Leasing System.

Much can be said in favor of the leasing system in mines where the veins are comparatively small and the values spotted. Time and again leasers have taken properties abandoned by corporations as failures and have made them pay from the commencement of operations, by the leasing system. The natural inference is that there must be some good reason for this, and there is. There are, in fact, several reasons. In the first place, the leaser is working for himself, and that is an incentive to greater effort. The more rock he can get out on a shift the cheaper his mining cost. He works faithfully. Usually he has one or more partners, and if there be a laggard among them, he is spurred on to greater endeavor; but usually the probability of increased gain is sufficient to keep him at work. The mine manager cannot understand this and says: "These men should work just as hard for us as for themselves." But the men will not do it. They will give an honest day's work; but there is no incentive, no premium, if they accomplish more than a day's task; so the miner satisfies himself with eight or ten hours' work, and the management must also be satisfied.

The leaser has little capital invested, and so is not losing interest on plant, nor suffering from its deterioration. He sells his product to the highest bidder, and he gets "all there is in it," less his royalty, which is fixed by agreement at an arbitrary percentage on a sliding scale based upon the changing value of the ore.

The leasers are their own managers and their own clerical force, and these and many other expenses which cut into the profits of a corporation are dispensed with. They pay no insurance, no taxes, and sustain no "city office."

They reduce the proposition to the plane where it naturally belongs: that of legitimate mining stripped of unnecessary expense. Their share of the expenses of deterioration, taxes, etc., are all covered by the royalty percentage, determined before they commence work. If they make nothing, they lose nothing but their time and the actual expense of supplies consumed. Of course, this contemplates the small parties of individual leasers, who take the whole or a part of a mine on tribute. Some mines are operated under lease with all the circumstance which attends a corporate enterprise; but usually the management of leases so operating look very closely to the results accomplished, more so, perhaps, than the managers of corporations.

In Colorado the leasing system is very popular and contributes a large proportion of the output of the State.

The Limitations of Liquid Air.

During recent years some wonderful discoveries have been made—the X-ray is one of the most recent and it is already being successfully applied in many useful ways. The telegraph and telephone no longer seem wonders because of daily familiarity, and so in time the X-ray will become as commonplace as the telephone. The latest discovery is the process of making liquid air. The enthusiasts say wonderful things are to be accomplished by the use of liquid air, and no doubt this is so. The substance is in tself wonderful enough to astonish the most learned, but when it is said that liquid air will be manufactured for almost nothing from the air surrounding us in such abundance and which is free to all alike, and that in the liquid form it will generate a power far in excess of that required to manufacture it, there arises a doubt in the cautious mind. "Look at the telegraph, the telephone and the X-ray," says the enthusiast. "Are liquid air and its possibilities any more improbable than the application of electric forces was considered before they became so well known?" The telegraph, telephone, X-ray, electric transmission of power and similar devices are each in direct accord with nature and not contrary to its fundamental principles, as are the claims for the generation of increasing power from liquid air. The transmission of power by electricity is now a familiar thing, but it is a well-recognized fact that it is with a constant loss from the point of generation, whether by steam or water power. There is loss in the generator, loss in the transmitting line, loss in the motor and loss in the machines to which power is directed. So with steam, with water power and every other motive force. Is it then likely that liquid air will controvert nature and accomplish that which no other force known can attain? It is not probable. The only accelerating force with which all are familiar is gravity and this must not be trammelled by the devices of men or it too loses its power by reason of frictional resistance.

The Selection of a Mill Site.

When determining upon the location of a mill or other machinery for the beneficiation of ore, the surroundings should be studied in reference to the economy of transportation and treatment. The mill should be placed where the ore can be delivered from the mine into its highest portion, above the bins, without the necessity of hauling the ore up an incline as is often seen, and that, too, where it could have been avoided. The mill should be furnished with every mechanical device which will reduce the expense of manipulation to a minimum, the ore passing from one process to another by gravity. Water is an important consideration and the mill must have a liberal supply. Often it is a question of choice between locating the mill near the water and at a distance from the mine or placing the mill near the mine and pumping water to it from a lower elevation. When this problem presents itself, it becomes a question of economy—which will be least expensive, to tram the ore to the mill at the water or pump the water to the mill. The selection of site is also influenced by the topography of the ground. If a good site is obtainable at the mine and it would be necessary to pump water up to the mill, even if the latter were located near the water, it will in most cases be wise to build the mill at the mine and pump the water unless the distance and elevation be prohibitive. Experience has already demonstrated that large volumes of water may be pumped many miles against 500 feet or more head at nominal expense per ton of ore treated if the quantity be large—200 tons or more daily. No two situations are identical and these matters are wholly dependent upon the judgment of the management. The economical features must be considered, the relative cost determining the proper course to pursue.

A RECENT apparently authentic cablegram from South Africa was to the effect that the Transvaal Government had declared that in the event of war with England the Boers would wreak ruin on the mining interests there by blowing up the mills, and wreck the works generally. This savage threat did much to alienate sympathy from their cause, as such a course would be barbarous reprisal directed against innocent investors. This week comes a statement from the Witwatersraud that the Transvaal Government desires to keep the mining industry going, and wants to protect it; that it has notified the Rand companies that their men will receive protection as long as they remain peaceful, and should war unfortunately occur, the men will be given a reasonable time to leave the country if they desire, which sounds more civilized. However great the provocation on both sides, it is manifest that cooler counsels will prevail, and that armed collision will be at least deferred.

DIVIDENDS are essential to success in a mining enterprise under corporate as well as private management. Most mining companies find that it requires time and the expenditure of considerable sums of money before the dividend period is reached; but occasionally an exception is found, and dividends are advertised before the machinery is actually in operation. The Little Tiger Mining Co. of Boston, Mass., a new enterprise, operating near Yreka, Siskiyou Co., Cal., started up its mill last week, but shut down to make some necessary repairs. The company has, however, already announced a dividend.

AMONG trade values "good will" is a recognized quantity. So, also, is an old established street number, a firm name, and occasionally come new elements deemed valuable, as in the recent instance of a Kansas City, Mo., firm, which, consolidating with another concern in the same business, retains its old telephone number, which it values at $3000.

Concentrates.

IT is expected that coinage will begin at the Denver mint early in 1900.

TO ANNEAL STEEL make it hot, put in hot ashes or charcoal dust and cool slowly.

METALLOGRAPHY has been defined as "the science of metals, with special reference to their structure."

THE law makes no mention of a strip of land of definite width on either side of a ditch, flume or pipe line.

A SCIENTIFIC, illustrated explanation of the international date line, all about it, appeared in the issue of Dec. 3, '98.

A CONTRACT that a single person shall be employed as the sole agent of manufacturers to sell their output is valid and enforceable.

UNDER the "permit" system no competent miner should have present difficulty in securing work at Wallace or Wardner, Idaho.

THE value and economy of superheated steam has long since been recognized, but still is not in general use, owing to practical difficulties.

TWO YEARS' assessment may be done on claims at one time by performing half the work in December and the remaining $100 worth in January.

THE yield from the Klondike region has thus far reached about $11,000,000 this year, and it is estimated that it will reach $18,000,000 for the season.

MAGNESITE usually occurs with serpentine and other magnesian rocks. It is chalky white to cream color, and may be either hard or soft; often earthy.

PEARLITE is a volcanic glass, in which a peculiar structure has resulted upon the cooling of the magma. It is light gray in color and has a pearly luster.

THE demand for aluminum has made the mining of bauxite, which is an ore of aluminum, a very profitable business in some localities where these deposits occur.

CONCENTRATION is almost as ancient as mining. The separation of gold from alluvial soil was effected in Brazil a century ago by placing rawhides in sluices, the hair side up.

BURN no more candles or lamps under ground than necessary where ventilation is poor. Each candle consumes more oxygen than a man and only decreases the scanty air supply.

SOMETHING new in strikes is reported from the Helena-Frisco mine, Idaho, where the entire day shift walked out, refusing to go to work unless three union miners were discharged.

THE New York man who asks for advice regarding investment in Copper King of Arizona stock might hear something to his advantage by addressing Gov. Murphy of that Territory.

COLORADO and Utah have the largest published lists of dividend-paying mines. Many of the California producers are of private ownership and make no announcement of their affairs.

THE exports of the United States now reach $1,000,000 per day, against half a million daily five years ago. Among the exports, mining machinery and supplies form a prominent item.

THE largest stamp mill in Canada is in the Salmon River district, on the property of the Montreal Co. It has sixty stamps. There is a 40-stamp mill on the Richardson mine, in Stormont district.

WASHINGTON State miners propose this season to take advantage of their new mining law by putting a portion of their assessment work on the roads and trails leading to their mines where necessary.

A STATEMENT of account sent in lieu of a draft to a bank or other collecting agency for the purpose of collection is subject to taxation as an order for payment of money and requires a two-cent revenue stamp.

GRANITE-PORPHYRY is a granite rock of normal type in which have developed distinct crystals of some mineral, larger than those composing the make-up of the rock. These crystals are usually feldspar.

THE Golden City mine, in Stanislaus county, Cal., was worked years ago and was anomolous in some respects. The gangue was chiefly heavy spar, and required unusual care in timbering. It was rich in gold.

GRAPHIC granite is usually found in dykes of coarsely crystallized granite called pegmatite. It is a mixture of quartz and feldspar in which the arrangement resembles the characters used in ancient writings, hence the name.

EIGHTY-FOUR per cent of the entire State of Idaho is still public land, amounting to more than 44,000,000 acres. Of this area it has been estimated by the Government Geological Survey that 7,000,000 acres can be successfully irrigated.

PARTS II and III of "Aaron's Assaying," the standard work on that subject, revised and newly issued, being the third edition of that popular work, is out to-day. It is reduced in price and increased in excellence, and is recommended.

ALLOYS are of three kinds: those whose component parts form neither definite chemical compounds nor isomorphous mixtures; those whose metals form definite chemical compounds; and those which do form isomorphous mixtures.

THE water flowing from the Sutro tunnel furnishes power for an 18-foot undershot wheel. It is 11,600 west of the mouth of tunnel. The wheel runs an air compressor which supplies drills in the Zadig drift in the Brunswick lode on the Sutro tunnel level.

THE black oxide of manganese (pyrolusite or psilomelane), when sufficiently pure, is ground to a fine powder and is used in chlorination works in the generation of chlorine gas by the action of sulphuric acid upon sodium chloride in the presence of the manganese oxide.

THE most important constituents of phonolite are silica about 60%, aluminum oxide 20%, iron oxide 2.5%, potassium oxide 5% and sodium oxide 9%. These proportions vary somewhat in different specimens. There are also numerous other constituents in small amount.

ZINC ore shipments from Colorado to Europe can not be deemed profitable at present prices. While spelter held up to $5.25 per 100 lbs. there was a slight margin, but at prevailing figures no freight rate from Leadville could make the shipments pay.

FAULTS and veins each are often found marking the course of a gulch or canyon, due to the fact that the rock on either side of the fissure, being softer and more shattered, was more easily eroded than the normal country rock, and a depression was the result.

THE recent shipment of the $5,000,000 in coined silver dollars from the Carson, Nev., mint to San Francisco was supplementary to a clearing out earlier in the year of about $2,000,000 gold and silver bullion, etc. The Carson establishment is now a bullion assay office.

GEORGIA furnishes considerable bauxite, or "aluminum ore." Such ore imported from France to Philadelphia and New York sells for $6.50 per ton. The easier solubility of the Georgia bauxite has obtained as high as $9 per ton for it at Syracuse, N. Y., and Pittsburg, Pa.

IN the early days of California quartz mining a great many overshot water wheels were built to furnish power to hoists and mills. Many of these were skillfully constructed under difficulties. One near Jamestown, in Tuolumne county, Cal., is said to have been nearly 60 feet in diameter.

RESPONSIBLE miners can usually be found who are willing to undertake shaft or other mine work at a fair price under contract, but the giving of bonds to insure the completion of such contract is unusual, though there may be those who would be willing to undertake the contract if price was satisfactory.

THE calorific value of gasoline is about 21,000 B. T. U. per lb; the usual guarantee of the manufacturer for engine use is about one pint per B. H. P. an hour. Under no circumstances should any considerable amount of gasoline be kept in the immediate vicinity of a mine, and wherever it is stored should be well ventilated.

THE Ontario mine, at Park City, Utah, which recently resumed operations after a long idleness, has produced $34,000,000 and paid $13,000,000 in dividends. Forty-five hundred gallons of water per minute flow through the lower drain tunnel, driven at a cost of $700,000. The pump in No. 3 shaft, costing $100,000, has been idle since the tunnel was driven.

WHEN in sinking a shaft it becomes necessary to change its angle from vertical to an incline, or, if an incline, from a stated angle to another, the change should be made on a curve of sufficient radius to permit the running of skips on this curve without slacking speed. A sudden change in direction when running rapidly may result disastrously and is always dangerous.

OUR Chihuahua, Mexico, correspondent, who has an important document so faded as to be illegible, can probably restore the color to the ink by bathing the paper in a solution of ammonium-sulphide. If this fails, gallic or tannic acid will probably bring out the words. After applying either solution, the document should be carefully rinsed and dried.

WHERE extremely volatile ores, like tellurium, are to be roasted in a reverberatory furnace, the fumes and dust containing high values may be thrown down and kept within the furnace by introducing a number of fine jets of water into the smokestack just above the furnace arch. This scheme has been successfully applied, in the roasting of telluride ores rich in gold preparatory to chloridizing.

THE descriptive term "Portland," as applied to cement, is only an arbitrary name for an artificial mixture. The name was first so used by a brick mason of Leeds, in England, who had made a cementing substance. On account of its close resemblance in color to a popular building stone taken from the Portland sandstone quarries of the English channel he called his invention "Portland cement."

THE Seven Stars mine, in western Arizona, crops for nearly 3000 feet, but in the entire distance casts no float. The vein quartz is crystallized, heavily mineralized and often presents a "comb structure." Where oxidation has taken place, the quartz disintegrates into sand and no pieces of float have ever been found. The croppings are very obscure on this account and are much mixed with the talus on the slope of the mountain side.

CHROMITE occurs massive and granular to compact. Its color is iron black to brownish black, translucent to opaque, sometimes feebly magnetic. It usually occurs in serpentine and varies greatly in value and size of deposit. Often the ore is largely composed of serpentine, seeming to indicate that for some reason the process of deposition had been arrested before it was complete. Ores of this kind can be readily concentrated.

THE corrugations on the rim of a silver piece of United States money are not the "milling." The "milling" is the little raised rim around and above the level of the sides to protect the surface from wear. The parallel notches or corrugations around the rim are called the "reeding." The latter term is adapted from its architectural use to express a small convex molding, especially when such moldings are multiplied, parallel to each other.

INVESTIGATION of the subject by the American Institute of Electrical Engineers regarding the relative economy of horse and electric delivery wagons goes to show that the average delivery wagon covers a distance of about 11,268 miles per year, at a cost of 13,86 cents per mile for a two-horse vehicle. An automobile would cover the same distance for 2,65 cents per mile less, equivalent to $298.60 per year. A further economy is the higher speed of the electric vehicles.

WHERE a mining claim is located over which a ditch has been previously constructed, the claim is taken subject to any easement existing at the time the location was made. The miner who locates a piece of ground must take it as he finds it, subject to prior rights, which have an equal equity, on account of an equal recognition from the Government. After such location has been completed the estate of the owner cannot be subjected to any additional burdens excepting for public use. The owner of the pre-existing ditch may go upon the later mining location for the purpose of repairing his ditch, but he cannot enlarge it without the consent of the mine owner.

THERE are two types of feed-water heaters, the open and the closed: in the open the exhaust steam comes directly in contact with the feed water; in the closed it does not. The object of the feed-water heater is to save fuel by making use of the exhaust steam from the engine to heat the feed water. A good heater of ample proportion should raise the temperature of the feed water to 200° F. Besides so heating the feed water, a good heater also purifies the water by extracting the scale-producing matter and mud.

WHERE the locator of a claim has failed to do the assessment work within the time specified by law, and goes onto the claim and resumes work before another sets up an adverse claim, the first locator can hold his claim as against another—provided he show his honest intention by completing the assessment work. It would be difficult to persuade the Government or any individual that the intention was to do the assessment unless the work were done. One's intentions are usually interpreted according to his acts.

A COLORADO reader writes that in his little town four copies of this paper are weekly received, in single wrappers, directed to residents, evidently sent by subscribers elsewhere, who, after reading the paper, send it to friends and acquaintances there, who, probably, after reading, pass the copies on to others elsewhere. It has been asserted, with some show of truth, that each issue of such a paper as the MINING AND SCIENTIFIC PRESS is read by three or four men in addition to the original purchaser or subscriber.

A CIRCULAR SAW, with diamond-pointed teeth, is used for sawing stone for buildings for the Paris Exposition. The saw is a steel disk, 6 feet in diameter, in the edge of which cutting teeth, crystals worth about $1.25 a carat, are fixed. For sawing hard stone the cutting edge has 200 diamonds; the speed is 300 turns a minute; it advances into the stone about a foot in that time. For soft stones the teeth are of steel, with diamonds at intervals of every five teeth. These saws cut and dress the stones on all sides at from one-eighth to one-tenth the cost of hand labor.

EXPERIMENTS are being made in several mills in Deadwood Gulch, at Lead City, Ragged Top, and on Squaw creek, South Dakota, with tailings by the cyanide process. For more than twenty years tailings have gone to waste down Gold Run, Bobtail, and Deadwood gulches, which contained 75c to $1.25 per ton. An effort is now being made to economically extract a portion of the values. The finer material is carried many miles from the mines, the discoloration showing plainly in the Belle Fourche river, thirty miles from the mines. The greater portion is deposited, however, within the first ten miles of the mills.

WHILE mining machinery has gone up in price, it is no higher, relatively, than any other class of machinery at present. Raw material used in its construction has advanced from 40% to 85%, and that necessarily occasions increase in cost to the manufacturer and to the purchaser. Every manufacturer of mining machinery is busy, and, hence, there would be a little delay in delivery of large orders. A man wanting a hoisting plant to sink 1,500 feet could not expect to have his order filled "right away," but could, probably, have what he wanted ready for delivery in sixty days. In mining machinery as in everything else, competition makes it impossible for any concern to make or maintain high prices, and if the present prices seem high to any intending purchaser, it is for the reason stated.

FOLLOWING is Dr. J. Loevy's advice in anticipation of a possible case of poisoning in cyanide works: "A quantity of pure peroxide of hydrogen, distilled water, and a Pravarz syringe should be kept in every cyanide plant, and all workmen on the plant should be made acquainted with the method of preparing a solution of the required strength and of injecting it subcutaneously—a practice which any sensible man can readily acquire. The peroxide of hydrogen should be kept in small bottles containing about one-half ounce, with tight-fitting glass stopper, and kept in the dark to prevent decomposition. Considering that provisions have been made in all large industrial establishments to render first surgical aid in the case of accident, I think that a provision as suggested above against cyanide poisoning is just as well called for in cyanide plants."

THE type of engine known as the automatic high-speed engine has a wide range of cut-off, from almost 0 to ¼-stroke; to avoid a long valve and a long travel, and thus secure a quick admission and cut-off of the steam, recourse is had to multiple admission valves. These valves are so constructed that when one of them is moved from midposition a distance equal to, say, one-sixteenth of an inch more than the steam lap, the width of the opening for the steam to pass through into the cylinder is one-sixteenth multiplied by the number of admisions of the valve. Thus, if the valve is a double-admission valve, and is moved one-sixteenth plus the steam lap from midposition, the port is opened a distance equal to $2 \times 1\text{-}16 = \frac{1}{8}$ of an inch. Double admission valves are common; there is also a quadruple admission valve used, made as flat valves and as piston valves, but all with a common object in view: to secure an early cut-off and quick opening and closing of the ports with a valve whose length and travel shall be short.

THERE being some doubt as to the effect of the Act of the last California Legislature in an attempt to repeal the mining law of 1897, our California inquirer is advised to also comply strictly with the law of 1897. A fissure vein is a vein occupying a crack or crevice in the earth's crust; all fissure veins are "true fissure" veins. A gash vein is one having limited vertical extent, and is characteristic of mica schist formations. Some so-called gash veins occurring in other rocks have been found to reopen into large veins in depth, the several ore bodies being connected by a mere seam. "Chute" is the name of a mechanical contrivance for the passage of ore, and "shoot" is considered a proper spelling of a word indicating an ore body. Where three locations are made in a common direction, joining, and all are on one vein, the apex of which passes through each of the three claims, each claim is entitled to all the ore lying within the end lines of the claim, and each may follow the vein downward on its dip within the planes drawn downward through the end lines even though extending outside of and beyond the side line of the claim.

Republic District, Washington.

Written for the MINING AND SCIENTIFIC PRESS.

Republic, Washington, is the seat of the newly created county of Ferry, segregated from Stevens, and is on the Colville Indian reservation, opened to mineral location several years ago, and which is to be thrown open to white settlers as soon as allotments to the Indians have been completed. The entire section encompassed by this reservation is well wooded with pine, fir, cedar and tamarack timber, is watered by the Columbia, Kettle and San Poil rivers and their tributaries, and, so far as prospecting discloses its mineral formations, it is shown to be a mining country of great possibilities.

That portion known as Republic district is thirty miles south of the international boundary line and about equi-distant from the Columbia river at Kettle Falls and the Okanogan river at Loomis—thirty-seven miles from each point. The district is reached by stage, wagon or horseback from several points on the Spokane Falls & Northern Railway. The generally traveled route is from Bossburg by stage via Grand Forks, B. C., making a trip of eighty miles. Another route is from Myers Falls, via Kettle Falls, across the mountains, by which the distance is about thirty-eight miles. A stage road is being established over the latter route. As the Crow's Nest branch of the Canadian Pacific Railroad is now completed to Grand Forks, it is probable that considerable of the travel to Republic will be by rail to the former place via Rossland and Robinson. From Grand Forks to Republic is about thirty-seven miles, over a fairly smooth road. The construction of a north and south railroad from a a point on the Great Northern main line, up the San Poil valley, through Republic, to the international boundary line, is deemed a probability, as the Great Northern Co. have a charter covering such route.

The Republic district is waiting for transportation facilities, whereby milling machinery may be more economically shipped in, and whereby her smelting ores may be shipped out. The proposed line—up the San Poil and down the Curlew—would put Republic ores within reach of smelters at Grand Forks, Trail, Northport and outside points. Republic ores, which are highly silicious, would smelt well with the characteristic copper and iron sulphide ores of the Boundary and Rossland districts. Were such transportation and smelting facilities accessible, it is conceded that a considerable tonnage of Republic ores would be smelted rather than milled. The great bodies of ore, however, range in value from $10 to $20 per ton, and the problem, which is still not solved to the satisfaction of all, is as to the method by which those ores of low and medium grades can be profitably treated. The one mill operating in the district belongs to the Republic Con. G. M. Co., and runs exclusively on ores from the Republic mine. This is the practical application of the Pelatan-Clerici process. The ores are crushed and ground, the pulp passing through an 80-mesh screen. There are eight cyanide tanks, in four of which there are anode plates, which turn on the center shaft. The bottom of each tank is covered with a copper plate, on which the mercury is deposited. By electric currents the gold in solution is precipitated on the mercury-covered surface. About thirty-five tons per day are thus treated, but the Republic mine is capable of producing from 200 to 600 tons per day, and experts for the company have been making determinations which are to decide as to the equipment of the contemplated new mill of large capacity. It is probable that they will adopt some modification of the cyanide process.

Cyanide operators from Colorado and Montana have been here to study the situation and test the ores, and it seems understood that as soon as a requisite tonnage of ore can be guaranteed from the mines cyanide reduction plants will be built for custom work. The Republic and Mountain Lion, the most thoroughly developed mines of the district, are providing their own milling facilities, and the other properties, while developed with an excellent showing of valuable ores, are apparently not in position as yet to guarantee a steady tonnage to a mill. The mill just contracted for by the Mountain Lion will consist of twenty stamps, with amalgamating plates and cyanidation facilities for the tailings. This recalls to mind the fact that from 40% to 50% of the ordinary run of Republic ore values can be saved by the amalgamating process. It is conceded by all that the gold is largely in the free state, but in exceedingly fine particles. The veins trend in a north and south direction, within the limits of a great mineral zone, opened from the Mountain Lion on the north to the Princess Maude on the south. The country rock is porphyry and granite and the vein matter consists of white quartz of fine texture, varying in width from a few inches to 30 feet.

In the district there are forty or more claims, besides the Republic and Mountain Lion, whose developments make an encouraging showing of ore. Among those having development which would enable them to become shippers, to a limited extent, were milling and smelting facilities within reach, I mention the following, though there may be others entitled to the same classification: Ben Hur, Lone Pine, Quilp, Surprise, Black Tail, San Poil, Princess Maude, Tom Thumb, Bodie, Morning Glory, Rebate.

The Mountain Lion is developed by an 800-foot crosscut tunnel, with 600 feet of drifting on the vein and an upraise of 350 feet from the tunnel level to the surface. Work has commenced on a shaft on the vein from the tunnel. The work in the mine aggregates 2000 feet. A compressor has been installed on the property and air drills are in use.

The Republic ledge, which outcrops along the crest of the mountain ridge, is opened by means of three crosscut tunnels, one from the west side of the ridge and the others from the east side, by all of which a vertical depth on the vein of 400 feet is attained. A tunnel—No. 4—is also being driven from the east side, which will cut the ledge at about 2300 feet from the tunnel entrance and 200 feet below the present lower tunnel workings. The three tunnels completed are connected by upraises and the ledge is extensively opened by drifts and stopes. Good progress is being made on the lower tunnel and the values and ledge conditions determined by it will be of importance to the entire district. The ores milled, it is claimed, have averaged from $60 to $65 per ton, but vast bodies of lower grade remain, blocked out, awaiting a cheaper method of treatment. In the earlier development of the Republic mine 1540 tons of ore were hauled eighty miles in wagons to the railroad station and shipped to smelters, from which a net average of $160 per ton was derived.

The Princess Maude, adjoining the Republic on the south, is developed by a 400-foot tunnel, 120 feet of drifting and a 40 foot winze on the vein. The pay ore is white quartz, with narrow bands of black sulphurets, the values being gold, with good values in silver. So far as the developments go the prospects are excellent.

The Ben Hur shaft, 160 feet in depth, is expected to strike the ore body at 250 feet, which has been opened at another point through a tunnel.

The Quilp tunnel is in 160 feet and there are 500 feet of drifting on the ledge, 200 feet of which is in pay ore running $10 to $20 per ton.

The North San Poil shaft, at 125 feet depth, is in an 8-foot ore shoot, carrying good values. It is on the same vein as the San Poil, the latter having a fair amount of development.

The Trade Dollar is in ore, having 400 tons of good grade on the dump.

The Bodie's incline shaft is 250 feet deep, from which drifting is being done on the vein. The values here average well.

Development on the Tom Thumb has reached a favorable stage, and that on the Rebate is being vigorously pushed. A shaft on the latter is 150 feet deep.

The Morning Glory tunnel has reached 250 feet from the entrance, from the level of which a winze sinks 85 feet on the vein. In the workings a ledge 6 to 8 feet wide has been uncovered, the paystreak being about 18 inches in width.

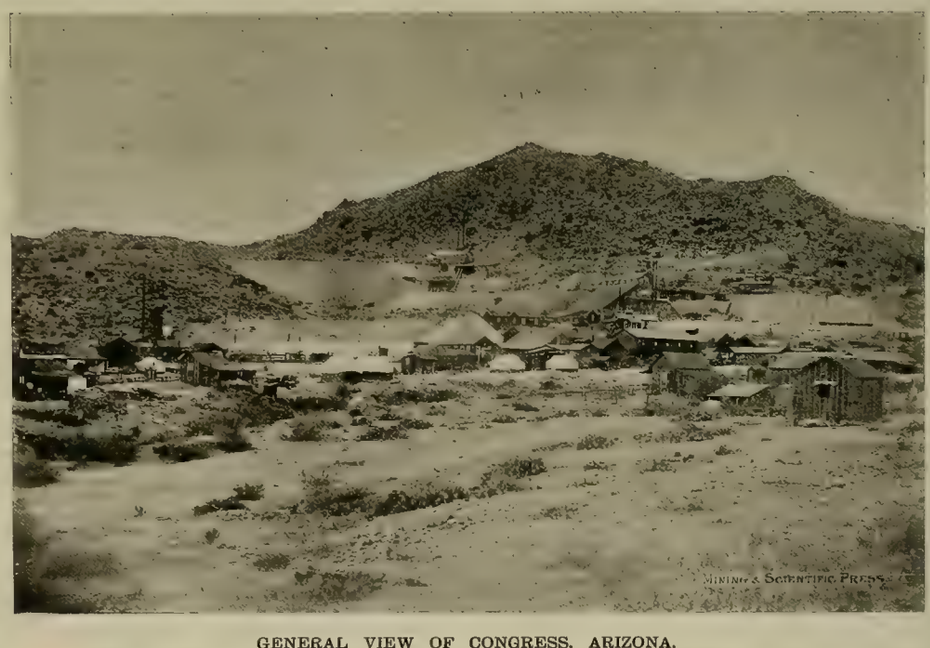
The town of Republic, though it has suffered from fires, continues to grow. It has picturesque surroundings and a population of about 3000. An electric power plant, driven by a 4-inch water wheel from a 1700-foot flume, a few miles from town, is to be put in operation for lighting purposes.

Republic, Wash., Aug. 21st, '99. WASCOTT.

The Congress Mine, Arizona.

Written for the MINING AND SCIENTIFIC PRESS.

The Congress gold mine is in southern Yavapai county, Arizona, about midway between Prescott and Phœnix. The mine was discovered about twelve years ago and in its early history had several successive owners, eventually coming into the possession of "Diamond" Joe Reynolds, who equipped and developed the mine extensively before his death. It is now the property of the Congress Gold Co. and is one of the best appointed and most successfully operated mines in Arizona. In the early days of the mine's history some of the oxidized ore was noted for its light weight and high value in gold. Masses of spongy iron oxide with silica—the result of decomposition and leaching of the solid iron sulphide similar to that found at lower levels—were surprisingly light in weight, yet some of this material was worth over $600 per ton. The mine is equipped with a 40-stamp mill, has twenty concentrators and a complete cyanide plant. The concentrates are shipped to the smelters. The cyanide plant is provided with roasting furnace, and has a capacity of 100 tons daily. The surface of the tailings dumps is stirred by plowing to facilitate drying, which is quickly accomplished under the fervent sun of that clime. The dried lumps of tailings are carted by wheeled scrapers to a pulverizer, from which they are discharged by an elevator going to the furnace. The material is given a dead roast lasting four hours. Every care is taken to economize water. All the water used at Congress is pumped from Martinez creek, a mile distant, being elevated over a ridge 500 feet high. There is a large accumulation of tailings, the result of the operation of former years. The tailings as they come from the mill are a light gray in color. When they leave the cyanide plant they are red, the result of the oxidation of the iron sulphides in the roasting furnace.



GENERAL VIEW OF CONGRESS, ARIZONA.

The property consists of a group of twenty-three claims located along the strike of the croppings of the vein.

There are two veins—the Congress and the Niagara. Each is opened at a number of places. The main shaft is down almost half a mile, with no deterioration in either the size of the vein or its value. Two other shafts—the deeper 650 feet—are connected with the main shaft by levels. The mine is dry, and the item of expense so common in many mines—that of having to raise large volumes of water from great depths—is unknown here. The shaft follows the vein at an angle of about 30°. It is estimated that the total cuttings in the mine reach a distance of ten miles.

Two of the illustrations herewith give good underground views of the Congress vein. One at the 1850 level, the other at the bottom of the shaft when it was 1750 feet from the surface; each of which are characteristic scenes in a dry underground mine. The third illustration is that of the town which has grown up about the Congress mine.

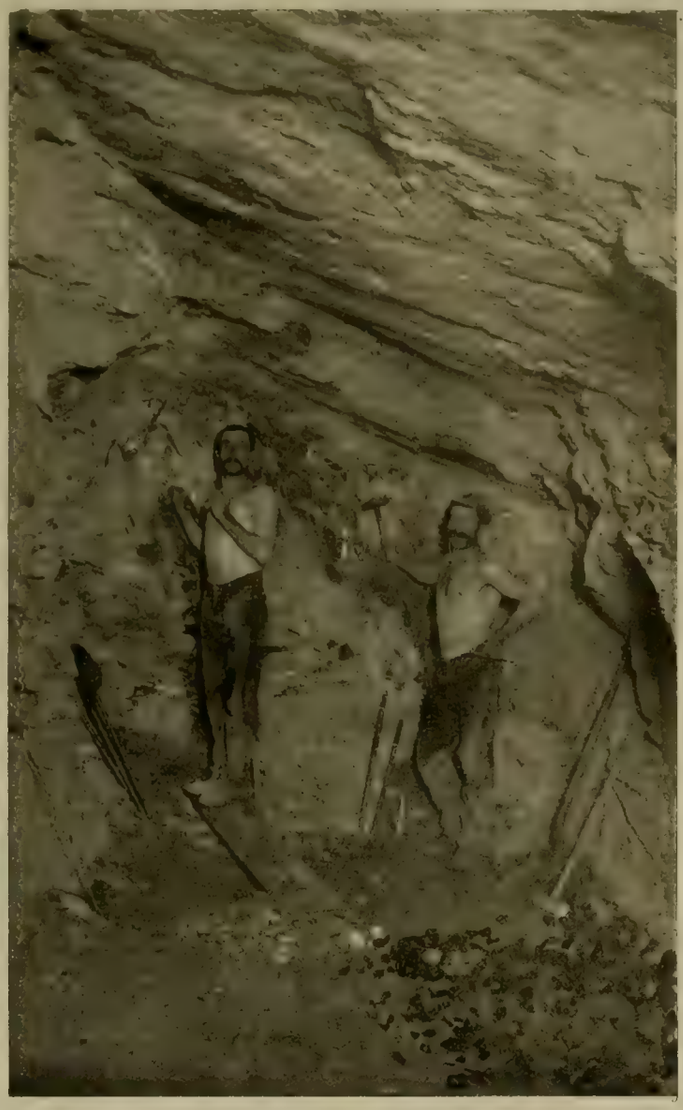
The mines, mills and other company buildings are lighted by electricity, and there are many modern conveniences to be found scarcely to be anticipated in an isolated mining camp.

The mine and principal buildings are situated on a hillside, from which a magnificent view can be obtained of the far-reaching valley country beyond. Above the stretches of sand rise distant peaks and ranges, cut sharp and clean against a cloudless sky,

in an atmosphere so clear that hills 100 miles away seem near. Each of the distant hills and ranges is known to contain veins of gold, silver and copper. Indeed, there are few hills or mountains in Arizona where mines, or the promise of such, may not be found.

The Congress Co. has built at its own expense a railroad from the mine to the line running from Ash Fork to Phœnix by way of Prescott. This mine railroad has developed some startling feats in railroad engineering. It reaches the mine by a series of switchbacks, heavy gradients and abnormally sharp curves.

The town is characteristic of all mining camps in the great Southwest. It is divided into two sections—that at the mine and the lower town, in which the company has no interest. The contrast between them is marked. The buildings at the mine are neat and are arranged with symmetry and purpose. It comprises the company's offices, stores, bunk houses and homes of employes, etc. The lower town is built in a straggling line along the gulch, and contains buildings of stone and adobe and frame houses—adobes without roofs, tents, huts and lean-tos, a miscellaneous assortment of odds and ends. Still, Congress is prosperous. The lack of abundant water is a serious drawback to extensive building, as several serious fires have already visited the camp.



AT THE 1850 LEVEL, CONGRESS, ARIZONA, MINE.
From Land of Sunshine.

Metamorphism of Rocks.

Written for the MINING AND SCIENTIFIC PRESS.

In their normal condition rocks are of two kinds, sedimentary and eruptive. These two great divisions cover practically all the rocks with which science is acquainted, but each of these groups is divided into several types of rocks, which have a somewhat different origin. For instance, sandstone and limestone are each sedimentary rocks but formed by different processes. Sandstone is the result of deposition of grains of sand derived from the degradation of older rocks. This material deposited on the floor of a lake, gulf or ocean, in time becomes indurated, and being uplifted by the movements of the earth's crust above the level of the waters, is called sandstone. The great limestone formations are mostly the result of the deposition on the floors of deep oceans of an infinite number of particles of carbonate of lime from minute organisms living in the waters. This deposit, in time being lifted above the sea, in consolidated form, is called limestone; beds of fine mud and clay are likewise uplifted and become shales.



BOTTOM OF SHAFT AT 1750 FEET, CONGRESS, ARIZONA, MINE.
From Land of Sunshine.

The eruptive rocks are of many kinds and occur in various forms. Those which are erupted and do not reach the surface are called intrusive or dyke rocks and are mostly of earlier geological age. Of this type are granite, diorite and some acid and porphyritic rocks such as quartz-porphyry, felsite, etc. Those rocks which have reached the surface and spread out over it in sheets are called effusive rocks. Most of the large granite exposures are undoubtedly due to uplift and erosion and in some instances to profound faulting and tilting of the rocks.

The metamorphism of rocks has always attracted the attention of geologists but it is only in more recent years that its importance has been realized. Large areas of rocks are now known to be altered from some previous condition, and the process is becoming better understood. This advance in knowledge has been made possible by the use of the microscope. Chemical analyses are important in determining the mineralogical character of rocks, but when employing this method the rock is reduced to powder and all opportunity to study its structure is lost.

The simple microscope will afford little insight into the true structure and composition of rocks, but the use of the polarization microscope opens a new field, and much that is otherwise obscure becomes at once plain and readily understood. Each mineral exhibits peculiar optical properties when viewed through the polarization microscope, which serve to distinguish it from other minerals in the same rock. For the purposes of microscopic study, slices of rock are prepared as thin as tissue paper. These are mounted between two sheets of glass, secured in position by Canada balsam.

Viewed without the aid of the polarization apparatus (which consists of two Nichol prisms made from the variety of carbonate of lime, known as Iceland spar, placed one above and one below the rock slide), many rocks present a most uninteresting appearance. There may be patches of dull green or brown and areas that are transparent, but that is about all.

Place the polarization apparatus in position and all is changed. The areas which were transparent, uninteresting objects before are now found to possess brilliant chromatic coloration, and in some of them a most beautiful symmetrical lineature is seen. These latter are the feldspars. Quartz polarizes in high colors, also mica, selenite and many other minerals. Rotate the stage of the microscope and a kaleidoscope of changing color is seen. Each mineral, as previously stated, is identified by its behavior under the microscope, and by this means the mineral constituents are recognized and the rock classified accordingly.

Not less important is the relation to each other of the crystals or fragments composing the rock. In such rocks as rhyolite, for example, the crystals of feldspar are seen to be surrounded by the curving wavy lines of the original molten ground mass. The magma flowing around the crystals, which appear as obstructions, turning the current aside. The hornblende of a diorite is found altering along the edges to chlorite, and around its border is a black fringe—an accumulation of grains of magnetite.

A slide of fresh, unaltered diabase is placed on the stage. Each individual mineral composing the rock stands out distinctly. The striated feldspars are easily identified and the crystals of augite present their characteristic cleavage, color and other features. Here and there is a grain of olivine, and throughout the mass is scattered many grains of black, opaque substance with sharp angular outline. The most of it is magnetite. Another slide of rock from the same vicinity is put on the stage. The same minerals are again observed, but some of them present a somewhat different appearance. The feldspars are observed to be cracked and dislocated. The augite crystals are distorted, drawn out and a green border surrounds each crystal. An investigation of a band specimen of the rock from which this slide was made shows it to be slightly schistose.

Another slide of this series is examined. The green color of the rock is present but the feldspars are still further fractured, drawn out and have assumed a greenish tinge. The augite has all turned to green hornblende, and is fibrous, the cleavage having disappeared. The edges are chlorite; small patches of calcite are observed; and so with each constituent, a change is noticeable. Again, an examination of a specimen of rock from which this slide was cut shows it to be a greenstone schist.

A specimen is chosen from the same vicinity which is a typical chlorite schist. The slide representing this rock on examination is found to consist almost wholly of fibrous hornblende mineral and scales of chlorite with a granular admixture of calcite, feldspathetic material and quartz, all having a green color. All of

these rocks were taken from a single area and within a few feet of each other. The transition from the normal granular diabase to chlorite schist has been noted and the microscope has shown the cause of this alteration. At first the rock was evidently subjected to a severe crushing force which fractured the crystals and grains composing the rock. The next specimen showed that owing to a movement of the rock mass these fragments were drawn apart with a slight alteration of the edges; the fourth specimen indicated that the force that had created these changes had progressed further and that the individual fragments were being drawn out and flattened still further and the rock was becoming a schist. The last specimens simply exhibited the complete alteration to chlorite schist.

Diabase has been selected for example because that rock is so frequently altered to greenstone schist. Diorite is altered in the same manner, but when completely altered and no rock of the original type can be found it is difficult to determine whether the rock was originally diorite or diabase. This alteration of massive rocks is called metamorphism, and the process by which it has been accomplished is known as shearing. Large areas are found consisting wholly of greenstone schist and slate, a microscopic study of which shows that the entire series of these schistose rocks owe their condition to compression and shearing in the manner described, with a consequent alteration of the individual minerals composing the original rock.

In the same manner granite is altered to gneiss and by further alteration passes over to mica schist; large masses of felsite become slaty with the development of secondary mica, and some sandstones and conglomerates also became schists. A bed of sand is found changed to hard, dense quartzite. An investigation of a thin slip of the rock shows each individual grain of quartz to be surrounded by some kind of cementing material. In some cases it is iron, in others, carbonate of lime and in still others each grain of sand is seen to be surrounded by an envelope of crystallized quartz due to the infiltration of silica. This is not at all uncommon but it was never suspected until revealed by the polarization microscope.

The changes produced in rocks by their metamorphism is much the same whether the alteration be limited to a relatively small area along a vein, fissure or contact, or whether it cover many square miles of territory. When the change is limited to a small area it is called local metamorphism, and is due to some dynamic force operating in the immediate vicinity. Examples of this type may frequently be observed where a fissure occurs in massive greenstones and the rocks on one side or both sides of the fissure are found altered from normal granular rocks to schistose or slaty condition. Where the alteration has taken place over a broad area it is called regional metamorphism and is due to some great force in nature which has subjected an immense volume of rocks to great pressure accompanied by movement, which at first fractures, then elongates the grains, and finally alters them to other minerals, the same process, in fact, as that already described, though more extensive. In metamorphism new rocks are not made but old ones changed.

Contact metamorphism is the result of the influence of the intrusion of an igneous rock upon a sedimentary or an older eruptive rock. The character of contact metamorphism varies with the character of the rock and to some extent with the kind of rock intruded. The intrusion of an igneous mass into limestone often results in its alternation to a crystalline condition forming marble. Slates often become semi-crystalline and develop foreign minerals in the form of distinct crystals, such as chiastolite and andalusite; shales are compressed and baked into dense, hard jaspers; quartzites are found to have developed a porphyritic structure; sandstones become vitrified into quartzites, etc. Contact metamorphism may be confined to a narrow strip along the intrusive rock or it may extend back from the intrusive rock for several hundred yards. Where granite has been intruded into contact with schistose rocks which lie parallel to the contact, the region of metamorphism is often broad, it being impossible to discover a line of demarkation, both the granite and the schist having been metamorphosed. When this occurs it may usually be found to be due to pressure and movement and a consequent shearing of both rocks. In some cases no alteration at all is found along portions of such a contact, without any apparent reason. When an eruptive rock cuts across the edges of an older formation the eruptive is often found to include many fragments of the older rocks, though the alteration of the older rocks is not so pronounced usually as when the contact lies parallel with the strike of the older rock. Metamorphism often wholly destroys the original sedimentary planes of rocks, the slaty cleavage and joints being entirely independent of sedimentation. The deposition of ores in sedimentary formations such as limestone and quartzite may be called a species of metamorphism but is usually the result of replacement—the substitution of an atom of ore for an atom of original rock, or it may be simply an infiltration of mineral into the interstitial spaces of the rock, as cinnabar in sandstone.

The metamorphism of rocks has a bearing upon ore deposits, for wide experience has shown that ore bodies seldom occur in rocks which have not been altered more or less. There are exceptions but these are comparatively rare.

Rand Deep Levels.

By JOHN YATES, Johannesburg, S. A. R.

The question of how best to work the great area of the deeper levels of the Witwatersrand is a matter in which the future of Johannesburg and the Transvaal is very intimately connected. So far our attention has been fully occupied in nibbling at the fringe of the reef—for in view of the operations of the future our present deepest mine does not carry us beyond this—but having now completed arrangements for working the outcropping edge, we are at liberty to devote attention to the exploitation of the body of the reef, a task which we have a strong inducement to undertake in the knowledge that satisfactory results are reasonably certain. But, as Mr. Miller indicates in his paper, the question is not how can the reef be worked, but, what is the best method of attacking it? To win a large area of the deeper reef presents few, if any, great difficulties, being well within our resources, but how to win it so as to secure a profit—the greatest possible profit—is a matter which, to a large extent, only time and experience of the new conditions will enable to be decided.

In taking up this problem it would appear that, as it is unlikely that there will be any necessity for material departure from the present methods of blocking out the reef for stoping, it resolves itself mainly into a matter of shafts, their position, number, and size, and the method of hoisting in them.

The features of the auriferous banket beds of the Rand are such that there is no reason to apprehend that their extent to the dip is very limited; on the contrary, the evidence available practically places beyond doubt that they will continue in depth far beyond a point where high temperature will render mining operations impossible. Where is this limit of work as fixed by temperature likely to be? Mr. Seymour has informed us that specially conducted experiments have discovered a rise for 1° F. for every 203 feet of vertical depth. If, therefore, we assume that the average temperature at a depth of 1000 feet is 72° F., that the maximum air temperature in which men and boys can do a shift's work is 100° F., and that this corresponds (say) to a rock temperature of 125° F., we find that the limit of work by temperature is 12,000 feet vertical, so that unless we are favored with a series of upthrow strike faults—a not unlikely contingency—the pegging of claims more than four miles from the outcrop will probably prove a waste of both time and money. In the headings and rises the difference between the temperature of the rock and that of the air is not likely to be so great, owing to the less perfect ventilation, and for these, at a depth of 12,000 feet, compressed air or other means of cooling the atmosphere would be needed to create a bearable temperature.

In shaft sinking the temperature would also be less than 12,000 feet vertical; the imperfect ventilation and the presence of a crowd of men and boys will probably make it 7000 feet—a limit, which, of course, could be extended by supplying the sinkers with cooled air, but it is open to question whether men and boys will be easily found who will sink vertical shafts to a depth of even 7000 feet.

In view of the fact that the practicability of working at a depth of 5000 feet is not infrequently questioned, the idea of working to a vertical depth of 12,000 feet will, I am afraid, be generally regarded as too visionary to call for serious discussion, but future operations will disillusion those who think that our limit is going to be anything like 5000 feet vertical.

The idea of seeing miners at a depth of 12,000 feet shivering in a cold draught is at present calculated to raise a smile, but things are moving so fast and so many impossibilities have become possibilities that it takes a venturesome man to predict what things we are not going to see in the future; but no matter how much the probability of reaching 12,000 feet vertical may be doubted, the possibility of the thing cannot safely be ignored in the laying out of our next deeps. It is not unlikely that our third row of deep level mines will have vertical shafts of about 5000 feet. Between these shafts and the 12,000 feet vertical limit there will be 14,000 feet of reef, as measured on the line of the dip, assuming the latter to be 30° and the formation undisturbed.

Owing to the enormous cost and the difficulties attending the sinking of very deep shafts, together with the possibilities of heat limiting the maximum depth of verticals to 7000 feet, I take it that it is improbable that more than one row of shafts will be put down south of the 5000 feet series. But the question arises: Cannot the whole of the reef down to the heat limit be best tested and worked through these 5000-foot shafts, and is stage winding in vertical shafts likely to assume the importance Mr. Miller appears to imagine? In order to discuss this, I will assume that it is practicable to put down a 9000 feet vertical shaft, that the third row of deeps with their 5000 feet shafts have 8000 feet of reef measured on the dip, the reef leaving the property at 9000 feet vertical, and that from this to the 12,000 feet vertical limit constitutes a fourth row of deeps, with 6000 feet of reef on the line of the dip.

Present operations having placed the prospects of 5000 feet deeps practically beyond doubt, these might be taken in hand without delay; but it is not likely that a 5000-foot shaft for the fourth row is going to be started without some positive evidence of the value of the ground at that depth. Such evidence could be obtained either by a borehole—though to put such a hole down would probably tax our resources to the utmost—or by the sinking of the inclines of the third row of deeps.

Testing by borehole, though very convenient, is unsatisfactory where such enormous interests are at stake. Their disclosures are too local and too limited. On the other hand, the incline shafts of the third row of deeps would not only indicate, with some approach to accuracy, the size and value of the reef at the lower depths, but also the temperature, the quantity of water, and the nature of the formation likely to be met with, whether disturbed or not; in fact, they would yield information which would enable prospects to be judged almost to a nicety. These considerations are strongly in favor of testing by the incline shafts. But it might be urged that to do this would inconveniently delay the opening up of the lowest deeps. This, however, is not the case, provided that the shafts of the third deeps are put down with a view to also serving the fourth deep, and thus doing away with the need for verticals on the latter. Calculating on the present rate of sinking in the stiffer ground of the Central Rand—rates which will undoubtedly be improved on in the future—the sinking of the verticals and inclines of the third row of deeps would take: 5000 feet vertical at 90 feet per month, 55.5 months; 8000 feet incline at 100 feet per month, 80 months; total, 135.5 months; while to put down a 9000-foot vertical shaft—assuming it possible—on the fourth deeps, to reach the same point, would, allowing 75 feet per month, take 120 months, or practically the same time; in other words, the reef of the fourth and final row of deeps can be reached and opened up as quickly by the verticals and inclines of 5000 feet deeps as by vertical shafts sunk within their own boundaries—presupposing that there is no material upthrowing of the reefs by reverse faults. This is favorable to working such fourth deeps through the shafts of the thirds, or, to go a step further, to having the third row of deeps work to the heat limit, opening them up in a manner comparable with the claim area, and thus having the full number of stamps allotted to this area dropping much sooner than would be the case if the claims were divided into independent third and fourth deeps.

The total length of incline working to the heat boundary through the 5000-foot shafts would be 14,000 feet, so that winding in four stages in this distance would probably suffice and constitute a satisfactory working arrangement. Doing all the hoisting through the 5000-foot shaft would be a little more costly for power than having the 9000 feet vertical for the lower section of the reef, inasmuch that the ore from this section would be pulled 8000 feet along the incline instead of 4000 feet vertical; but against this there would be the saving of wages and of maintenance due to there being one shaft instead of two.

It will be noticed that this idea of working out the reef to the heat limit through 5000 feet verticals would do away with the need for stage winding in verticals, for Mr. Seymour has steadily informed us that one stage winding from this depth not only can be done, but is an accomplished fact. It is not that there are any engineering difficulties connected with stage winding in verticals, but I think that although stage winding on inclines would give every satisfaction, it should not be introduced into verticals except where absolutely necessary—the simpler we can have vertical hoisting the better. There would appear to be nothing simpler than one stage rope hoisting, and about 5000 feet is apparently the present limit for this, so that by having shafts of this depth, with one stage hoisting, we apply the maximum of power direct, thus avoiding some of the loss connected with the transmission of power to motors underground.

(To be Continued.)

Volume and Head of Water.

The following table will give information of value to miners and others who may want to know how many miners' inches of water they will require to have a certain head of water for a certain-size nozzle:

Head, feet.	*Miners' Inches*				
	2-in nozzle.	*2½ in.*	*3-in.*	*4-in.*	*5-in.*
100	80	125	185	322	500
150	100	155	225	400	625
200	115	180	260	460	715
250	130	200	290	515	800
300	140	220	320	565	880
350	150	240	345	610	950
400	160	255	365	650	1000

Latest Mining and Metallurgical Patents.

Patents Issued Sept. 5, 1899.

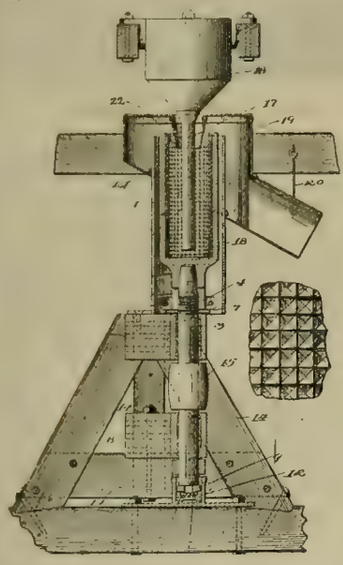
Specially Reported for the MINING AND SCIENTIFIC PRESS.

PUMPING APPARATUS FOR OIL WELLS.—No. 631,776; J. H. Cook, Pittsburg, Pa.



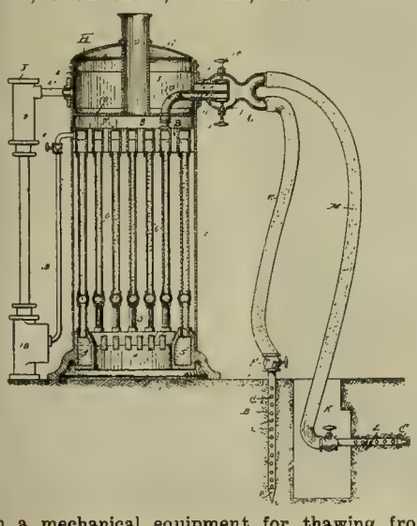
A working valve for an oil well pump consisting of the tube 21, the cups 10 arranged thereon, the glands 17, the divided packing rings 14, the springs 16, the upper cage 23 and valve 22, the divided frame 8, and pin 5 attached therero.

ORE CONCENTRATOR.—No. 632,338; E. Clark, Denver, Colo.



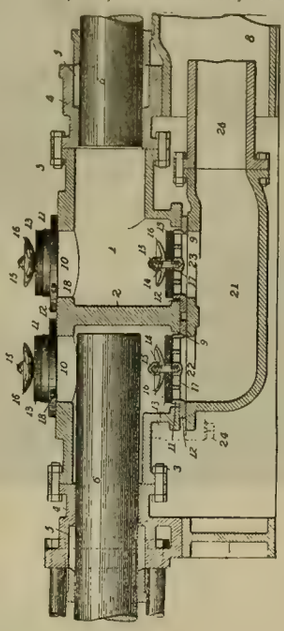
A lining for the walls of an ore-concentrating chamber, having series of pyramidal pockets extending into the lining at right angles to the axis. The combination of a vertical centrifugal ore concentrating chamber and a vertical removable lining having pyramidal pockets extending from the face of the lining to the wall of the chamber.

APPARATUS FOR THAWING FROZEN GROUND.—No. 632,388; J. Whitehead, Urbana, Ohio.



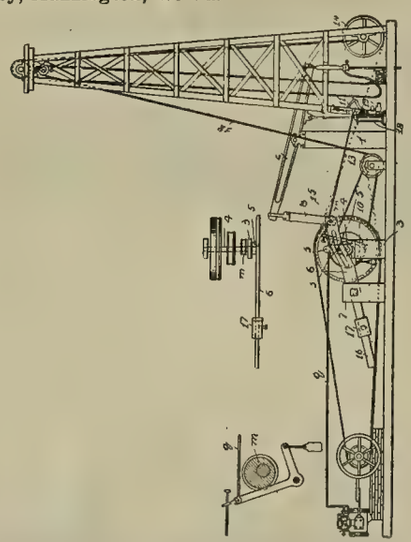
In a mechanical equipment for thawing frozen earth the following apparatus: A steam generator and an air heater consisting of a shell with a fire box near one end, and a water and steam head, an air chamber above head, a steam and air cock connected with head and air chamber, a steam pump with its operating cylinder connected with head and its pumping cylinder connected with air chamber, a flexible pipe connected with cock adapted to receive steam or air according to the adjustment of the cock, a heating pipe connected at one end with flexible pipe and pointed at the other and having perforations through a portion of its length and insertible in the earth throughout the perforated portion and a part of the imperforated portion, whereby a special apparatus is formed for alternately applying steam and air, and an effective distribution of such medium against the frozen earth is effected without leakage of the medium between the earth and heating pipe.

PUMP.—No. 632,428; J. B. Poore, Scranton, Pa.



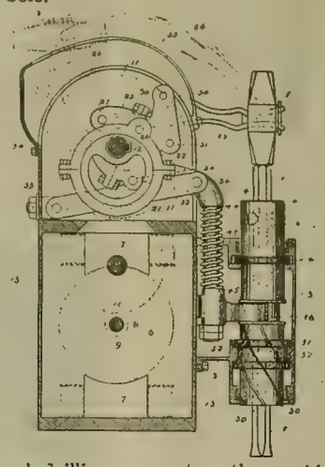
In a pump, the combination with the water barrel having an inlet opening in its lower side and a suction chamber beneath barrel and removably secured thereto, of a valve within the opening and having a seat adapted to be clamped between barrel and chamber, and supports for holding valve in place when the chamber is removed. A horizontally arranged water barrel having two chambers, and pistons adapted to operate through the opposite ends of barrel, of an inlet opening in the lower side of each chamber, a suction chamber beneath opening and removably secured to barrel, a valve in each opening having a flanged seat adapted to be clamped between the suction chamber and the barrel, and supports for holding the valves within the openings when the chamber is removed. The combination of two stuffing boxes, a support for each, a water barrel arranged between and supported by the stuffing boxes, and two pistons, one arranged in each of the stuffing boxes and adapted to operate in the water barrel between boxes.

WELL-DRILLING MACHINERY.—No. 632,537; C. F. Rigby, Mannington, W. Va.



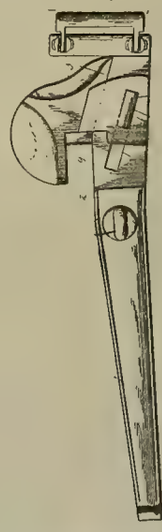
In well-drilling machinery, the combination of a crankshaft carrying a crankpin, a cable-actuating lever fulcrumed to reciprocate vertically, the lever having an elongated slot in which the crankpin operates, the outer portion of the slot being disposed transverse the path of the pin's travel when depressing the lever, whereby the latter is given gradual downward movement, and the slot portion 9′ or that part nearest the lever-fulcrum, disposed at an angle to slot portion 9 so as to more nearly coincide with the path traveled by the crank in its ascent, thereby causing the lever to rise at accelerated speed, the parts being so constructed and arranged that the point of divergence of the slot portions is reached by the crankpin after the lever finishes its downward reciprocation and before it begins to ascend, whereby the lever and cable have a perceptible rest, and torsional strain of the latter incident to sudden reversal of movement is avoided.

ELECTRIC ROCK DRILL.—No. 632,658; G. W. Pickett, Denver, Colo.



In a rock-drilling apparatus, the combination of drilling mechanism having a reciprocating movement of its rock-cutting parts, an electric motor having a rotary movement of its armature in one direction, and gearing connecting the armature-shaft of the motor with the drilling mechanism and provided with a friction clutch adjusted so as to transmit the power of the motor to the drilling mechanism but to slip or yield at or about the times when the movement of the reciprocating parts is reversed. A drill supported in a holder and having longitudinal movement therein, a reciprocating hammer arranged to strike the head of the drill, mechanism for reciprocating the hammer, an electric motor, and connecting gearing between the motor and the hammer-operating mechanism.

WRENCH FOR WELL-DRILLING TOOLS.—No. 632,555; C. L. Dunham, Center View, Ohio.



A wrench involving the combination of a lever having a straight portion to form one jaw of a wrench, a face inclined with relation to straight portion, an elongated shot in a plane parallel with the inclined face, a flanged jaw adapted to slide backward and forward over the inclined face, and a key for coupling the lever and the movable jaw.

THE operation of gravity tramways is dependent upon a natural and accelcrating force—the loaded car descending the inclined plane draws the empty one upward, but there is a loss of force. Cut the car loose at the top of the incline and it starts toward the base, slowly at first but with accelerating speed until it dashes to destruction at the bottom. If it were possible a falling body would in time assume a velocity equalling that of the planets in their orbits but the limitations of distance do not permit it.

Folsom-Sacramento, Cal., Transmission Plant.

At a special meeting June 10th, '99, of the Franklin Institute, B. C. Washington read a paper on "Water Power Electrical Plants in the United States," in which prominent place was given to the Folsom-Sacramento, Cal., transmission plant which has now been operating successfully since June, '95. It is of interest to note that the first sawmill in the world operated wholly by transmitted electrical power is run by current furnished by the plant in question. Engravings of the sawmill appear on this page. Reference is made to this mill as it particularly illustrates the difference between theory and practice, and the fact that commercial success is the test in this as in everything else. The mill herewith illustrated was the first in the world to be run wholly by electricity. It has been idle for a long time and when it does start again steam power will be used, at least as an auxiliary. So far as the electrical equipment is concerned it worked perfectly and is a complete success in normal seasons when sufficient water is obtainable. But the ordinary refuse and offal of a sawmill that is usually burned became in this instance a problem. Instead of being utilized as fuel to make steam, the slabs, sawdust, etc., became a source of expense, for, as the pile accumulated, the State Fish Commissioner compelled its being kept out of the river. Prohibitive freight rates precluded the sale of the sawmill's refuse in Sacramento or elsewhere. So that when this sawmill is again in operation the electrical equipment will probably be supplemented by steam generation of electrical power.



THE FOLSOM, CAL., SAWMILL — FIRST ONE IN THE WORLD RUN WHOLLY BY ELECTRICITY.

The mill is part of the general equipment of the American River Lumber Co., which, by its foothill and mountain connections, will be ultimately able to put logs into the Folsom dam for $4 per M. Mr. Washington, in his article, gives some technical data of interest in connection therewith: The water power of the American river is utilized for driving the generators. The water supply of that river presents some peculiar features, as the flow of water is derived from new sources at all seasons of the year. In the late spring and summer months the melting snows in the mountains bridge over the dry season, and later, as this source of supply is on the wane, the rainy season sets in. The foundation of the dam was begun thirteen years ago by the Natoma Water & Mining Co., and on this foundation, in 1888, the transmission company began the work of completing the dam. The river is confined for several miles by high granite hills, which, where the dam is erected, form a natural point for the building of such a structure. The dam contains 30,000 cubic yards of masonry; the headworks about 15,000 cubic yards. The storage capacity of the dam is about 13,000,000 cubic yards of water. The shutter is a trussed timber platform, which rests in a masonry recess running longitudinally along the top of the center of the dam. When lowered, it is secure from damage by floating debris. The shutter is operated by five hydraulic rams. The sand gates each cover an opening 5x6 feet through the wing dam, and are at the end of the dam to prevent sand or gravel from passing into the canal and causing injury to the water wheels. The bottom of each gate is 8 feet below the bottom of the canal; a short distance farther down the stream a wall 8 feet high is built directly across the canal. The inlets to three of the gates are tunnel-like openings covering the width of the canal. The openings are 8 feet below the bottom level of the canal. The headgates are operated by hydraulic rams. Both the primary and secondary coils of all the step-up transformers are worked in parallel, taking current at 800 volts from the generators and delivering it to the lines at a potential of 11,000 volts. Each generator is provided with a separate and distinct circuit from the power house to Sacramento, and can be worked singly or in parallel. A double-pole line, 22.75 miles long, follows the road. The poles are of cedar, 12 inches at the top, 16 at the butt, and are set 6 feet in the ground, fifty-two to the mile. The cross-arms are braced with angle irons, and are 4x4 inches in cross-section and 7 feet long. The



ANOTHER VIEW OF THE SAWMILL AT FOLSOM, CAL., RUN WHOLLY BY ELECTRICITY SUPPLIED BY THE FOLSOM-SACRAMENTO ELECTRIC TRANSMISSION PLANT.

transmission circuits are supported on double-petticoat porcelain insulators tested to withstand a potential of 25,000 volts. The pole lines each support six No. 1 B. & S. bare copper wires, which effect the transmission at an estimated loss of 10% at full load. A telephone line is carried on one set of poles. The line is transposed every five poles. At the distributing station the transmission circuits are led direct from the pole lines to the step-down transformer chamber, in which are located the various transformer equipments. Three large 250-kilowatt synchronous motors are supplied with energy from 125-kilowatt transformers, which deliver current at 500 volts. The other transformers step-down to 125 volts, the current being distributed over the city on a four-wire system, consisting of three wires for the 3-phase current and a fourth or neutral wire. The incandescent lighting service is rendered by extensions made between either of the three wires and the neutral, proper care being taken to keep the circuits balanced within reasonable limits. The power service is rendered directly from the 3-phase wiring. Large motors are operated from 500-volt, 3-phase wiring; the 125 and 250-volt, four-wire system is used for small motor work and incandescent lighting.

Telegraphing Without Wires.

During the Columbian Exposition at Chicago in 1893, an invention for wireless telegraphy by induction was brought before the International Congress of Electricians by W. H. Preece, electrician to the British Postoffice; Nicola Tesla is understood to be engaged in an invention on a new system; and other inventions and experiments are noted; but the lead in practical success so far seems to have been taken by G. Marconi, a young Italian, who in 1896 made some remarkable experiments at Spezia, Italy, and later came to London, where his invention was examined and approved by Mr. Preece. During 1897 and 1898 Marconi succeeded in telegraphing from the shore of the British Channel to a vessel at different points, at a distance of several miles, and even despite the intervention of high headwinds; and in April, 1899, messages were successfully transmitted across the British Channel from a point near the South Foreland lighthouse to a French station near Boulonge.

Marconi is said to use static or Faradic electricity of very rapid vibration, (the line of frequency of oscillation being probably about 250,000,000 per second) rather than the ordinary electric current of commerce; and he is thus able to produce vibrations in the ether of space. These etheric vibrations would be in every direction but for a contrivance of "reflectors," which send them in the direction desired.

The receiver, to which they are transmitted through the ether, consists essentially of two silver poles set in the ends of a glass tube about two inches in length, within which is a vacuum as nearly perfect as can be made, while the metallic ends extend within the tube toward each other, and are separated only by an almost infinitesimal distance, within which are fine filings of nickel and silver with a trace of mercury. The current of etheric vibration being received at one pole of this apparatus is strong enough to throw the fine filings in this vacuum into polarized arrangement, when they at once form an electric conductor for a current of galvanic electricity connected with the receiver's poles by a local circuit, and this local current instantly sets in motion a small hammer, which taps upon the tube and by jarring breaks up the polarized arrangement of the filings as soon as the polarizing influence of the etheric wave ceases, so destroying their power of conduction. Thus by an alternating conductivity and non-conductivity of the filings of the local circuit is made and broken, and signals are conveyed, the resumption of the current being audible in the tapping of the local sounder for sound reading, while the same current can also record Morse signals on paper by ink.

To the objection that the message thus transmitted could be read off by any receiver, and so all privacy destroyed, it is answered that the transmitter and receiver are "tuned" to a key of corresponding vibrations, a phenomenon of electric vibration which may be compared to the tuning of musical strings or tuning forks to the corresponding pitch, so that the sounding of one will excite to sound the other also.

A conspicuous part of both the transmitter and receiver is a perpendicular wire, the height of which to get the best results should vary with the square of the distance. The electric current being broken by an ordinary Morse key, sparks pass between two brass balls which cause a succession of electric waves in the ether. These would naturally spread, like the waves of light, in every direction; but they are directed by a copper reflector, as light by a mirror, towards the receiver, and there received by the sensitive apparatus described.

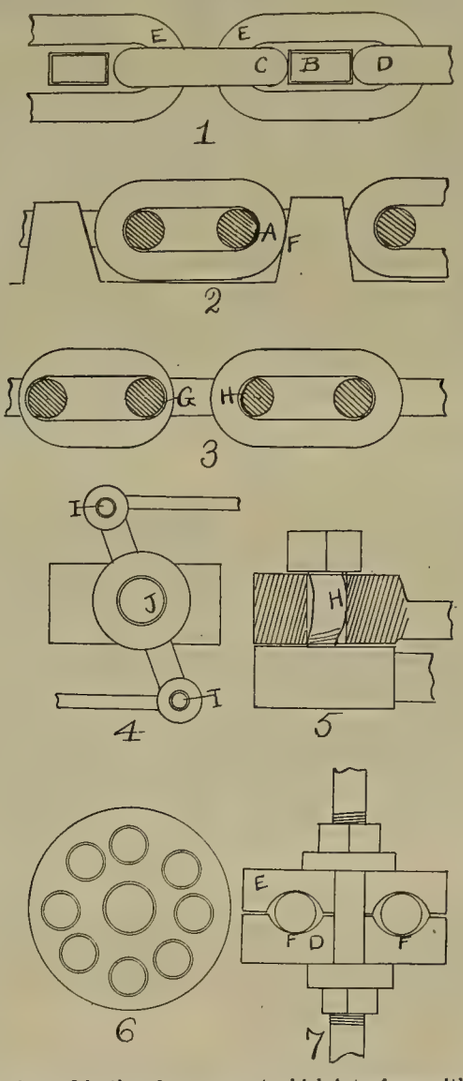
Other electricians besides Marconi are connected with the development of wireless telegraphy. All make use of theories of electric currents published by Henri Hertz 1887. In Paris, M. Ducretet has established posts at different points within the city; in Berlin, Prof. Slaby has connected the top of his house with the laboratory of the Technical School, and with Potsdam, over twenty miles of distance; and the Russian electrician, M. Popoff, has communicated between a shore station and vessels at sea.

General Greely, of the U. S. Signal Service, says that many experiments and tests show that great delicacy and constant adjustment are required in the receiver, so that the transmission of signals and messages is as yet uncertain and unreliable; though the value of the system between ships at sea, instead of the ordinary flag signals, is sure to be manifested.

Topics for Coal Miners.

Written for the MINING AND SCIENTIFIC PRESS by GEO. S. RICE.

Chain drives on hauling systems and power transmission in coal mines require special care if good work is to be expected. Figs. 1 and 2 are sketched to illustrate some usual faults in chains, with which the mining engineer has to contend. The tendency is to use a too heavy lubricant and apply it to such an extent that caking results; hard, crusty fills of hardened mixture of grease and foreign matter collect at *E*, Fig. 1, and likewise on the other links of the



chain, and in time form a crust which interferes with the free working of the chain. The writer has found chains in such condition from this crusting of grit and oil that the corresponding links are forced against the teeth *B* in the sprockets, producing binding at *C* and *D*. This is shown in Fig. 2, in which *A* marks a collection of the foreign matter and *F* the place where the link binds on the tooth in consequence. This trouble is frequent in chains which are exposed to the elements. The best kinds of oils or greases produce a good surface for dust, dirt and pieces of vegetable matter to cling to, and unless there are regular inspections and cleaning trouble is likely to occur. Even in boxed chains this difficulty happens. Some engineers partly overcome the clogging trouble by using very thin oils and applying them in such a manner as to clean out and wash off any dirt which may have gathered. I often find that the ill-working of a chain is due to the links being worn as at *G*, Fig. 3, or at *H*. In either case the remedy consists in the substitution of new links.

Shifters.—One of the shifters used in shifting from switch towers in coal mines is shown in Fig. 4. When this pattern binds it is usually due to the springing or bending of the central stud *J*. When the rod studs *I I* become bent, twisted, sprung, badly worn, clogged with old oil, or in any way out of form, binding will result and no more oil should be applied, but the worn parts should be substituted with new, and the parts which may have slipped or loosened should be readjusted. In the eccentric pattern of shifter, the failure of operation is ordinarily due to the uneven wearing down of the cam or the bending and consequent binding of the set screw *H*, Fig. 5.

Faulty Bearing.—Fig. 6 is a design of ball thrust bearing of recent construction, and presented here to illustrate how unreasonable some inventors of new forms of bearings are. Fig. 6 is a top view of the bearing, which consists of a plate or disk provided with openings for the steel balls. This bearing was completely covered with oils, time and time again, and yet proved non-effective in an elevator shaft in a coal mine. The reason is apparent. The balls are supposed to roll or turn on their axes on the step plates, and are retained in place by the retaining plate or disk. But certain laws of mechanics were overlooked in the planning of this pattern of bearing, for instead of a smooth, sliding or turning motion of the balls, the latter scrape on the sides of the openings in the retainer to such an extent as to produce undue friction. This results in a sort of a sliding frictional contact, and is not the neat rolling contact which would work well in harmony with a good lubricant, as is the case in a thrust bearing remodeled to the plan in Fig. 7. Here we have the balls *F*, *F* in grooves formed in the disks *E* and *D*, rolling under such conditions that each ball may revolve on its own axis, producing rolling contact without the necessity of being bound up in the retainer as in the first case.

Winding Cylinder Working Irregularly.—The following are some of the important reasons for a winding cylinder of a hauling system running unevenly: (1) Lack of perfectly free movement in the winding friction, either in the worm which is turned by the governing motion, or in the worm placed within the arm of the quadrant. This latter may become bent near the top and give trouble; or the upward play of the worm may become arrested occasionally, and so shorten the length of chain; or there may be too much upward play of worm, allowing it to rise when the quadrant arm gets to a forward position of about 55 degrees, thus suddenly lessening the strain and as quickly catching it again. (2) The set screw on the winding drum gear getting loose, preventing it turning readily. The stud, holding spur gear to the winding drum, may also become loose. (3) Winding drum gear may not be set true. It should be set parallel with the axis of the cylinder. (4) Carriages striking out or in too hard, or striking in too easy. (5) Squaring bands too slack. (6) In backing off, the faller should gently follow the unwinding of the chain.

Observations on Rock Drilling.

TO THE EDITOR:—The Miners' Union gave a picnic at Stent, Tuolumne Co., Cal., on Labor Day. One of the main attractions was the drilling contest, the first prize of $100 being won by Page & Wainright of Sonora, who drilled 37 15/16 inches double-handed in fifteen minutes, stone used being Rocklin granite. This remarkable record was made with first-class American drill steel. The second best drilling was done with imported high-grade steel, while the poorest of all was done with drills made from the highest priced tool steel in the market, which goes to show that hammered steel is the best for percussive rock-drilling tools, and a steel which may be superior to any other for making chisels and lathe tools for cutting iron may be unfit for rock drills.

Extra care is taken with the tempering of drills to be used in drilling contests, as a broken drill or a battered one may lose the driller his match. None but the most experienced past masters in the art of tool dressing are considered fit to temper the "chisel-pointed" thin-as-a-knife-blade bits used in exhibition drilling. The maker of the drill bit, although usually overlooked, is entitled to as much admiration for his skill as is the miner whose true, rapid and sturdy blows, shedding a shower of sparks at each impact of the hammer, drives the drill through the solid granite. C. L. LANG.

"DID you ever see a double-barreled tunnel?" inquired a well-known resident of the news-gatherer. The latter had not, and wanted to know what a double-barreled tunnel was. The gentleman addressed said: "Well, when I was over near Salton, California, in July, I went to the mines, and in one place I noticed that the party developing the property had opened two tunnels and that there was not 6 feet space between the face of the openings. Why the owners did not crosscut I cannot say, but it struck me that whoever run those tunnels had "wheels," and had 'em bad. There are mining men whose proper place is behind a ribbon counter." With the last remark the speaker gave expression to his feelings by uttering a pronounced grunt, added to which was a liberal supply of swear words.

A NEW steel shaft just finished for the Boston Elevated Railway Co. is said to be the largest ever cast. It is to be used in the company's central power station. The engine will be of 4000 H. P. at ordinary speed. The shaft is 28 feet in length and 38 inches in diameter in the center, and weighs about 75,000 pounds.

Prominent Achievements in Metallurgy.

Of the achievements in metallurgy which have either been actually effected or are in immediate prospect Professor Sir W. Roberts-Austen recently gave the following collective statement in his presidential address to the Iron and Steel Institute of Great Britain. There are, he said, blast furnaces which will produce 690 tons of pig iron in twenty-four hours, with a consumption of little over 15 4 cwt. of coke per ton of iron, and the gases of blast furnaces are used not only as sources of heat, but directly in gas engines. There are Bessemer converters which can hold 50 tons of metal, and open-hearth furnaces which will also take 50 tons, while 100-ton furnaces are projected. The open-hearth furnaces are fed with one ton of material in a minute, by the aid of a large spoon worked by an electro-motor. There are gigantic "mixers," capable of holding 200 tons of pig iron, in which, moreover, a certain amount of preliminary purification is effected. Steel plates are rolled of over 300 feet in area and 2 inches thick, and there are girders which justify the belief of Sir Benjamin Baker, that a bridge connecting England and France could be built over the Channel in half-mile spans. There are ship-plates which buckle up during a collision, but remain water-tight. There are steel armor-piercing shot which will penetrate a thickness of steel equivalent to over 37 inches of wrought iron. The points of the shot remain intact, although the striking velocities are nearly 2800 feet a second. There are wires which sustain a load of 170 tons per square inch without fracture. Hadfield, whose labors he hoped to see continued far into the twentieth century, has given us manganese-steel that will not soften by annealing; while Guillaume has studied the properties of certain nickel-steels that will not expand by heat, and others that contract when heated and expand when cooled. Nickel, chromium, titanium and tungsten are freely used alloyed with iron, and the use of vanadium, uranium, molybdenum, and even glucinium, is suggested. Huge ingots are placed in soaking pits and forged direct by 120-ton hammers, or pressed into shape by 14,000-ton presses, and there are steel castings for parts of ships that weigh over thirty-five tons. —Cassier's Magazine for September.

Electrolytic Separation of Cadmium From Iron.

A method for separating these two metals in slightly acid solutions is described in the *Zeitscrift fur Elektrochemie*. As a cyanide solution gives the best deposits of cadmium, certain experiments have been made with the idea of finding out whether such a solution could not be used for the electrolytic separation of iron from cadmium. When an excess of cyanide of potassium is added to a solution of a ferrous salt, a soluble ferrocyanide of potassium is formed. With solutions of ferric salts, hydrated peroxide of iron is produced, and only a very small proportion of iron passes into the cyanide solution. The method proposed is based on the non-electrolytic decomposition of the soluble ferrocyanide of potassium. The mixed salts of iron and cadmium are dissolved in 100 c. c. of water very slightly acidulated with a few drops of dilute sulphuric acid; to this is added two or three grammes of pure cyanide of potassium, and the whole heated until the solution becomes perfectly clear. If this clarification requires too long a time, a few drops of caustic potash may be added. The solution is then diluted to 200–250 c. c., and, after cooling, electrolyzed with a current of 0.05 to 0.010 ampere per square decimeter. The deposit of cadmium is perfectly coherent. If the solution contains but a very small quantity of iron, the floating hydrated peroxide may be neglected; but if, on the contrary, the iron is present in any considerable proportion, it becomes necessary to reduce this ferric salt to the ferrous state by means of a sulphurous acid; to effect this it suffices to add to the acid solution a small quantity of sulphite of soda, and heat for a short time.

Output of Iron Mines.

A prominent iron ore miner says the Lake Superior region will ship 16,000,000 tons of iron ore this season. His estimate for the mines tributary to Duluth–Superior is 7,500,000 tons. The local furnaces, such as those at New Duluth, Ashland and Escanaba, will probably receive some ore during winter, but Pittsburg and Chicago will be supplied during the season of navigation.

The ore shipments from the Lake Superior region will be divided as follows:

Vermilion and Mesaba, 7,500,000 tons; Gogebic range, 2,500,000; Marquette range, 3,000,000; Memoninee range, 2,500,000.

Shipments from the Lake Superior region last season were about 13,600,000 tons. The Minnesota ranges and the Gogebic range are the ones that will provide the increased ore tonnage this year. Practically all of it will be from the Minnesota ranges. There will be an increase of from 1,900,000 to 2,000,000 tons from the entire Lake Superior district, and the Minnesota ranges will furnish about 1,400,000 tons of the increased shipment. The Marquette and Menominee ranges will just about hold their own this year as to output and shipment. The Gogebic will show a fair increase, but Minnesota is the bulwark of the iron ore consumers this year with their great demands.

The Vermilion range, which last year shipped 1,200,000 tons, will this year ship 1,800,000 tons. The Iron Range road will handle 4 000,000 tons this year; the Mesabe road 2,500,000 to 3,000,000 tons, and the Eastern about 1,000,000 tons. Shipping over the Eastern will become heavier after the Sauntry mine begins operating and the road is extended to it.

Next year there will be the same demand as this year for ore, and will probably be greater. But the mines will be in better shape to produce the ore, and the transportation facilities will also be increased. There will be more boats and more ore cars to meet the emergencies of heavy shipping, and the whole scheme of production and transportation of, say, 16,000,000 tons of ore, will be more easily accomplished than this year. Prices for ore will certainly be better than those at which the bulk of ore was sold this season. The big sales were made before the boom in iron and steel commenced.

Ishpeming *Iron Ore* quotes Joseph Sellwood as predicting that the State of Minnesota would send out 8,000,000 tons of ore this season, and thought the entire region would furnish about 16,000,000. The big mines are not always going to hold out. The constant drain at the present big volume makes serious inroads. There are many worked-out properties on the older ranges, and some of the new fields are already feeling the effects of big shipments.

A DELICATE instrument, designed by Horace Darwin, will indicate slow tilts and pulsations of the earth's crust of less than one three-hundredths of a second, or an angle less than 1 inch in 1000 miles. It consists of a circular mirror suspended from brackets by two wires of very unequal length. Slight tilting of the upright causes exaggerated motion of the mirror. The spot of reflected light will vary ½-inch when a finger is laid on the support of the apparatus.

THE wavelike appearance seen on the faces of some sandstones and shaley rocks when broken from their beds is due to either the rippling of water or the action of the wind. The marks thus made have been preserved in the rocks by subsidence of the formation beneath the waters and subsequent deposition of other material upon the bottom of the lake or lagoon. The process may be seen in operation on the shores of a low, marshy shore or on the heaps of drifting sand along the shores of some lakes and the sea.

The Assay of Foreign Lead Ore.

An important decision regulating the sale of foreign lead ores was handed down recently by Judge Hanford of the Federal Court of the State of Washington, in the case of the Puget Sound Reduction Works, operating the Everett Smelter, on appeal from a decision of the United States Board of Customs Appraisers in New York City.

Judge Hanford holds that, under the United States laws, what is known as the "fire" assay shall be used to determine the amount of dutiable lead in imported ores, and gives the smelter company judgment against the United States for the amount of excess duties paid on ores shipped to it under the ruling of the Washington officials that the "wet" method should be used in assaying such ores.

Under the new ruling, the Government will be compelled to change its system of assaying imported ores for the purpose of obtaining values on which to figure duties. In the past the official system has been the "wet" or chemical process. It is contended and generally acknowledged that this process yields about 2% more lead than the fire system. The smelter people fought the case and won on the theory that the commercial method is the fire assay. The decision settles the question as to whether the wet or the fire assay is the commercial method by declaring that the evidence is satisfactory and convincing in favor of the latter.

Judge Hanford had the case under advisement and handed down a written opinion. Reviewing the evidence, he says, in part:

"It would require a very strained construction of the law to find that Congress, after having in 1894, and again in 1895, enacted statutes requiring the sampling and assaying of ores, for the purpose of collecting duties thereon, to be according to commercial methods, and without having expressly repealed the law of 1896, could have intended in the law of 1897 to continue the same policy as regards the methods of sampling and yet departed from that method for the purpose of assaying.

"It is my opinion that the Secretary of the Treasury is required, by the positive provision of the Acts of Congress above referred to, to prescribe regulations for the assaying of lead ores by the commercial method, is a question of fact, for the decision of which resort must be had to evidence.

"In this case the evidence is all one way and it is in all respects satisfactory and convincing. From it I find that the commercial method of ascertaining the quantity of lead contained in imported ores is the fire process, and any other method of assaying does not meet the requirements of the law."

AN old wagon bridge which has spanned the Wabash river, near Clinton, Ind., for half a century has been removed by aid of the electric current. The county bought the piers, the principal owner agreeing to remove the superstructure to make way for a new bridge. Efforts were made to burn the bridge, but it was found that this would injure the piers, so the sills were wired and electricity applied. In nine hours the pile toppled into the river, leaving the foundations unhurt. The current had the effect of cutting all the sills simultaneously as with so many saws.—Electricity.

The oldest iron steamship in the world is the United States steamer Michigan. The vessel was constructed at Pittsburg, Pa., in 1841–43; the parts were transferred to Erie, put together, and launched on December 5, 1843. The original machinery, with the exception of the boilers, is still in her and in good condition. The vessel is an iron paddle-wheel steamer of 635 tons displacement; length of keel, 156 feet 4 inches; length between perpendiculars, 162 feet 6 inches; breadth of beam, 27 feet; depth of hold, 12 feet 5½ inches.

Rare Brazilian Sand Used for Incandescent Mantels.

The monazite or Prado sand, which is used in the manufacture of the Auer incandescent mantels, says the London *Electrical Review*, is found at Bahia, Porto Seguro, and in small quantities in Matto Grosso, Brazil. In the first two places the sand is found close to the shore and is derived from the decomposition of the neighboring gneiss. It is of a dark yellow color, like gold, and very heavy. The following is an average analysis:

	Per Cent.
Aluminum	3
Cerium	62 to 70
Iron	2½
Lanthanum	2½
Thorium	1½ to 8½
Yttrium	1 to 2

Cerium is an extremely rare metal, hitherto found only in Sweden. Its color is a whitish-green, and it has considerable metallic luster. Its specific gravity is almost equal to platinum. Mixed with copper and zinc, an artificial gold is produced, having the same luster and weight as real gold.

Thorium is of a gray color, and when burned in air or oxygen is converted into an oxide. The metal combines energetically with chlorine, sulphur and phosphorus and dissolves in hydrochloric acid, liberating hydrogen in the process. As may be supposed, there has been a considerable run on these valuable sands since they were discovered, and it is expected that the value of this current year's exports will be more than double what it was last year.

Thirty-three Miles of Aluminum Cable.

The Hartford Electric Light Co. of Hartford, Conn., has ordered thirty-three miles of aluminum cable. The company is building a concrete dam in the Farmington river, at Tariffville, Conn., eleven miles from Hartford. From this waterfall it will realize 2300 H. P., which will operate two 1000 H. P. generators, giving 10,000 volts. This current is to be transmitted over aluminum cables to the company's power station in the city of Hartford. There will be three cables for transmitting the current, strung in the form of a triangle on double crossarms and double insulators. The wires will be left bare and will run to within a mile of the city limits, when the current will be reduced to 2400 volts, at which voltage it will run to the company's city generating station, where the current will be transformed to a lower voltage for power and lighting purposes.

Each cable has seven strands, and each strand is made up of seven wires of No. 11 Brown & Sharpe gauge. The complete cable is about 1 inch in diameter, and has a conductivity equal to No. 0000 copper wire. Aluminum is to be used in the high-pressure transmission line only, and by utilizing the light metal instead of copper the company estimates that, with present prices for copper, it will save $3500. —Electricity.

THERE is no data available which would furnish anything like a reliable estimate of the extent of the underground workings of the Leadville, Colo., mines, but the sum total must be enormous. For twenty years the hills have been honeycombed with underground drifts, and the work is still progressing. For the past two or three years from five to six miles of new work have been done in the Ibex mine, and there are now upwards of forty miles of workings in that property alone. There are about twelve miles of workings in the Chrysolite, and at least as much in the R. E. Lee. The Carbonate hill mines have honeycombed that hill very thoroughly, while Iron hill has been burrowed through to an enormous extent. It is safe to say that if all the drifts, levels, winzes, upraises and shafts in Lake county were represented by a continuous tunnel, it would represent an underground passageway of over 1500 miles. There are some calculators who can figure out that there are at least 2000 miles of workings.

Mining Summary.

ALASKA.

The last monthly reports of the Alaska-Mexican and Alaska United mines show results as follows. The former crushed 14,936 tons ore, valued at $19,679, and turned out 200 tons sulphurets, valued at $10,201. The ore averaged $2 20 per ton. The gross earnings were $32,178 and the working expenses $19,-. The latter mine crushed 24,144 tons, valued at $45,725, and yielded 645 tons sulphurets, valued at $20,165. The ore averaged $2.52 per ton. The gross earnings were $65,8-6. One of the mills, dependent [illegible],765 and the working expenses were upon water power, had to hang up some of its stamps five days during the month because of the short supply.

Juneau *Miner*: The following are the values of Alaskan and British Yukon gold:

	Per oz.
Little Manook, American	$19 50
Small, Cape Nome	18 50
Ophir, Golovin Bay	18 50
Bunker, Klondike	17 00
Pine, Atlin	16 75
Wright, Atlin	16 75
Dominion, Klondike	16 75
American, Eagle City	16 75
Porcupine, American	16 75
Bonanza, American Yukon	16 75
Bonanza, Klondike	16 30
El Dorado, Klondike	15 50

El Dorado carries the poorest quality of Yukon gold, and Little Manook the richest. The highest assay returns from Yukon gold were from gold taken from No. 8, Little Manook, owned by former Governor J. H. McGraw and Gen. E. M. Carr. It ran $19.63 per ounce. The American Cape Nome is high grade. El Dorado gold has run as low as $15 per ounce, as high as $17.09 per ounce has been obtained from discovery claim on the American Porcupine Creek.

ARIZONA.

MOJAVE COUNTY.

The 20 stamp mill at the Sheep Trail mines, near the Colorado river, is running.

The C. O. D. mine on Stockton hill is again working. The old dumps are to be milled and concentrated.

W. J. Shick of New York has commenced work on a large hydraulic plant in the Ehrenberg district for the purpose of working the Chrego placers. Water will be pumped from the Colorado river, five miles, and the plant will handle 2000 yards of gravel per day.

YAVAPAI COUNTY.

(Special Correspondence).—R. A. Thomas, of the Black Hills Copper Co., has arrived at Jerome from Los Angeles, for the purpose of initiating the work of the newest Jerome company. All matters pertaining to the organization are reported satisfactorily consummated.

Several boarding houses and bunk houses have been put up at the Iron King and Copper Chief properties, which are as yet in the hands of the Chinese. At the Copper Chief nothing new is reported. The Iron King is working in the lower tunnel. The surveyors have completed the new pipe line from Allen's diggings and within thirty days will begin laying pipe.

Jerome, Sept. 9th, '99.

CALIFORNIA.

Amador.

The Oneida mine, between Jackson and Sutter Creek, makes 400,000 gallons of water daily.

R. Porter is making good headway in the shaft of the Mutual mine, south of Amador City. The shaft is in a slate formation full of quartz and sulphurets. This is the newest large enterprise in Amador.

E. Purington, formerly superintendent of the Gover mine, near Amador City, has bought the Loyal Lead, near Drytown.

Amador *Ledger*: Bryson & Worthing, of the Abe M. & M. Co., have a bond on the C. Kretcher property, south of the Bay State mine. It was opened many years ago and a drift test returned $4.65 per ton in free gold. A tunnel cut the Bay State ledge and all the Kretcher ledge, though the latter was not noticed. A drift south shows that the come together 25 feet from the original tunnel where the ledge is 12 feet thick of good value in free gold with 4% sulphurets. They will sink a vertical shaft.—At 300 feet in the old shaft, a crosscut was driven to the Kretcher vein, from which valuable ore was milled. At the 750-foot level crosscutting to the Kretcher ledge is in progress, now in 340 feet.

Butte.

J. S. Trowbridge, at the Robinson mines, is putting up a new hoist building. A boiler and a double-cylinder hoist for sinking 1000 feet have been added, and power drills will be used. The shaft is down 100 feet below the creek level. There are 1400 feet of tunnel on the ledge above the collar of the shaft. The 20-stamp mill has been rebuilt and ten stamps will run.

Calaveras.

It is reported that the Lucas mine, on the Mokelumne river near Big Bar bridge, has been sold to the owners of the Tomboy mine in Colorado, Posey & Co., for $20,000. The purchase price was paid down. The new owners express a purpose to expend large sums of money on the property.

F. F. Thomas, president and manager of the Gwin mine, accompanied by J. McSorley, visited North Branch recently and examined the Hudson, Mester and Jackson mines, near Central Hill.

The Hudson vein lies at a low angle and a vertical shaft was sunk through it by early operators. Development work has been done on the mines lately.

Jackson *Dispatch*: High grade ore in the Derrest mine, near Fourth Crossing, is coming from the 400-foot level.—At the Barstow mine, near Glencoe, a new hoist and mill are being erected. The mine was recently sold in England.

San Andreas *Prospect*: At the Lightner mine in Angels, Supt. H. G. Murray will sink the main shaft now down 450 feet to 650 feet. The 40 stamp mill is crushing 208 tons of ore in twenty-four hours.

Angels *Echo*: The new hoisting machinery is in position at the Harris mine, a mile south of Angels, and the gallows frame is completed.

Inyo.

It is reported that a Vermont marble company is negotiating for the Lindsey marble quarries east of Antelope.

The Anthony group of mines in the Panamint range is reported sold for $45,000.

Kern.

Three shifts are rushing development work at the Butte mine at Randsburg.

Bullion returns on 1800 tons of ore crushed at the Red Dog mill near Randsburg amounted to $41,267.

Randsburg *Miner*: From a run of thirty-seven tons of ore the Kinyon mine owners received $11,000, and from twenty tons of second class ore milled they received $1000. One hundred and forty tons of ore taken from the dump averaged $8 a ton.—The Yellow Aster Co. has eleven men working at the wells drifting. They have encountered another good flow of water. At the mine 152 men are employed - 137 in the mine and twenty at the mill. The payroll runs over $13,000 per month.

Marin.

Near Bolinas, oil deposits are reported on the outskirts of the town. J. D. Bradbury of San Jose has bonded several ranches and has ordered a plant and will commence sinking wells. Oil was first discovered near Bolinas several years ago by R. Coltingham. On the beach, among the rocks, natural gas is found. When the tide is out, on Duxbury Reef, the gas rushes out of the rocks, when lighted it will burn until extinguished by the tide. Ledges of asphaltum have been discovered on the beach.

Nevada.

The shaft of the Bismarck & Gladstone mine, near Selby Flat, is to be sunk an additional 100 feet.

Grass Valley *Union*: Steam was started on the old Union Hill mine on the 8th inst. for the first time in many years. The pumps are in operation. Sinking will be begun and old drifts cleaned out.

Grass Valley *Union*: Supt. Brockington reports work progressing favorably at the Omaha, Homeward Bound and Lone Jack mines under his direction. Sinking was commenced at the Omaha and drifts are being run in both directions at the bottom.

Placer.

The Jupiter mine, near Iowa Hill, cleaned up $2200 for August, the result from drifting.

At the Sailor mine, in Sailor canyon, where a large amount of money has been expended in search of a gravel channel, a new tunnel has been started, on the advice of N. A. Harris, 400 feet higher than the old workings. It is thought the channel will be found in 350 feet.

Nevada City *Herald*: A carload of rich copper ore was shipped from Sheridan to the smelter last week.——Prospectors on Bear river are finding rich ground at 30 to 50 feet depth with augers.

Plumas.

Oroville *Register*: Steam-power drills are to be used in the Robinson mine in Granite basin, and a new hoist is being put up. A new water wheel has been put in, which will give more power than the one formerly in use. R. C. Robinson has two shifts working and expects to strike ore this week. Men are building 2300 feet of flume to carry 250 inches of water, which will be used to run an 8-inch hydraulic elevator.—San Jose capitalists are to open what is known as the Elizabethtown channel mine.

San Diego.

Miners are investigating the gold-bearing veins near Campo, in Laguna mountains.

Ex Receiver C. W. Pauly of San Diego has petitioned the court for privilege to work the tailings of the Golden Cross mill at Hedges. There is a large amount of this material accumulated and it all contains value in gold.

San Joaquin.

The Golden Gate Oil Producing Co. has been incorporated at Stockton. W. R. Thomas, D. O. Castle, S. E. Lotta, W. J. Rhodes and S. M. Spurrier. Capital stock, $100,000.

Santa Barbara.

The St. Valentine M. Co. has been incorporated at Santa Barbara. W. Ealand, G. F. Treuwith, J. H. Burson, A. C. Grant and C. A. Stork. Capital stock, $100,000.

Santa Clara.

The Gay Quarry Co. has been incorporated at San Jose. W. A. Porter, C. Wehner, G. Lion, J. W. Rea, A. C. Darby, A. Greeninger and T. W. Hobson, San Jose. Capital stock, $50,000.

Shasta.

(Special Correspondence).—The Coronado Copper M. Co. of San Francisco is developing a large area of territory twenty-six miles southwest of Redding, in the neighborhood of the Bully Choop mine. The company owns 400 acres. J. Blumenthal is president and R. Mohr secretary. A contract was recently let to run 400 feet of tunnel, which is calculated to cut the ore body at a depth of 280 feet. A 60-foot shaft opened a vein which was crosscut 18 feet without finding the walls. The contract price is $5 per foot.

Basset & Welch are running a new tunnel in the Eureka mine near Shasta. They found a third ore body on this property, which assays $22 a ton.

Behrns & Lievasay are working seven men on the Oro Fino mine near Shasta. This mine has had many operators in the past few years. The present company has found the ore body so long sought. The values are from fair to high grade.

The recent transfer of copper properties at Furnaceville and Copper City has stimulated prospecting in those sections and almost every available claim has been located.

In the neighborhood of Kennet about sixty claims have been relocated (jumped) since the announcement of the news that the last Legislature did not repeal the Act of '97.

Redding, Sept. 13th, '99.

Experiments are to be made with the ore of the Yellow Rose of Texas. The gold bearing material is talc and clay and does not crush readily under stamps.

That there has been unusual interest in mining in this county the past year is shown by the number of locations filed for record during the past twelve months as compared with the number during the twelve months preceding. From Sept. 7, 1897, to Sept. 7, 1898, 1134 locations were filed with the County Recorder. From Sept. 7, 1898, to Sept. 7, 1899, the number was 1735 an increase of 551.

Shasta *Courier*: A number of men employed at the Mount Shasta mine have been laid off and sinking on the ledges is in progress to open ore deposits on lower levels. At the Old Bunker Hill mine development is in progress. Rich rock, carrying tellurium and free gold, has recently been discovered in a defined ledge. The mine is two miles south of Shasta and is owned by Mrs. J. Loag of New York, J. V. Scott and others.

Sierra.

Downieville *Messenger*: Articles of incorporation of the Twin Eagle M. Co. have been filed with the County Clerk. The capital stock is $50,000. The directors are J. C. Hastings, J. S. Wilbur, F. S. Gould, E. McGary, Jr., and J. McGary. The company is preparing to operate the Gray Eagle mines on Kanaka ravine. A mill recently purchased in Nevada county is on the ground, and construction work commenced. J. S. Wilber, Supt. Gray Eagle mine, near Gold Point, is at the mine and has commenced grading for the mill.

Siskiyou.

The Greenhorn Blue Gravel mine has been purchased by A. & L. J. Wetzel, J. E. Harmon and W. R. Ridenour, who intend sinking a new shaft and adding apparatus for working on a more extensive scale. John Garvey will continue as foreman.

The group of quartz mines on Squaw creek, a tributary of Willow creek, in the Gazelle district, promises to turn out well. The mines show a ledge 98 feet wide, and have been bonded to Dr. G. W. Dwinnell, of Montague, for $45,000, the agreement being that quartz yielding $30 a ton or more be shipped to Keswick and lower grade ore stacked until a mill is put up.

A four-mile ditch is to be dug from Buckhorn creek, a tributary of Horse creek, on Klamath river, to the Poverty Point and Yankee placer mines opposite Oak Bar.

W. A. Bantz started up the mill on the Little Tiger mine at Greenhorn last week, but has shut down to make alterations in machinery.

Mr. Rader, who bought out the Hunter-Johnson quartz mine at Horse creek, on Klamath river, has been finding rich prospects. The sulphurets contain gold, but have to be sent to the Selby works.

Yreka *Journal*: The company working the mine at Greenhorn on the Nehrbass place, adjoining the Blue Gravel mine, are down 130 feet, which indicates that it is in a deep ancient channel.—Work is to be started again on the cinnabar mine at the head of west fork of Beaver creek, by the Siskiyou Con. Q. M. Co. Mr. Newcomb has been at the mine lately, making arrangements for starting with fifteen men.—The ledge at the Golden Star or Spencer mine, on Humbug creek, is rich but small.——G. W. Foote, working the Merrimac mine on Humbug, has a rich ledge.

Tuolumne.

Sonora *Independent*: J. Meighan has men grading for the 20-stamp mill on the Mt. Jefferson mine, at Groveland.—A new station in the Accident mine of Big Oak Flat has been cut and drifts driven. The ledge is 21 feet wide. The property is managed by J. Meighan.—Rich ore is being taken from the Republican mine at Jacksonville. Byrne & Herndon have bought the Ophir mine, near Big Oak Flat, from Mr. King, and will erect a mill.——C. Hall has returned from Placer county and has resumed work on the Golden Eagle pocket mine in Big Oak Flat. At the Pauper's Dream, formerly the Accident, in Big Oak Flat, they are down 260 feet in good ore and are drifting on the 100-foot level in $20-rock.——The Mississippi mine, at the lower end of Big Oak Flat, has started up again.—At the Nonpareil shaft, near Deer Flat, ore bins are being built. The shaft is down 80 feet and sinking in good ore.

Sonora *Union-Democrat*: Forty five men are constructing a dam on the Stanislaus river, four miles below Robinson's Ferry. When completed an electric plant is to be put in and power sold. The enterprise is owned by C. D. Lane & Co.——At the Bown, near Robinson's Ferry, ten men are drifting on the cross-vein at the 300 and 400 levels. The quartz at these points has a width of 3 feet of ore.——Work on the Alameda, near Rawhide, which was to have been resumed, has been indefinitely postponed. The entire force was laid off Saturday.—Three shifts are making 15 feet a week in the Arbona shaft at Tuttletown, in hard rock. No crosscutting or drifting will be done until 600 feet is reached.—The Norwegian, near Tuttletown, has closed down on account of lack of water, and will not resume until the first of the year.

COLORADO.

BOULDER COUNTY.

Staples & Eddy have attached the Ward pyritic smelter, claiming $580 for work, driving the tunnel on the St. Louis mine, which is under bond and lease to the smelter company.——The upraise in the San Blas, connecting the lower workings with the surface, will be completed next week. A body of ore has been opened in the upraise and shipments will be made.

The B & M. is driving the 150 450 and 600 foot levels west, and is shipping three carloads of smelting ore per week. The leasers on the Ni Wot have two carloads of concentrates ready for shipment. The Ward Rose will soon be in operation on development work. J. Machlebrenner of Pittsburg, one of the stockholders, will superintend the work.

CHAFFEE COUNTY.

(Special Correspondence).—The D. & R. G. R. R. main line runs within four miles of Turret and a branch runs to the Calumet iron mine through the camp, giving good railroad facilities. Buena Vista has a smelter eighteen miles distant and Salida is to have a 200-ton smelter fourteen miles from Turret. Assays of the camp range from a trace to $2500 in gold per ton, and it is nothing unusual to get assays of from 10 to 30 ounces in gold per ton. The formation is graphic granite, the veins are hematite and copper, copper, pyrites in most cases running with them, the dykes being 3 to 50 feet in width. In depth copper appears in nearly all the veins and occurs in a variety of forms. The veins are of good width. It is two years since the first location was made here.

The Gold Bug has the deepest shaft in the district down 200 feet and is sinking to 300 feet. Shipments from this property range in value from $20 to $24 per ton in gold. It also carries copper and silver. The vein at the 100 foot level is 31 feet wide. A crosscut at the 200 foot station is being run to determine the width at that depth.

At the Holdridge, which is 75 feet deep, the smelter returns show the ore to run $92 per ton. Work is being pushed throughout the camp. The altitude is 9000 to 10,500 feet.

Turrett, Sept. 9th, '99.

The plans have been completed for a 60-ton smelter to be erected by the Salida Mining & Smelting Co.

Cree camp, near Monarch, is about to commence steady shipments. The Clinton mine has ore that runs $2 in gold, 64 ounces silver, and 20% lead. More than 750 feet of development has been done.

A new camp called Dawson has been formed near Cree camp, and ore taken from the surface assays from $180 to $200 to the ton in gold. A large number of claims have been located, and work is in progress.

CLEAR CREEK COUNTY.

The Newhouse tunnel is to resume work.

The Stevens mine recently made a shipment of ore that carried 60% lead, 30 ounces in silver, and $2 in gold to the ton.

The Johnson mine, in Argentine, recently had a mill run of ore that ran 387 ounces silver and 19% lead, worth $220 per ton.

Ore has been found in the Independence that runs 2370 ounces in silver.

F. W. Isham of Denver has a lease upon half of the dump of the Meadota mine at Silver Plume, upon royalties aggregating 20%. He operated in the interests of Denver mining men. This dump is one of the characteristic sights of Silver Plume, containing 80,000 tons of rock, carrying fair values in zinc, lead, gold and silver. The work of reducing the dump has been begun in the Dives-Pelican mill.

GUNNISON COUNTY.

The Hercules and Ajax properties are being worked above the tunnel. A mill run of concentrating ore was made last week. T. Nichols, of Denver, is opening the Denver City, on Sheep mountain, Crystal district. Copper ore is being taken out and shipment will be made. R. J. Walter and F. Kratzer are owners with Mr. Nichols.

O. Allen has made a proposition to the mine owners at Snow Mass, Crystal district, to put in a concentrating plant for the treatment of the mill dirt of the copper prospects in the vicinity.—A strike of rich copper ore has been made in the lower tunnel of the Burt mine. Native copper is found in the gangue.—The Scofield mill is now operating on ore from the Whopper.

LAKE COUNTY.

At the annual meeting of the Fanny Rawlings M. Co., owners of the Fanny Rawlings claim, on Breece hill, in the gold belt, held at Colorado Springs, it was determined to purchase a $10,000 plant of machinery and to deepen the shaft 200 feet. The mine commenced shipping in November, 1898, and $200,000 was the gross receipts up to April 1, 1899. Two dividends from royalties amounting to $20,000 have been paid this year. The lease is held by Taylor & Copeland of Aspen. The mine is shipping twenty five tons daily of gold copper ore to the Bi Metallic. This property had remained undeveloped since its location, twenty years ago. Manager J. F. Walsh has made a study of the occurrence of the Breece hill ore channels and developed the Fanny Rawlings.

Colorado zinc ores are of good value, but not as easy to reduce as the Missouri ore on account of the iron it contains. One large smelter works has a contract for several thousand tons of 50% zinc at $30 per ton. The Vieille Montagne Co. of Antwerp, Belgium, has made a flat contract for 5,000 tons of Colorado zinc at $5 per ton. F. O. B. Jacobsen & Co. of New York City, zinc brokers, are making purchases in this market and have wired to increase shipments. The Louisville will increase its zinc output as the stopes are opened.

The Greenback is drifting on the 1100-foot level, and will soon make connection with the Mahala workings.—M. O'Connell is working the Maine group of seven claims, on the Mosquito range, and has uncovered a vein that assays 71 ounces silver, 3% copper, 7% lead and $8 in gold. In one of the shafts the vein is 20 feet wide.—The Coronado has a small force of men developing the 550-foot level and is making regular ship-

Prominent Achievements in Metallurgy.

Of the achievements in metallurgy which have either been actually effected or are in immediate prospect Professor Sir W. Roberts-Austen recently gave the following collective statement in his presidential address to the Iron and Steel Institute of Great Britain. There are, he said, blast furnaces which will produce 690 tons of pig iron in twenty-four hours, with a consumption of little over 15 4 cwt. of coke per ton of iron, and the gases of blast furnaces are used not only as sources of heat, but directly in gas engines. There are Bessemer converters which can hold 50 tons of metal, and open-hearth furnaces which will also take 50 tons, while 100-ton furnaces are projected. The open-hearth furnaces are fed with one ton of material in a minute, by the aid of a large spoon worked by an electro-motor. There are gigantic "mixers," capable of holding 200 tons of pig iron, in which, moreover, a certain amount of preliminary purification is effected. Steel plates are rolled of over 300 feet in area and 2 inches thick, and there are girders which justify the belief of Sir Benjamin Baker, that a bridge connecting England and France could be built over the Channel in half-mile spans. There are ship-plates which buckle up during a collision, but remain water-tight. There are steel armor-piercing shot which will penetrate a thickness of steel equivalent to over 37 inches of wrought iron. The points of the shot remain intact, although the striking velocities are nearly 2800 feet a second. There are wires which sustain a load of 170 tons per square inch without fracture. Hadfield, whose labors he hoped to see continued far into the twentieth century, has given us manganese-steel that will not soften by annealing; while Guillaume has studied the properties of certain nickel-steels that will not expand by heat, and others that contract when heated and expand when cooled. Nickel, chromium, titanium and tungsten are freely used alloyed with iron, and the use of vanadium, uranium, molybdenum, and even glucinium, is suggested. Huge ingots are placed in soaking pits and forged direct by 120-ton hammers, or pressed into shape by 14,000-ton presses, and there are steel castings for parts of ships that weigh over thirty-five tons. —Cassier's Magazine for September.

Electrolytic Separation of Cadmium From Iron.

A method for separating these two metals in slightly acid solutions is described in the *Zeitscrift fur Elektrochemie*. As a cyanide solution gives the best deposits of cadmium, certain experiments have been made with the idea of finding out whether such a solution could not be used for the electrolytic separation of iron from cadmium. When an excess of cyanide of potassium is added to a solution of a ferrous salt, a soluble ferrocyanide of potassium is formed. With solutions of ferric salts, hydrated peroxide of iron is produced, and only a very small proportion of iron passes into the cyanide solution. The method proposed is based on the non-electrolytic decomposition of the soluble ferrocyanide of potassium. The mixed salts of iron and cadmium are dissolved in 100 c. c. of water very slightly acidulated with a few drops of dilute sulphuric acid; to this is added two or three grammes of pure cyanide of potassium, and the whole heated until the solution becomes perfectly clear. If this clarification requires too long a time, a few drops of caustic potash may be added. The solution is then diluted to 200–250 c. c., and, after cooling, electrolyzed with a current of 0.05 to 0.010 ampere per square decimeter. The deposit of cadmium is perfectly coherent. If the solution contains but a very small quantity of iron, the floating hydrated peroxide may be neglected; but if, on the contrary, the iron is present in any considerable proportion, it becomes necessary to reduce this ferric salt to the ferrous state by means of a sulphurous acid; to effect this it suffices to add to the acid solution a small quantity of sulphite of soda, and heat for a short time.

Output of Iron Mines.

A prominent iron ore miner says the Lake Superior region will ship 16,000,000 tons of iron ore this season. His estimate for the mines tributary to Duluth–Superior is 7,500,000 tons. The local furnaces, such as those at New Duluth, Ashland and Escanaba, will probably receive some ore during winter, but Pittsburg and Chicago will be supplied during the season of navigation.

The ore shipments from the Lake Superior region will be divided as follows:

Vermilion and Mesaba, 7,500,000 tons; Gogebic range, 2,500,000; Marquette range, 3,000,000; Memoninee range, 2,500,000.

Shipments from the Lake Superior region last season were about 13,600,000 tons. The Minnesota ranges and the Gogebic range are the ones that will provide the increased ore tonnage this year. Practically all of it will be from the Minnesota ranges. There will be an increase of from 1,900,000 to 2,000,000 tons from the entire Lake Superior district, and the Minnesota ranges will furnish about 1,400,000 tons of the increased shipment. The Marquette and Menominee ranges will just about hold their own this year as to output and shipment. The Gogebic will show a fair increase, but Minnesota is the bulwark of the iron ore consumers this year with their great demands.

The Vermilion range, which last year shipped 1,200,000 tons, will this year ship 1,800,000 tons. The Iron Range road will handle 4,000,000 tons this year; the Mesabe road 2,500,000 to 3,000,000 tons, and the Eastern about 1,000,000 tons. Shipping over the Eastern will become heavier after the Sauntry mine begins operating and the road is extended to it.

Next year there will be the same demand as this year for ore, and will probably be greater. But the mines will be in better shape to produce the ore, and the transportation facilities will also be increased. There will be more boats and more ore cars to meet the emergencies of heavy shipping, and the whole scheme of production and transportation of, say, 16,000,000 tons of ore, will be more easily accomplished than this year. Prices for ore will certainly be better than those at which the bulk of ore was sold this season. The big sales were made before the boom in iron and steel commenced.

Ishpeming *Iron Ore* quotes Joseph Sellwood as predicting that the State of Minnesota would send out 8,000,000 tons of ore this season, and thought the entire region would furnish about 16,000,000. The big mines are not always going to hold out. The constant drain at the present big volume makes serious inroads. There are many worked-out properties on the older ranges, and some of the new fields are already feeling the effects of big shipments.

A DELICATE instrument, designed by Horace Darwin, will indicate slow tilts and pulsations of the earth's crust of less than one three-hundredths of a second, or an angle less than 1 inch in 1000 miles. It consists of a circular mirror suspended from brackets by two wires of very unequal length. Slight tilting of the upright causes exaggerated motion of the mirror. The spot of reflected light will vary ½-inch when a finger is laid on the support of the apparatus.

THE wavelike appearance seen on the faces of some sandstones and shaley rocks when broken from their beds is due to either the rippling of water or the action of the wind. The marks thus made have been preserved in the rocks by subsidence of the formation beneath the waters and subsequent deposition of other material upon the bottom of the lake or lagoon. The process may be seen in operation on the shores of a low, marshy shore or on the heaps of drifting sand along the shores of some lakes and the sea.

The Assay of Foreign Lead Ore.

An important decision regulating the sale of foreign lead ores was handed down recently by Judge Hanford of the Federal Court of the State of Washington, in the case of the Puget Sound Reduction Works, operating the Everett Smelter, on appeal from a decision of the United States Board of Customs Appraisers in New York City.

Judge Hanford holds that, under the United States laws, what is known as the "fire" assay shall be used to determine the amount of dutiable lead in imported ores, and gives the smelter company judgment against the United States for the amount of excess duties paid on ores shipped to it under the ruling of the Washington officials that the "wet" method should be used in assaying such ores.

Under the new ruling, the Government will be compelled to change its system of assaying imported ores for the purpose of obtaining values on which to figure duties. In the past the official system has been the "wet" or chemical process. It is contended and generally acknowledged that this process yields about 2% more lead than the fire system. The smelter people fought the case and won on the theory that the commercial method is the fire assay. The decision settles the question as to whether the wet or the fire assay is the commercial method by declaring that the evidence is satisfactory and convincing in favor of the latter.

Judge Hanford had the case under advisement and handed down a written opinion. Reviewing the evidence, he says, in part:

"It would require a very strained construction of the law to find that Congress, after having in 1894, and again in 1895, enacted statutes requiring the sampling and assaying of ores, for the purpose of collecting duties thereon, to be according to commercial methods, and without having expressly repealed the law of 1896, could have intended in the law of 1897 to continue the same policy as regards the methods of sampling and yet departed from that method for the purpose of assaying.

"It is my opinion that the Secretary of the Treasury is required, by the positive provision of the Acts of Congress above referred to, to prescribe regulations for the assaying of lead ores by the commercial method, is a question of fact, for the decision of which resort must be had to evidence.

"In this case the evidence is all one way and it is in all respects satisfactory and convincing. From it I find that the commercial method of ascertaining the quantity of lead contained in imported ores is the fire process, and any other method of assaying does not meet the requirements of the law."

AN old wagon bridge which has spanned the Wabash river, near Clinton, Ind., for half a century has been removed by aid of the electric current. The county bought the piers, the principal owner agreeing to remove the superstructure to make way for a new bridge. Efforts were made to burn the bridge, but it was found that this would injure the piers, so the sills were wired and electricity applied. In nine hours the pile toppled into the river, leaving the foundations unhurt. The current had the effect of cutting all the sills simultaneously as with so many saws.—Electricity.

The oldest iron steamship in the world is the United States steamer Michigan. The vessel was constructed at Pittsburg, Pa., in 1841–43; the parts were transferred to Erie, put together, and launched on December 5, 1843. The original machinery, with the exception of the boilers, is still in her and in good condition. The vessel is an iron paddle-wheel steamer of 685 tons displacement; length of keel, 156 feet 4 inches; length between perpendiculars, 162 feet 6 inches; breadth of beam, 27 feet; depth of hold, 12 feet 5½ inches.

Rare Brazilian Sand Used for Incandescent Mantels.

The monazite or Prado sand, which is used in the manufacture of the Auer incandescent mantels, says the London *Electrical Review*, is found at Bahia, Porto Seguro, and in small quantities in Matto Grosso, Brazil. In the first two places the sand is found close to the shore and is derived from the decomposition of the neighboring gneiss. It is of a dark yellow color, like gold, and very heavy. The following is an average analysis:

	Per Cent.
Aluminum	3
Cerium	62 to 70
Iron	2½
Lanthanum	2½
Thorium	1½ to 3½
Yttrium	1 to 2

Cerium is an extremely rare metal, hitherto found only in Sweden. Its color is a whitish-green, and it has considerable metallic luster. Its specific gravity is almost equal to platinum. Mixed with copper and zinc, an artificial gold is produced, having the same luster and weight as real gold.

Thorium is of a gray color, and when burned in air or oxygen is converted into an oxide. The metal combines energetically with chlorine, sulphur and phosphorus and dissolves in hydrochloric acid, liberating hydrogen in the process. As may be supposed, there has been a considerable run on these valuable sands since they were discovered, and it is expected that the value of this current year's exports will be more than double what it was last year.

Thirty-three Miles of Aluminum Cable.

The Hartford Electric Light Co. of Hartford, Conn., has ordered thirty-three miles of aluminum cable. The company is building a concrete dam in the Farmington river, at Tariffville, Conn., eleven miles from Hartford. From this waterfall it will realize 2300 H. P., which will operate two 1000 H. P. generators, giving 10,000 volts. This current is to be transmitted over aluminum cables to the company's power station in the city of Hartford. There will be three cables for transmitting the current, strung in the form of a triangle on double crossarms and double insulators. The wires will be left bare and will run to within a mile of the city limits, when the current will be reduced to 2400 volts, at which voltage it will run to the company's city generating station, where the current will be transformed to a lower voltage for power and lighting purposes.

Each cable has seven strands, and each strand is made up of seven wires of No. 11 Brown & Sharpe gauge. The complete cable is about 1 inch in diameter, and has a conductivity equal to No. 0000 copper wire. Aluminum is to be used in the high-pressure transmission line only, and by utilizing the light metal instead of copper the company estimates that, with present prices for copper, it will save $3500. —Electricity.

THERE is no data available which would furnish anything like a reliable estimate of the extent of the underground workings of the Leadville, Colo., mines, but the sum total must be enormous. For twenty years the hills have been honeycombed with underground drifts, and the work is still progressing. For the past two or three years from five to six miles of new work have been done in the Ibex mine, and there are now upwards of forty miles of workings in that property alone. There are about twelve miles of workings in the Chrysolite, and at least as much in the R. E. Lee. The Carbonate hill mines have honeycombed that hill very thoroughly, while Iron hill has been burrowed through to an enormous extent. It is safe to say that if all the drifts, levels, winzes, upraises and shafts in Lake county were represented by a continuous tunnel, it would represent an underground passageway of over 1500 miles. There are some calculators who can figure out that there are at least 2000 miles of workings.

Mining Summary.

ALASKA.

The last monthly reports of the Alaska-Mexican and Alaska-United mines show results as follows: The former crushed 14,666 tons ore, valued at $19,679, and turned out 299 tons sulphurets, valued at $10,201. The ore averaged $2 20 per ton. The gross earnings were $32,178 and the working expenses $19,089. The latter mine crushed 24,134 tons, valued at $35,725, and yielded 645 tons sulphurets, valued at $20,163. The ore averaged $2.52 per ton. The gross earnings were $58,806. One of the mills, dependent $60,765 and the working expenses were upon water power, had to hang up some of its stamps five days during the month because of the short supply.

Juneau *Miner*: The following are the values of Alaskan and British Yukon gold:

	Per oz.
Little Manook, American	$19 50
Anvil, Cape Nome	18 50
Ophir, Golo in Bay	18 50
Hunker, Klondike	17 00
Pine, Atlin	16 75
Wright, Atlin	16 75
Dominion, Klondike	16 75
American, Eagle City	16 75
Porcupine, American	16 75
Chicken, American Yukon	16 75
Bonanza, Klondike	16 30
El Dorado, Klondike	15 50

El Dorado carries the poorest quality of Yukon gold, and Little Manook the richest. The highest assay returns from Yukon gold were from gold taken from No. 8, Little Manook, owned by former Governor J. H. McGraw and Gen. E. M. Carr. It ran $19.63 per ounce. The American Cape Nome is high grade. El Dorado gold has run as low as $15 per ounce. As high as $17.09 per ounce has been obtained from discovery claim on the American Porcupine Creek.

ARIZONA.

MOJAVE COUNTY.

The 20-stamp mill at the Sheep Trail mines, near the Colorado river, is running.

The C. O. D. mine on Stockton hill is again working. The old dumps are to be milled and concentrated.

W. J. Shick of New York has commenced work on a large hydraulic plant in the Ehrenburg district for the purpose of working the Trego placers. Water will be pumped from the Colorado river, five miles, and the plant will handle 2000 yards of gravel per day.

YAVAPAI COUNTY.

(Special Correspondence).—R. A. Thomas, Pres. Black Hills Copper Co., has arrived at Jerome from Los Angeles, for the purpose of initiating the work of the newest Jerome company. All matters pertaining to the organization are reported satisfactorily consummated.

Several boarding houses and bunk houses have been put up at the Iron King and Copper Chief properties, which are as yet in the hands of the Chinese. At the Copper Chief nothing new is reported. The Iron King is working in the lower tunnel. The surveyors have completed the new pipe line from Allen's springs and within thirty days will begin laying pipe.

Jerome, Sept. 9th, '99.

CALIFORNIA.

Amador.

The Oneida mine, between Jackson and Sutter Creek, makes 400,000 gallons of water daily.

S. R. Porter is making good headway in the shaft of the Mutual mine, south of Amador City. The shaft is in a slate formation full of quartz and sulphurets. This is the newest large enterprise in Amador.

C. E. Purington, formerly superintendent of the Gover mine, near Amador City, has bought the Loyal Lead, near Drytown.

Amador *Ledger*: Bryson & Worthing, of the Globe M. & M. Co., have a bond on the C. Kretcher property, south of the Bay State mine. It was opened many years ago and a mill test returned $4.65 per ton in free gold. A tunnel cut the Bay State ledge and also the Kretcher ledge, though the latter was not noticed. A drift south shows that they come together 25 feet from the original tunnel where the ledge is 12 feet thick of good value in free gold with 4% sulphurets. They will sink a vertical shaft.——At 300 feet in the old shaft, a crosscut was driven to the Kretcher vein, from which valuable ore was milled. At the 750-foot level crosscutting to the Kretcher ledge is in progress, now in 340 feet.

Butte.

N. S. Trowbridge, at the Robinson mines, is putting up a new hoist building. A boiler and a double-cylinder hoist for sinking 1000 feet have been added, and power drills will be used. The shaft is down 100 feet below the creek level. There are 1400 feet of tunnels on the ledge above the collar of the shaft. The 20-stamp mill has been rebuilt and ten stamps will run.

Calaveras.

It is reported that the Lucas mine, on the Mokelumne river near Big Bar bridge, has been sold to the owners of the Tomboy mine in Colorado, Posey & Co., for $20,000. The purchase price was paid down. The new owners express a purpose to expend large sums of money on the property.

F. F. Thomas, president and manager of the Gwin mine, accompanied by J. McSorley, visited North Branch recently and examined the Hudson, Mester and Jackson mines, near Central Hill.

The Hudson vein lies at a low angle and a vertical shaft was sunk through it by early operators. Development work has been done on the mines lately.

Jackson *Dispatch*: High grade ore in the Demarest mine, near Fourth Crossing, is coming from the 400-foot level.——At the Barstow mine, near Glencoe, a new hoist and mill are being erected. The mine was recently sold in England.

San Andreas *Prospect*: At the Lightner mine in Angels, Supt. H. G. Murray will sink the main shaft now down 450 feet to 650 feet. The 40-stamp mill is crushing 208 tons of ore in twenty-four hours.

Angels *Echo*: The new hoisting machinery is in position at the Harris mine, a mile south of Angels, and the gallows frame is completed.

Inyo.

It is reported that a Vermont marble company is negotiating for the Lindsey marble quarries east of Antelope.

The Anthony group of mines in the Panamint range is reported sold for $45,000.

Kern.

Three shifts are rushing development work at the Butte mine at Randsburg.

Bullion returns on 1800 tons of ore crushed at the Red Dog mill near Randsburg amounted to $41,367.

Randsburg *Miner*: From a run of thirty-seven tons of ore the Kinyon mine owners received $11,000, and from twenty tons of second class ore milled they received $1000. One hundred and forty tons of ore taken from the dump averaged $8 a ton.——The Yellow Aster Co. has eleven men working at the wells drifting. They have encountered another good flow of water. At the mine 152 men are employed—137 in the mine and twenty at the mill. The payroll runs over $13,000 per month.

Marin.

Near Bolinas, oil deposits are reported on the outskirts of the town. J. D. Bradbury of San Jose has bonded several ranches and has ordered a plant and will commence sinking wells. Oil was first discovered near Bolinas several years ago by R. Coltingham. On the beach, among the rocks, natural gas is fonnd. When the tide is out, on Duxbury Reef, the gas rushes out of the rocks, when lighted it will burn until extinguished by the tide. Ledges of asphaltum have been discovered on the beach.

Nevada.

The shaft of the Bismarck & Gladstone mine, near Selby Flat, is to be sunk an additional 100 feet.

Grass Valley *Union*: Steam was started on the old Union Hill mine on the 8th inst. for the first time in many years. The pumps are in operation. Sinking will be begun and old drifts cleaned out.

Grass Valley *Union*: Supt. Brockington reports work progressing favorably at the Omaha, Homeward Bound and Lone Jack mines under his direction. Sinking was commenced at the Omaha and drifts are being run in both directions at the bottom.

Placer.

The Jupiter mine, near Iowa Hill, cleaned up $2200 for August, the result from drifting.

At the Sailor mine, in Sailor canyon, where a large amount of money has been expended in search of a gravel channel, a new tunnel has been started, on the advice of N. A. Harris, 400 feet higher than the old workings. It is thought the channel will be found in 350 feet.

Nevada City *Herald*: A carload of rich copper ore was shipped from Sheridan to the smelter last week.——Prospectors on Bear river are finding rich ground at 30 to 50 feet depth with augers.

Plumas.

Oroville *Register*: Steam-power drills are to be used in the Robinson mine in Granite basin, and a new hoist is being put up. A new water wheel has been put in, which will give more power than the one formerly in use. R. C. Robinson has two shifts working and expects to strike ore this week. Men are building 2300 feet of flume to carry 250 inches of water, which will be used to run an 8-inch hydraulic elevator.——San Jose capitalists are to open what is known as the Elizabethtown channel mine.

San Diego.

Miners are investigating the gold-bearing veins near Campo, in Laguna mountains.

Ex-Receiver C. W. Pauly of San Diego has petitioned the court for privilege to work the tailings of the Golden Cross mill at Hedges. There is a large amount of this material accumulated and it all contains value in gold.

San Joaquin.

The Golden Gate Oil Producing Co. has been incorporated at Stockton. W. R. Thomas, D. O. Castle, S. E. Lotta, W. J. Rhodes and S. M. Spurrier. Capital stock, $100,000.

Santa Barbara.

The St. Valentine M. Co. has been incorporated at Santa Barbara. W. Easland, G. F. Treuwith, J. H. Burson, A. C. Grant and C. A. Stork. Capital stock, $100,000.

Santa Clara.

The Gay Quarry Co. has been incorporated at San Jose. W. A. Porter, C. Wehner, G. Lion, J. W. Rea, A. C. Darby, A. Greeninger and T. W. Hobson, San Jose. Capital stock, $50,000.

Shasta.

(Special Correspondence).—The Coronado Copper M. Co. of San Francisco is developing a large area of territory twenty-six miles southwest of Redding, in the neighborhood of the Bully Choop mine. The company owns 400 acres. J. Blumenthal is president and R. Mohr secretary. A contract was recently let to run 400 feet of tunnel, which is calculated to cut the ore body at a depth of 230 feet. A 60-foot shaft opened a vein which was crosscut 18 feet without finding the walls. The contract price is $5 per foot.

Basset & Welch are running a new tunnel in the Eureka mine near Shasta. They found a third ore body on this property, which assays $22 a ton.

Behrns & Lievasay are working seven men on the Oro Fino mine near Shasta. This mine has had many operators in the past few years. The present company has found the ore body so long sought. The values are from fair to high grade.

The recent transfer of copper properties at Furnaceville and Copper City has stimulated prospecting in those sections and almost every available claim has been located.

In the neighborhood of Kennet about sixty claims have been relocated (jumped) since the announcement of the news that the last Legislature did not repeal the Act of '97.

Redding, Sept. 13th, '99.

Experiments are to be made with the ore of the Yellow Rose of Texas. The gold-bearing material is talc and clay and does not crush readily under stamps.

That there has been unusual interest in mining in this county the past year is shown by the number of locations filed for record during the past twelve months as compared with the number during the twelve months preceding. From Sept. 7, 1897, to Sept. 7, 1898, 1184 locations were filed with the County Recorder. From Sept. 7, 1898, to Sept. 7, 1899, the number was 1735—an increase of 551.

Shasta *Courier*: A number of men employed at the Mount Shasta mine have been laid off and sinking on the ledges is in progress to open ore deposits on lower levels.——At the Old Bunker Hill mine development is in progress. Rich rock, carrying tellurium and free gold, has recently been discovered in a defined ledge. The mine is two miles south of Shasta and is owned by Mrs. J. Loag of New York, J. V. Scott and others.

Sierra.

Downieville *Messenger*: Articles of incorporation of the Twin Eagle M. Co. have been filed with the County Clerk. The capital stock is $50,000. The directors are J. U. Hastings, J. S. Wilbur, F. S. Gould, E. McGary, Jr., and J. McGary. The company is preparing to operate the Gray Eagle mines on Kanaka ravine. A mill recently purchased in Nevada county is on the ground, and construction work commenced.——J. S. Wilber, Supt. Gray Eagle mine, near Gold Point, is at the mine and has commenced grading for the mill.

Siskiyou.

The Greenhorn Blue Gravel mine has been purchased by A. & L. J. Wetzel, J. E. Harmon and W. R. Ridenour, who intend sinking a new shaft and adding apparatus for working on a more extensive scale. John Garvey will continue as foreman.

The group of quartz mines on Squaw creek, a tributary of Willow creek, in the Gazelle district, promises to turn out well. The mines show a ledge 98 feet wide, and have been bonded to Dr. G. W. Dwinnell, of Montague, for $45,000, the agreement being that quartz yielding $30 a ton or more be shipped to Keswick and lower grade ore stacked until a mill is put up.

A four-mile ditch is to be dug from Buckhorn creek, a tributary of Horse creek, on Klamath river, to the Poverty Point and Yankee placer mines opposite Oak Bar.

W. A. Bantz started up the mill on the Little Tiger mine at Greenhorn last week, but has shut down to make alterations in machinery.

Mr. Rader, who bought out the Hunter-Johnson quartz mine at Horse creek, on Klamath river, has been finding rich prospects. The sulphurets contain gold, but have to be sent to the Selby works.

Yreka *Journal*: The company working the mine at Greenhorn on the Nehrbass place, adjoining the Blue Gravel mine, are down 130 feet, which indicates that it is in a deep ancient channel.——Work is to be started again on the cinnabar mine at the head of west fork of Beaver creek, by the Siskiyou Con. Q. M. Co. Mr. Newcomb has been at the mine lately, making arrangements for starting with fifteen men.——The ledge at the Golden Star or Spencer mine, on Humbug creek, is rich but small.——G. W. Foote, working the Merrimac mine on Humbug, has a rich ledge.

Tuolumne.

Sonora *Independent*: J. Meighan has men grading for the 20-stamp mill on the Mt. Jefferson mine, at Groveland.——A new station in the Accident mine of Big Oak Flat has been cut and drifts driven. The ledge is 21 feet wide. The property is managed by J. Meighan.——Rich ore is being taken from the Republican mine at Jacksonville.——Byrne & Herndon have bought the Ophir mine, near Big Oak Flat, from Mr. King, and will erect a mill.——C. Hall has returned from Placer county and has resumed work on the Golden Eagle pocket mine in Big Oak Flat.——At the Pauper's Dream, formerly the Accident, in Big Oak Flat, they are down 260 feet in good ore and are drifting on the 100-foot level in $20-rock.——The Mississippi mine, at the lower end of Big Oak Flat, has started up again.——At the Nonpareil shaft, near Deer Flat, ore bins are being built. The shaft is down 80 feet and sinking in good ore.

Sonora *Union-Democrat*: Forty-five men are constructing a dam on the Stanislaus river, four miles below Robinson's Ferry. When completed an electric plant is to be put in and power sold. The enterprise is owned by C. D. Lane & Co.——At the Bown, near Robinson's Ferry, ten men are drifting on the cross-vein at the 300 and 400 levels. The quartz at these points has a width of 3 feet of ore.——Work on the Alameda, near Rawhide, which was to have been resumed, has been indefinitely postponed. The entire force was laid off Saturday.——Three shifts are making 15 feet a week in the Arbona shaft at Tuttletown, in hard rock. No crosscutting or drifting will be done until 600 feet is reached.——The Norwegian, near Tuttletown, has closed down on account of lack of water, and will not resume until the first of the year.

COLORADO.

BOULDER COUNTY.

Staples & Eddy have attached the Ward pyritic smelter, claiming $580 for work, driving the tunnel on the St. Louis mine, which is under bond and lease to the smelter company.——The upraise in the San Blas, connecting the lower workings with the surface, will be completed next week. A body of ore has been opened in the upraise and shipments will be made.——The B. & M. is driving the 190, 400 and 600-foot levels west, and is shipping three carloads of smelting ore per week.——The leasers on the Ni Wot have two carloads of concentrates ready for shipment.—— The Ward-Rose will soon be in operation on development work. J. Muehlbronner of Pittsburg, one of the stockholders, will superintend the work.

CHAFFEE COUNTY.

(Special Correspondence).—The D. & R. G. R. R. main line runs within four miles of Turret and a branch runs to the Calumet iron mine through the camp, giving good railroad facilities. Buena Vista has a smelter eighteen miles distant and Salida is to have a 200-ton smelter fourteen miles from Turret. Assays of the camp range from a trace to $2500 in gold per ton, and it is nothing unusual to get assays of from 10 to 20 ounces in gold per ton. The formation is graphic granite; the veins are hematite and jasper, porphyry in most cases running with them, the dykes being 3 to 30 feet in width. In depth copper appears in nearly all the veins and occurs in a variety of forms. The veins are of good width. It is two years since the first location was made here.

The Gold Bug has the deepest shaft in the district down 200 feet and is sinking to 300 feet. Shipments from this property range in value from $29 to $34 per ton in gold; it also carries copper and silver. The vein at the 100-foot level is 31 feet wide. A crosscut at the 200-foot station is being run to determine the width at that depth.

At the Holdridge, which is 75 feet deep, the smelter returns show the ore to run $92 per ton. Work is being pushed throughout the camp. The altitude is 9000 to 10,500 feet.

Turrett, Sept. 9th, '99.

The plans have been completed for a 60-ton smelter to be erected by the Salida Mining & Smelting Co.

Cree camp, near Monarch, is about to commence steady shipments. The Clinton mine has ore that runs $2 in gold, 64 ounces silver, and 20% lead. More than 750 feet of development has been done.

A new camp called Dawson has been formed near Cree camp, and ore taken from the surface assays from $180 to $200 to the ton in gold. A large number of claims have been located, and work is in progress.

CLEAR CREEK COUNTY.

The Newhouse tunnel is to resume work.

The Stevens mine recently made a shipment of ore that carried 60% lead, 30 ounces in silver, and $2 in gold to the ton.

The Johnson mine, in Argentine, recently had a mill run of ore that ran 387 ounces silver and 19% lead, worth $230 per ton.

Ore has been found in the Independence that runs 2370 ounces in silver.

F. W. Isham of Denver has a lease upon half of the dump of the Mendota mine at Silver Plume, upon royalties aggregating 20%. He operated in the interests of Denver mining men. This dump is one of the characteristic sights of Silver Plume, containing 80,000 tons of rock, carrying fair values in zinc, lead, gold and silver. The work of reducing the dump has been begun in the Dives-Pelican mill.

GUNNISON COUNTY.

The Hercules and Ajax properties are being worked above the tunnel. A mill run of concentrating ore was made last week. T. Nichols, of Denver, is opening the Denver City, on Sheep mountain, Crystal district. Copper ore is being taken out and shipment will be made. R. J. Walter and F. Kratzer are owners with Mr. Nichols.——O. Allen has made a proposition to the mine owners at Snow Mass, Crystal district, to put in a concentrating plant for the treatment of the mill dirt of the copper prospects in the vicinity.——A strike of rich copper ore has been made in the lower tunnel of the Burt mine. Native copper is found in the gangue.——The Scofield mill is now operating on ore from the Whopper.

LAKE COUNTY.

At the annual meeting of the Fanny Rawlings M. Co., owners of the Fanny Rawlings claim, on Breece hill, in the gold belt, held at Colorado Springs, it was determined to purchase a $10,000 plant of machinery and to deepen the shaft 200 feet. The mine commenced shipping in November, 1898, and $200,000 was the gross receipts up to April 1, 1899. Two dividends from royalties amounting to $20,000 have been paid this year. The lease is held by Taylor & Copeland of Aspen. The mine is shipping twenty-five tons daily of gold-copper ore to the Bi-Metallic. This property had remained undeveloped since its location, twenty years ago. Manager J. F. Walsh has made a study of the occurrence of the Breece hill ore channels and developed the Fanny Rawlings.

Colorado zinc ores are of good value, but not as easy to reduce as the Missouri ore on account of the iron it contains. One large smelter works has a contract for several thousand tons of 50% zinc at $30 per ton. The Veille-Montague Co. of Antwerp, Belgium, has made a flat contract for 5,000 tons of Colorado zinc at $8 per ton, F. O. B. Jacobsen & Co. of New York City, zinc brokers, are making purchases in this market and have wired to increase shipments. The Louisville will increase its zinc output as the stopes are opened.

The Greenback is drifting on the 1100-foot level, and will soon make connection with the Mahala workings.——M. O'Connell is working the Maine group of seven claims, on the Mosquito range, and has uncovered a vein that assays 71 ounces silver, 3% copper, 7% lead and $8 in gold. In one of the shafts the vein is 20 feet wide.——The Coronado has a small force of men developing the 550-foot level and is making regular ship-

ments of twenty-five tons of iron per day.—Leadville has sent 150 men to work in the Cœur d'Alene district of Idaho.—The old Homestake mine, west of Leadville, which was a heavy producer in the early days, but damaged by snowslides one year ago, is again being put in shape for production.—The Fortune mine has shipped steadily throughout the smelter strike. The company is working a body of lead ore 12 feet wide carrying gold, silver and copper.

Leadville *Miner*: The A. Y. and Minnie mines and mills, worked under lease by Newton & Douglas, are making an output of 150 tons daily. The mill is the best conducted and the best dividend earner in the history of the camp. The concentrates run twelve to thirteen ounces silver and 30% lead.

LARIMER COUNTY.

It is reported that valuable mineral claims have been discovered near Gray Rock in the Poudre canyon, twenty-five miles west of Fort Collins. The ore carries gold and silver in large quantities.

OURAY COUNTY.

At Ouray on the 6th inst., a drilling contest resulted in McKenzie and partner of Leadville winning the champion double-handed drilling match, scoring 37⅞ inches.

PITKIN COUNTY.

Aspen *Sun*: Shipments are to begin from the Birthday mine, ten miles up Maroon creek from Aspen, formerly the Sunset mine. The property was never patented, though developed extensively. P. Palmer and U. G. Parnell made the relocation and began work. Assays taken from ore thrown over the dump by former operators show: Silver, 25 ounces; lead, 20%; gold, a trace to $8; copper, 2%. The ore carries 12% in zinc. Although the lead is high, the silver value is not with the lead.

SAN JUAN COUNTY.

Silverton *Miner*: Dr. Pascoe is about to place a 10 H. P. gasoline hoist on the 90-foot shaft of his Prodigal Son claim in Porcupine gulch, Cement creek. Assays from a 1⅝-foot streak of solid sulphide of iron-copper ore from the shaft returned $40 per ton.—An 8-ton lot of ore recently shipped from the San Juan Queen on Mastadon gulch, sampled $156 a ton. W. Fisher and H. Sherman own the mine which is worked by leasers.—The Commonwealth Exploration M. & M. Co. is operating the Zuni, at Silverton. A 1,200-foot crosscut tunnel to the lead 500 feet below the present workings is to be started.—E. H. Briggs et al. are again working their Turtle Dove, on Galena mountain. There is a body of high grade zinc ore in the mine.

SUMMIT COUNTY.

The Cashier G. M. & M. Co. has begun the construction of an amalgamating and concentrating mill. The preliminary work has been started.—H. Lee is groundsluicing south of Breckenridge. A test of 4 cubic yards of gravel yielded a return of $2 per yard.—The Jessie mine, operated under bond and lease by the North American Gold Dredging Co., has been cleared out, and shows good shipping ore and a body of milling dirt. The 40-stamp mill is being overhauled and repaired.—At the Mountain Pride mine the new mill is near completion and the new shaft has been unwatered and a force put at work driving the 80-foot level to a connection with the old workings.—The Ella recently completed the shipment of seventy-five tons of lead ore carrying a small amount of gold and silver.

TELLER COUNTY.

Lessee W. O. Dunham, operating a block of Stratton's Longfellow property, will resume shipments. The new shaft has a depth of 130 feet, at which point the shoot was cut on its dip. A station has been cut at the bottom of the shaft, and work on the ore is started. New ore bins have been erected.

In the Carlson lease on the Morning Glory No. 4 of the Work, two men are daily breaking ten tons of ore. The pay streak is more than 6 feet wide, and will average two ounces. The shoot is still strong.

The Mollie Dwyre, a patented claim of seven acres on Gold hill adjoining the Pointer, has been sold to R. C. Bogy and associates of Denver for $25,000. It is the intention of the new owners to organize a company and develop the ground.

At the annual meeting of the National M. T. & L. Co. held last week the directors decided to install a three-drill compressor on the Red Bird claim. On the 260-foot level the vein has been opened 160 feet. The ore averages 3 to 4 feet, and carries values from $50 to $70.

The Burris & Sexton lease on the north end of the Last Dollar mine of Bull hill is down 160 feet, and a vein encountered that assays $14 to the ton.

Purcell, Limbach & Welch, leasing on the Monument, are shipping from two shafts. The two shafts are 30 and 40 feet deep, and sinking continues in both of them. Sub-lessees Rhodine & Clark have seventeen-ounce ore, and will soon be shipping. A switch is being run to the Monument by the Midland Terminal road.

A new vein has been encountered in the Clemmons lease on the Dante, on Bull hill. The vein was unknown to the lessees. The vein shows 15 inches of ore, which assays three to eight ounces. The new vein was cut in a crosscut 12 feet from the Clemmons vein. The vein is 3 feet wide, and in it there is a streak of talc that runs as high as thirty ounces. A new plant of machinery has been put in. Four air drills will work in the sixth level—two in ore and two in development.

It is reported that a strike has been made on the Something Good, on Raven hill, and that 4 feet of pay ore has been found.

A. C. Hutchinson and associates of Denver have sold the Lucky Boy's Friend and the E. & H. lodes to A. P. Mackey of Denver.

The Logan, on Bull hill, is down 1180 feet. In the fifth level a large body of ore was encountered in the drift. Ore is now in all the levels from the first to the seventh. From the eighth to the eleventh levels only the stations have been cut. There are over 5000 feet of drift.

The Thompson mine, on Gibbons hill, was sold last week to the Colorado Ore Reduction Co., owner of the Arequa mill. This mine adjoins the Elkton, and has been a producer of medium grade ore. Ore was first opened in it last year by G. M. Weeks, of Chicago, who secured the property. Since that time it has been a heavy shipper. The new owner will sink the shaft 200 feet from its present depth of 520 feet. This purchase is to make the mill in Arequa gulch independent of custom ore. The company has five leases in the camp, four of which are shippers. The Thompson has been outputting sixty tons a day, which is to be increased to 100 tons. A tramway is to be built from the mine to the mill.

At a recent meeting of the Jack Pot Co. it was shown that the Creston Gold Mining Co., lessee of the south 600 feet of the Jack Pot claim, had encroached upon the company's territory to the extent of some 63 feet, from which they had extracted ore to the amount of $36,000. A demand for restitution of the $36,000 from the Creston Co. will be made, minus the cost of extracting the ore and minus the royalties paid on it.

The Old Colony Co., the Cripple Creek Railway Co. and the Finance Co. have each been incorporated and capitalized at $1,000,000. The incorporators of each are practically the same. These incorporations are connected with the plans of G. H. Proctor of New York, who two years ago attempted to float the Pike's Peak Tunnel & Railway Co., which proposed to bore through the range with a railway tunnel, which would end 4000 feet below the town of Victor, and have two branches encircling the Cripple Creek district, the total distance of the system underground being fifty miles. The present plans of Mr. Proctor are the same as those brought forward a year ago. The Finance Co. proposes to erect a reduction works eighteen miles north of Canyon City. The Old Colony Co. is organized to conduct mining enterprises in the Cripple Creek district, several claims having been secured by Mr. Proctor. The Cripple Creek Railway Co. proposes to build a road from Cripple Creek to Canyon City and from Cripple Creek to Denver. Mr. Proctor has left for New York. He says that bonds of the railway company and the Finance Co. are practically placed, and men are at work securing the right of way and have 8000 acres along the line. P. Morton, vice-president of the Santa Fe system, has been in Cripple Creek and Canyon City to look over the ground. It is reported that the Santa Fe is looking for a route into Cripple Creek. The Finance Co., besides the construction of a hotel and reduction works, proposes to drive the tunnel under Cripple Creek, which initiated Mr. Proctor's operations in this State. The tunnel will extend from Colorado City, El Paso county, to Marigold, this county. Mr. Proctor considers it feasible. The company will commence at the western terminus of the tunnel and reach within a mile of the town of Victor. The reduction works will have a capacity of 500 tons a day, and the cost of the plant is estimated at $500,000. The Finance Co.'s incorporators are G. H. Proctor, M. J. Stair and M. A. Rogers.

The Pike's Peak Power Co., to do business in Fremont, El Paso and Teller counties, has been incorporated with $1,000,000 capital stock by W., H. E. and F. M. Woods.

Denver *Republican*: The Doctor mine is again in bonanza ore, on Raven hill. There is a variance of opinion in regard to the particular shoot from which the mineral is coming. It is asserted that there are two veins—the Jack Pot vein and the Doctor vein. Some claim that the ore from the Creston G. M. Co. is coming from the Jack Pot vein, which, it is asserted, is distinct from the Doctor vein. They also claim that the Doctor vein, with the exception of the deposit from which Cone & Lyman shipped their bonanza ore in the early days of the camp, is barren. Those operating the Doctor mine assert that the Doctor and Jack Pot veins are the same. The mineral now being produced by the two properties is identical. In the meantime the old Doctor mine is again hoisting good mineral, and the lessee and sub-lessees are permitted to continue producing without being stopped or even hindered by litigation.—The Orphan Belle, on Bull hill, is owned by two newly organized companies—the Arrow and the Orphan. A number of lessees are at work; some already are breaking good ore.

IDAHO.

ADA COUNTY.

Idaho *Statesman*: R. J. Anderson states that the tunnel he has been running on the Copper Queen on Badger creek has cut the ledge, and that it has opened a fine body of ore. The walls are granite. The ore is 12 feet wide and is opened at a depth of 90 feet, the tunnel being in 127 feet. Assays gave from $3 up to $180, the average being $37.82. The ore is of different character at different points in the ledge, part of it being hard quartz heavily impregnated with iron pyrites. The ore concentrates readily. Mr. Anderson intends to make further test by concentrating thirty tons. There is a 1-stamp mill at the mine, through which the ore will be run, being concentrated on canvas. At the Sinker creek tunnel an 8-drill compressor will be installed, also a ventilating plant. The plans of the enterprise contemplate the expenditure of $500,000 in the purchase of property and in running the tunnel.—H. W. Dorman reports Willow creek lively. The Checkmate 10-stamp mill is completed, awaiting machinery.—The Leviathan mill and mine are running. The mine has a large body of ore on the 160-foot level. A portion of the ore is being shipped; the balance of the ledge is milled.—N. J. Sorenson recently bought the Richmond mill and is running on ore taken three years ago from the Pinto mine. He is retimbering the mine.—A strike has been made recently on the Shamrock in the old workings.—Mr. Dorman is operating the I X L and Ada. In the latter a body of ore has been opened. The I X L tunnel is in 500 feet. Three eight-hour shifts are to be put on.

IDAHO COUNTY.

(Special Correspondence.)—Hobson's Choice, at Buffalo Hump, was sold to W. S. Norman, F. C. Innes and Mr. Cameron of Spokane, by A. N. Graham, L. Yates, W. H. Palmer and J. C. Moore. The St. Louis, also at Buffalo Hump, was recently sold by Young & Turner to Boston capitalists.

Lewiston, Sept. 9th, '99.

LEMHI COUNTY.

The Black Bird, near Salmon City, has let a contract for a wagon road from the main road to the mines, and October 1st machinery will be installed and active operations begun under Mr. Buckley's supervision. It is the intention to explore the copper-bearing area to depth when concentrating machinery and matting furnaces will be provided.

On Moose creek the Pacific Dredge Co. has a machine in operation and is handling 1,000 cubic yards daily, the gravel averaging fifty cents a yard. Others are employing giants with good results. At the California Bar, Leesburg, a large force is being worked. Estimates place the clean-up for the season at $250,000.

Capt. Singster will operate a dredging machine on his placer and has ordered a dynamo for his quartz mill and will hereafter employ electricity in the extraction of his metal.

MONTANA.

MISSOULA COUNTY.

Two carloads of ore have been shipped from the Last Chance, and one from the U. S., this week. These two properties have furnished all the ore which has ever gone from Saltese, each turning out an occasional carload for six or seven years. They adjoin on Packer creek, four miles northwest from Saltese. The ore is nearly all carbonate, running high in silver, with a little copper and gold and runs from $200 to $300 above freight and smelter charges.

NEVADA.

It is reported that all the companies on the Comstock interested in the new electric power installation have signed the bonus contract, excepting Hale & Norcross. The bonus is raised by apportionment of a certain percentage to each mine, as follows: Con. California & Virginia, 15%, or $15,000; Sierra Nevada, Union Con., Mexican, Ophir, Best & Belcher, Gould & Curry, Savage, Chollar, Potosi, Crown Point, Belcher and Yellow Jacket, each 7½%, or $7500 each; Hale & Norcross, 5%, or $5000; Confidence, Caledonia and Occidental Con., each 1½%, or $1500 each; Utah Con., Andes, Bullion, Alpha Con., Con. Imperial, Challenge Con., Seg. Belcher, Overman, Alta and Justice, each 1%, or $1000. The total amounts to 124½%, or $124,500. The payment of the bonus will be made in installments as follows: First payment, $5000, upon the signing of the contract; second payment, $20,000, thirty days after the date of execution of the agreement; third payment, $25,000, ninety days after the date of execution of the agreement; fourth payment, $25,000, in 120 days after the date of execution of the agreement; the balance, $25,000, upon the completion of the power plant and successful working of the same.

At the C. & C. shaft, Comstock lode, No. 2 elevator has been removed, repaired and replaced. It is thought more rapid progress will be made. The water stands 34 feet below the 1950 level.

ELKO COUNTY.

(Special Correspondence).—As the result of two weeks run of the 40-stamp mill, with cyanide tailings equipment, on the property of the Dexter G. M. Co. at Tuscarora, a bar of bullion of the value of $14,560 and auro-cyanides valued at $3400 were shipped to Salt Lake City on the 8th inst. The ore milled came from the 250-foot level, which is 100 feet deeper than former workings. This is the 99th shipment of bullion and auro-cyanides from this property under the present management. The property is owned principally in Salt Lake City and is managed by S. B. Milner.

Tuscarora, Sept. 9th, '99.

HUMBOLDT COUNTY.

Winnemucca *Silver State*: J. Taylor of Bloody canyon is arranging to ship sixteen tons of high-grade antimony to San Francisco. The ore is from Mr. Taylor's mine, fifteen miles from Mill City. The ore is high grade.

OREGON.

BAKER COUNTY.

(Special Correspondence). — The Imperial lead of the Eagle group at Cable Cove has a tunnel that taps the vein 200 feet below the surface, from which 225 feet of drifting has been done on the vein. The ores here run as high as five ounces gold, thirty ounces silver and 16% lead. The width of ore of that value runs from 1 foot to 40 inches. This is the property of J. C. Young and associates.

The rich strikes recently made in the Golconda uncovered blocks of sulphurets, tellurium and coarse gold whose values ran up into the thousands. The singular feature of the discovery was that gold in the above-named forms was found after going through a capping of base arsenides and antimonial ores of very moderate grade.

The Golconda mill, involving the apparatus and equipment for treating those ores by the bromo-chlorine-electrical process, has finally been adjudged unsatisfactory by J. G. English, owner of the property, and steps are being taken to discard that process and make such changes in the mill as will adapt it to amalgamation and concentration work.

The Climax vein, adjoining the Golconda, belonging to J. W. Bolland and F. G. Jewett of Baker City, is being developed by them.

F. S. Baillee, who resigned the management of the Columbia, has become manager of the Golconda, T. L. Lammers succeeding him at the Columbia.

The Cayuse group was sold a few days ago by W. Snarr to E. Finch and W. C. Calder. The property is in the Greenhorn range, twenty-five miles from Sumpter.

Sumpter, Or., Sept. 5th, '99. WASCOTT.

The Ibex mine, near Sumpter, was sold last week to the Consolidated Mines Association, of London. The Ibex is on the same ledge as the Baisley-Elkhorn, North Pole, Columbia and Golconda.

Baker City *Epigram*: W. Potter, who put up the Red Boy 20-stamp mill, will build on the Little Giant mine a 20-stamp mill and on the Magnolia and May Queen one of ten stamps each, and a cyanide plant at the Red Boy.

SOUTH DAKOTA.

(Special Correspondence). — Within two years the Two Bit country has had a boom. There are six hoists on as many groups of claims. The Chicago & Two Bit shaft is down 512 feet, and there found the lower quartzite. There are 150 feet of drifts, but no ore body in sight.

A mile above this the Deadwood & Detroit Co. are down 200 feet, in quartzite, with several hundred feet of drifts, and some small shoots of ore. The others are of less importance.

The Hardin Standard mine is down 300 feet in a body of auriferous iron pyrite (low grade).

On Spruce gulch is a body of iron pyrite which was formerly shipped to the D. & D. smelter, but the appearance of blende and galena in the ore rendered it unfit for the pyritic smelter. This deposit is separated from a sheet of porphyry 100 feet thick by a thin sheet of shale. Under the porphyry is shale, which extends to the lower quartzite. The latter has not been explored, though showing galena and pyrite, hematite, manganese, gold and silver. One hundred and fifty feet higher than the bed of pyrite and blende referred to is a bed of shale containing the richest ores in the district, and 100 feet still higher is a horizon containing gold ores. Lying loose upon the surface in some places is quartzite honeycombed with the borings of of fossil insects (arencolites). All of this rock is gold-bearing, but ordinarily low grade. This rock in the Terry peak region is rich in gold and silver ores.

In Ruby basin, east of Terry peak, 500 tons of ore are milled daily. The great silicious telluride ore deposits extend southeasterly and southwesterly from Bald mountain. The ores in this district occur in two systems of shoots, divided by a valley or depression in the quartzite. Upon each side of this depression, and parallel with it, are two large shoots, the larger one being on the west side. Numerous small shoots branch off from these large ones and run often 100 feet, when the ore ceases. There was some ore in the valley described, at the north end of Nevada gulch, near Bald mountain, but as work proceeded southward the ore left the valley and the depression became more sharply defined, and 1800 feet south of Bald mountain no ore is found in the depression for more than 2000 feet.

Deadwood, Sept. 8th, '99.

TEXAS.

ARCHER COUNTY.

Denver *Republican*: A company is attempting to work a copper deposit in this county, of which J. Philbrick says: "We are mining for copper, but instead of finding it in rock we find it in a formation which resembles clay. No one would ever have thought of starting a mine in the place if it had not been for the color of the deposit. A bit of the material was taken to an assayer, and his returns showed high copper values. We haven't done much development work for the reason that we do not know how to go about it. Soft rock is bad enough to mine in, but clay is almost impossible. I have been in consultation with several mining engineers, all of whom have given it up. If we hit upon a reasonably economical method of retaining the walls of our drifts and tunnels we will have a paying thing. The formation is, as far as we can explain it, a large fissure filled with finely ground rock containing mineral matter. The hanging wall and foot wall have not been found. Small uncrushed chips of porphyry are found."

UTAH.

IRON COUNTY.

G. H. Smith says the new strike in the Johnny at Stateline promises to develop into a productive proposition. F. Wilson, who recently sold the April Fool for $100,000, purchased an interest and bid $10,000 for another fifth in the property. The first and second class ores show free gold, and the milling ores average $40 per ton. Of the first class three tons are ready for shipment. The sampling in the bottom of the shaft gave an average of $600 a ton in gold. The mill is to be started up.

L. Bast is working the Vandalia, an extension of the Johnny, and the Ophir is working with a full force.

JUAB COUNTY.

(Special Correspondence).—The Picnic mine at Silver City recently shipped ore from the 650-foot workings. They are drifting with the expectation of getting the South Swansea vein. The ore bodies of the Four Aces, Park and South Swansea come to a junction on the Picnic grounds, it is claimed.

A gasoline hoist has been set at work on the Carressa, near Silver City, and a shaft is being sunk. This property was sold last winter to Smith & Moffatt of Denver, Colo, and is in charge of Supt. Underwood.

Silver City, Sept. 11th, '99.

The Grand Central M. Co., at Tintic, has

commenced action against the Mammoth Co., enjoining the latter from extracting ore from the plaintiff's ground.

Another strike has been made at the Shoebridge Bonanza, Tintic. Manager Heffron reports the vein has been broken into by the drift off the 200-foot level, the entire face showing chloride of silver.

Tintic *Miner*: There is enough shipping ore in sight in the Centennial-Eureka to more than pay the purchase price of the mine, besides several thousand tons of a milling grade.

SALT LAKE COUNTY.

(Special Correspondence).—The Red Wing at Bingham has developed two fine ore bodies, one of which is copper and the other silver and lead. Development consists of a 700-foot tunnel and 300 feet of drifting on the veins. The veins average 60 feet wide. The lead-silver ores are concentrated at the Red Wing mill in the ratio of four and one-half tons into one ton.

Under direction of Capt. DeLamar, thorough exploration has been going on at his holdings near Bingham. Thorough tests have been made with drills and ores from a number of tunnels have been tested. These tests have just been concluded and it is claimed the results are not disappointing.

Work on the Cook group progresses. In driving through the country rock, which is porphyry and quartzite, it is found this material is mineralized, containing fair values.

Bingham, Sept. 11th, '99.

SUMMIT COUNTY.

Park *Record*: Work on the Lucky Bill is to be resumed.——The machinery of the old Anchor concentrator is being moved to the new mill.——Fifteen men are grading for the sinking of the 500-foot shaft on the Putnam ground. The machinery formerly at the Woodside mine will be moved and used on this property.——O. E. Lawrence has secured a lease and bond on the Jupiter mine on Pioneer ridge, and will commence operations.——Foreman Charles Buehler of the Steamboat group reports that property looking well and development progressing. Work will be continued until winter and then abandoned until spring, when machinery will be put in and work resumed.——James Kennelley has a lease and bond on the Silver Key, situated south of the Crescent mine and near the Apex. Men will be put to work next week.

TOOELE COUNTY.

(Special Correspondence).—The Overland at Sunshine is treating about 100 tons per day at its cyanide plant. Development on this mine has progressed well, the vein being opened for 1000 feet on the strike of the vein and to 600 feet in depth on the dip.

The Chloride Point cyanide mill is handling about thirty-five tons of ore per day, the grade running from 15 to 20 ounces silver. The mine is worked through tunnels.

Sunshine, Sept. 10th, '99.

Salt Lake *Tribune*: Capt. De Lamar is examining into Deep creek. R. C. Gemmel, has charge of the expedition. He says he found very little work going on at the camps. The Queen of Sheba has been shut down some time, also the Midas. The greatest activity observed was on Dutch mountain, where M. Evans and associates are operating.

WASHINGTON COUNTY.

(Special Correspondence).—The Dixie M. & S. Co. are operating a copper mine and smelter twelve miles from St. George and fifty-five miles from the Oregon Short Line Railroad at Modina. The vein from which ore is being taken is from 25 to 30 feet wide and is opened through a 426 foot tunnel. The general average of the ore is 16% copper, though select lots have run about 43%. The smelter has two furnaces and handles twenty tons per day. There are also small values in gold.

St. George, Sept. 9th, '99.

WASHINGTON.

KING COUNTY.

Work has been started on what promises to be one of the largest smelting plants in the Northwest at Kirkland. It is expected to be ready for work by January 1st.

STEVENS COUNTY.

The Chesaw district now has 500 inhabitants. The hills are low and rounded and the valleys are fertile and tilled. The C. P. railway will be built within six miles of Chesaw. The character of the ores is like that of Camp McKinney.

Spokesman-Review: The Jim Hill claim at Chesaw is a paying mine. A month ago the Chesaw Imp. Co. commenced work on the old shaft which had been sunk 23 feet, at that depth showing talc and lime-like quartz, carrying small values. At a depth of 50 feet the whole bottom of the shaft was composed of a blue-gray quartz assaying $30 in gold. The shaft is in the middle of the ledge, no walls being in sight.

WYOMING.

Grand Encampment *Herald*: The Rudefeha has struck ore in a crosscut from the working shaft, 150 feet from the original discovery, and 100 feet below the bottom of the old 80-foot shaft. The ore is of the same quality as in the old workings.——A large body of high-grade ore is blocked out.

CARBON COUNTY.

The Supt. of the Wyoming Con. Copper Co.'s mines reports a tunnel 160 feet driven alongside the ledge and a crosscut that shows the richest body of ore to be 12 feet wide, with 50 feet in width more or less mineralized. The shaft being sunk onto the ledge 700 feet from the mouth of the tunnel shows copper glance and chalcopyrite. The tunnel will cut under this point 250 feet. Plans are formed to utilize Big creek to generate electrical power. The developments show that the ledge extends northwest 4500 feet, and southeast there are three miles of claims.

FOREIGN.

AUSTRALIA.

Melbourne *Standard*: Prospectors have found a large reef at Mount Shorter giving good prospects. Other parties are excavating about the surface, but have found ore carrying good but very fine gold, not visible, except in very rare instances, to the naked eye. All the available ground around Mount Shorter is held under lease extending for several miles. In Moppitt's, Mount Shorter, is exposed solid quartz 14 feet wide, which is stated to crush 25 dwt. per ton.——The Great Boulder Perseverance Co., in West Australia, is shipping 800 tons of sulphide ore monthly to the Eastern colonies to be smelted, the assay value of which is six ounces. A start has been made by this company to erect their own sulphide plant, which will be completed in six months.——W. B. Greenwood, a Government prospector, has telegraphed from Worturpa to the Commissioner of Crown Lands the report that a rich vein of gold and telluride had been struck in Bevern's claims, 2½ miles west of the Reward claim, on a parallel ridge of ore.

BRITISH COLUMBIA.

(Special Correspondence.)—In the Virginia workings, at Rossland, a rich shoot of ore was recently opened in a surface cut, on which they are now sinking. The main shaft is down 500 feet, from which a drift runs to the vein. At the 300 level a drift is being run to find the vein that was uncovered at the surface.

Rossland, Sept. 9, '99.

J. Edwards-Leckie, on behalf of Montreal parties, has bonded from E. Spraggett, Grand Forks, and J. M. McGregor, Nelson, Wash., the Yankee Boy and the Bell for $25,000. The properties are on Hardy mountain, three miles from Grand Forks.

Moyie Leader: The Lake Shore at Moyie will begin ore shipments soon.——The Canadian Gold Fields syndicate will erect a concentrator this fall. There are fifty-two men on the syndicate's payroll.——Railway construction in Boundary Creek has resulted in opening several large ledges. Along the North Fork on the Oro Dinero and the Emma the railway grade made important exposures. The latest strike is on the Sunset mine, in Deadwood camp. The branch line from Greenwood to Deadwood and Copper camps opened a lode of rich copper ore.

CANADA.

Five furnace retorts started last week at the mines of the Great Lakes Copper Co. at Sudbury, Ont., and five more are in process of completion.

Large beds of marl and gypsum are being developed near Port Clinton, Ontario.

MEXICO.

It is stated that the richest copper mines in the Republic are in the State of Michoacan. In parts of that State are deposits of copper pyrites, which lie between a flow of andesite and granite.

The so-called copper mines in Lower California, near Cape St. Roque, have been investigated by San Francisco men and are pronounced worthless. The copper occurs as carbonate but in small amount.

SOUTH AFRICA.

Director of the Mint Roberts, in speaking of the effect of hostilities in the Transvaal upon the gold production, says: "Exactly how much the gold production would be curtailed would depend on the duration and extent of the conflict. The little Dutch republic is now the greatest gold producing country in the world. It assumed the lead of all other countries last year, and this year has been making gains over its former record. The total output of the Dutch republic last year was $88,000,000, and that was a great jump from the year before. During the month of July this year its gold output was more than $8,000,000, the largest amount ever taken out in one month. At this rate the yearly output would be nearly $100,000,000, and, including the gold mined in other parts of South Africa, would be fully $100,000,000." The English have the largest interest in the mines; the French and Germans are largely involved. The threat of President Kruger to destroy the mining properties refers to the millions of foreign money invested in machinery for taking out the gold.

Recently Declared Mining Dividends.

New York Zinc Co., dividend 1%; payable Oct. 1st.

Jack Pot, Cripple Creek, Colo., $50,000; payable Sept. 25th.

April Fool mine, De Lamar, Nevada, $5,000; Sept. 15th.

Calumet & Hecla, Michigan, $20 per share; payable Sept. 29th.

Portland M. Co., Cripple Creek, Colo., $60,000; Sept. 15th.

Stratton's Independence, Victor, Colo., $488,000; payable Sept. 25th.

Gwin Mine Development Co., Cal., $5,000; Sept. 12th. Total to date, $86,500.

Elkton Con. M. & M. Co., Cripple Creek, dividend of $30,000; payable Sept. 20th.

Wolverine Copper M. Co., Michigan, semi-annual dividend of $2 per share; payable Oct. 2nd.

An extra dividend of $1 per share has been declared by the Montana Ore Purchasing Co.; payable Sept. 27th.

Yellow Aster M. Co., Cal., monthly dividend, $10,000; Sept. 11th.

Books Received.

"*Slide Valves*," 81 pages octavo, one of a series of practical handbooks, treating of that necessary and important part of the steam engine—the valve—with particular reference to the "slide" variety. Published by Spon & Chamberlain, New York City; $1.

Industrial Notes.

—There are 11,583 soldiers at San Francisco.

—California and South Carolina are producing tea.

—The $5000 water bonds of Seattle, Wash., are ready for delivery.

—The formation of trusts has ceased to be an overcrowded industry.

—Martinez, Cal., contemplates a copper smelter and smokeless powder plant.

—San Luis Obispo, Cal., this week voted $116,000 for improvement of its water system.

—On the 13th inst. messages were sent from England to France by wireless telegraphy.

—The Iowa geological report shows that during 1898 the State of Iowa produced minerals to the value of $7,426,723.

—The sum of $3000 was paid the Brooklyn, N. Y. long distance telephone office for a recent fifty hour talk with St. Louis, Mo.

—The ridiculous project of a canal between Puget Sound and Gray's Harbor, Wash. is advocated by men who ought to know better.

—The Washburn-Moen end of the American Steel & Wire Co. are said to have earned $1,800,000 net for the year ending July 31, '99.

—Denver newspapers call on Coloradoans to patronize home productions wherever practicable, and cease spending money for foreign products.

—Ship carpenters are in demand at San Francisco; $4 for eight hours is paid, with $1 per hour for overtime; those working sixteen hours are paid $12 per day.

—Tin plate is advancing in price, owing to higher price of iron and steel and also to an increase in wages. The raise amounts to about 35 cents per box more than a year ago.

—The electrical plant at the Sperry, Stockton, Cal., flour mill was illustrated and technically described in the issue of August 19th. The electric power for which the Sperry Co. is to pay the Standard Electric Co. is being gauged by the number of barrels of flour turned out by the mill per month.

—The Manufacturers' and Wholesalers' League of San Francisco is securing the presence of purchasers from Texas, New Mexico and Arizona. Similar inducements have also been afforded merchants from Montana, Idaho, Utah and Washington by excursion rates, etc., the intent being to retain the trade.

—The manufacture of steel has been commenced at Minneapolis, where the plant of the Republic Iron & Steel Co. is making open hearth steel only. Under orders from headquarters the mill has ceased to make bar iron, the whole capacity of the mill being devoted to bar steel. The manufacture of bar iron is being gradually discontinued.

—Coal is reported discovered sixty-one miles below Dawson, a mile and three-quarters back from the Yukon river. The N. A. T. & T. Co. has built a railroad from the river to the mine. The coal is still frozen at a depth of 250 feet below the surface. Recently 1250 tons were shipped to Dawson. The Canadian Government took 250 tons at $30 per ton.

—Sacramento, Cal., is using electric power transmitted 65 miles over aluminum wires from Brown's valley, the first installment of 1000 H. P. sent by the North Yuba Co. under contract with the Sacramento Electric, Gas & Ry. Co. of Sacramento, and supplements power already used and transmitted here from Newcastle and Folsom. Under contract 4000 more H. P. is to follow.

—The town of Mountain View, Oklahoma, was recently organized. A rival town existed about a mile and a half west, and it was deemed advisable to consolidate it with Mountain View. The rival, Oakdale, was purchased entire for $34,380, and is now being transported to Mountain View. On the same principle the citizens of Skaguay, Alaska, are about to undertake a big enterprise. Dyea is to be taken up—the whole town at the entrance to the Chilkoot pass—and moved across Lynn canal on scows to Skaguay to augment the growing town at the head of Lynn canal. E. Foreman of California has secured 320 buildings, large and small, according to a local report.

—By an expenditure of nearly $600,000 the power of the Santa Ana river is transmitted to Los Angeles, Cal., eighty-two miles distant, and 9000 H. P. propels machinery, moves street cars and illuminates buildings in Los Angeles, Redlands, Riverside, Colton and Ontario. The most remarkable feature in this development of electrical power is the transmission of electricity of a high voltage over eighty miles of wire with so little loss of energy, the company finding, in fact, that it can send electricity of 33,000 volts, having a working efficiency of 4000 H. P., a distance of eighty-three miles, with a loss of but 10%. After doing its work in the production of electrical energy, the mountain stream is gathered into a conduit and led down the mountain side to irrigate the orchards and groves in San Bernardino valley.

Commercial Paragraphs.

THE Vulcan Iron Works of San Francisco is putting in the third ice plant supplied by this firm to Manila merchants.

THE Redlands Railway Co. have nearly completed their new electric system. All of their light rail was sold to Lee Chamberlain & Co., Los Angeles, Cal.

Obituary.

GEORGE HAINES WOODBURY, of San Francisco, died at Sydney, Australia, on the 6th inst. Deceased was the son of Geo. E. Woodbury, and had recently gone to Australia on business for his father. He was a graduate of the Massachusetts Institute of Technology and was just entering on a useful manhood.

Personal.

AUG. J. BOWIE has returned to San Francisco from Dawson.

T. A. RICKARD of Denver, Colo., has gone to southern Arizona to examine mines.

PATRICK CLARK of the Cœur d'Alenes has made Spokane, Wash., his permanent home.

WM. MCSORLEY has been appointed shift boss at the Daly-West mine, Park City, Utah.

F. H. CHERRY, traveling representative Vulcan Iron Works, San Francisco, is in Manila.

EBEN SMITH AND R. H. REID of Leadville, Colo., are in Utah looking after their interests there.

JOS. MCGILLIVRAY, the veteran California miner, has returned to Dawson, N. W. T., from London, Eng.

CLARENCE S. KING, formerly of Los Angeles, Cal., has purchased the assay business of Wallace & Hart at Baker City, Or.

A. L. DICKERMAN of Colorado Springs, Colo., has recently visited Jerome, Ariz., in the interest of John D. Rockefeller & Co.

AUGUST RHAUTT, formerly with the Philadelphia Smelter at Pueblo, Colo., is now Supt. Arkansas Valley Smelter, Leadville, Colo.

CAPT. W. M. JAMES and son of Shasta Co., Cal., will return to Johannesburg, South Africa, next month, if the present war cloud blows over.

A. D. MOFFITT, formerly foreman of the Ontario mill, at Park City, Utah, has been engaged to superintend the Bimetallic mill, near Phillipsburg, Mont.

F. WING of the Seattle, Wash., United States Assay Office, expects $2,000,000 additional gold dust from the North before the output ceases for the season.

MRS. NELLIE YEAGER, Dawson City, N. W. T., sends word that if her papa will send her his picture she will send him a check for $1000. He is Capt. Matthew Chance.

L. M. DAVIS AND R. B. ARCHIBALD of London, Eng., and Supt. Gallagher of the Anaconda mine are investigating the copper prospects of western Washington.

W. P. HANCOCK is at Cuprum, Idaho. He brought several California miners with him, and is superintending the operations of the Boston & Seven Devils Copper Co.

CAPT. M. A. HEALEY of the United States revenue service has returned to San Francisco from an extended inspection of the mining camps along the Alaskan coast.

THOS. A. EDISON denies the statement that he had bought the Ortiz, N. M., land grant, but says he is building one of his magnetic ore-extracting machines for use thereon.

GOV. A. R. SHEPHERD denies the recent statement wired to the New York press that he had sold his mining property at Batopolas, Mexico, and would return to Washington, D. C.

JOHN T. ENGLISH, of Baker City, Or., is in San Francisco buying machinery for his mine. It is understood that the result of the bromo-chlorination process at his mill is not an unqualified success.

W. R. ECKART AND W. F. PIERCE have charge of the buying of supplies for the Standard Electric Co., which proposes to issue $5,000,000 in its scheme of San Francisco electric transmission.

W. A. CARLYSLE, formerly mineralogist of the Province of British Columbia, now Supt. Le Roi mine at Rossland, is locally reported to have been offered the position of Mgr. Rio Pinto mines, in Spain, at an annual salary of $25,000.

I. TRUMBO has been appointed receiver of the Golden Cross mine, Hedges, Cal., thus practically ending the litigation over the property. The claim of retiring Receiver Pauly for $1000 per month salary and $2500 attney's fees was allowed.

J. R. DELAMAR AND HARTWIG COHEN left San Francisco on the 12th inst. for Paris via New York City. Capt. DeLamar says he will put 100 men at work at his newly acquired Bully Hill, Cal., property, and has no plan for smelters until he learns what kind of treatment is required.

R. A. PARKER has returned to San Francisco from Utah. While there, in company with A. F. Holden and J. W. Neill, he made an examination of the Centennial-Eureka, which, upon recommendation has been bought by the U. S. Mining Co. of Boston, Mass.; capital stock, $5,000,000.

J. M. CARMICHAEL, H. H. Keyes, W. S. Steel, Arch. Milligan, H. P. Anderson, H. B. Boyer, A. J. Pesnell, Jos. Kampachner, B. Evans and H. Harlan, form a party of Prescott, Arizona, miners who have gone to Peru, S. A., under a contract with C. P. Collins, to explore the mining region on the east slope of the Andes.

C. F. HOFFMANN, who for several years was Supt. Red Point mine, near Damascus, Placer Co., Cal., and who left about three years ago for Siberia, has returned to San Francisco. Mr. Hoffmann says there are good mines in Siberia, but that the existing conditions render their operation a hardship. Owing to the difficulty of obtaining supplies and improved American machinery, the development is slow, and, added to this, the tax imposed by the Government, amounting to about 17% of the output, is almost prohibitive and would in itself constitute a good dividend. More recently Mr. Hoffmann has been in Argentine Republic, South America. He says there are good mines there, but the best ones are found at an altitude of about 15,000 feet above the sea, where there is neither timber nor water and little air.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING SEPT. 5, 1899.

632,592.—BINDER AND LEDGER—Sol Adler, S. F.
632,615.—FIRE DOOR FOR FURNACES—O. A. Alexander, S. F.
632,673.—RAILWAY SWITCH—R. Cady, Los Angeles, Cal.
632,452.—GRADER AND DITCHER—G. F. Earhart, Lafayette, Or.
632,344.—FRUIT BASKET—O. C. Fenlason, Hoquiam, Wash.
632,345.—SHIPPING BOX—O. C. Fenlason, Hoquiam, Wash.
632,411.—WINDOW SASH—B. Hausmann, S. F.
632,356.—COLD STORAGE APPARATUS—J. T. Ludlow, S. F.
632,364.—LEATHER DRESSING MACHINE—C. E. Pellew, Alameda, Cal.
632,429.—SUPPORT FOR OPEN BOOK—A. M. Riddell, S. F.
632,374.—MOP WRINGER—S. Samson, Tacoma, Wash.
632,431.—CAMERA—I. G. Sigler, Los Angeles, Cal.
632,384.—BOOK SUPPORT—M. E. Welch, Portland, Or.
632,389.—PLOW—A. V. Wilbur, Stockton, Cal.
31,494.—DESIGN—X. Dodel, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SLIDABLE AND SWINGING WINDOW SASH.—Bernard Hausmann, San Francisco, Cal. No. 632,411. Dated Sept. 5, 1899. This invention relates to a mechanism for sliding window sashes and a means for disengaging such sashes so that they are turnable about hinges to swing inwardly for the purpose of obtaining access to the outside of the sash. It consists of guided, grooved and shaped slides to one of which one edge of the sash is hinged; a hook or hooks upon the opposite edge of the sash, and corresponding loops upon the slide with which the hooks engage when the sash is closed, a means for retaining in place and preventing the slide from moving upwardly when the sash has been disengaged therefrom, which consists of a stop or channel upon the slide and a yoke horizontally slidable, so as to engage with this stop or channel or be disengaged therefrom.

COLD STORAGE APPARATUS.—J. T. Ludlow, San Francisco, Cal. No. 632,356. Dated Sept. 5, 1899. This invention comprises a cold storage room in which meat may be either hung up or packed in bulk, and a convenient method for changing from one system to the other, and to secure a natural and even circulation of cold air around the outside of the bulk of packed meat. The rooms have non-conducting walls with stanchions and cross-bars removably fixed near said walls to form spaces, and other stanchions intermediate between the ends of the rooms, forming an open space larger than those contiguous to the walls, and through which access may be had. Stringers with transverse bars are fixed upon the floors so that the ends and central spaces are connected, and refrigerating pipes are disposed along the ceiling and around the upper part of the packing spaces. Below the lines of pipes are parallel bars having hanging hooks fixed to them, and hanging bars, the upper ends of which are fixed to the deck beams and are so formed as to support the refrigerating pipes and the hook-carrying bars.

LOOSE LEAF BINDER AND LEDGER.—Sol Adler, San Francisco, Cal. No. 632,391. Dated Sept. 5, 1899. This invention is designed as a temporary binder of that class which are designed to contain removable leaves, and which are made to form ledgers and other like books where it may be desired to temporarily bind together and lock the leaves in place, but at the same time provide a means by which the leaves may be removed when desired. It comprises a chambered back having a cover hinged at one side, a guided plate carrying the opposite cover and movable with relation to the back to increase or decrease the distance between the covers. Segmental posts are fixed so that one slides upon the other, and when they are together they form a complete cylindrical post. The sheets which are to be held upon these posts are perforated, and have slots opening out from one side, these slots fitting and being held by a rib which projects from one of the segmental posts, so that when the parts are all put together the leaves are locked in place, but when the part of the post having the rib is slipped upwardly, it allows the leaves to be disengaged or replaced at will.

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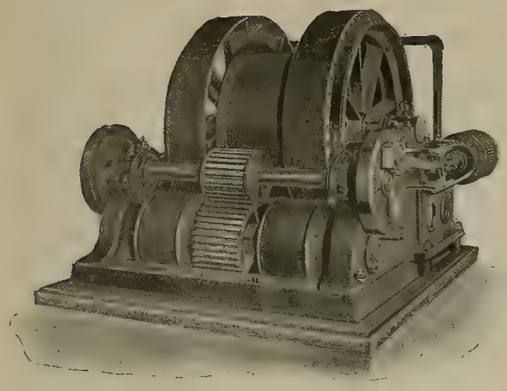
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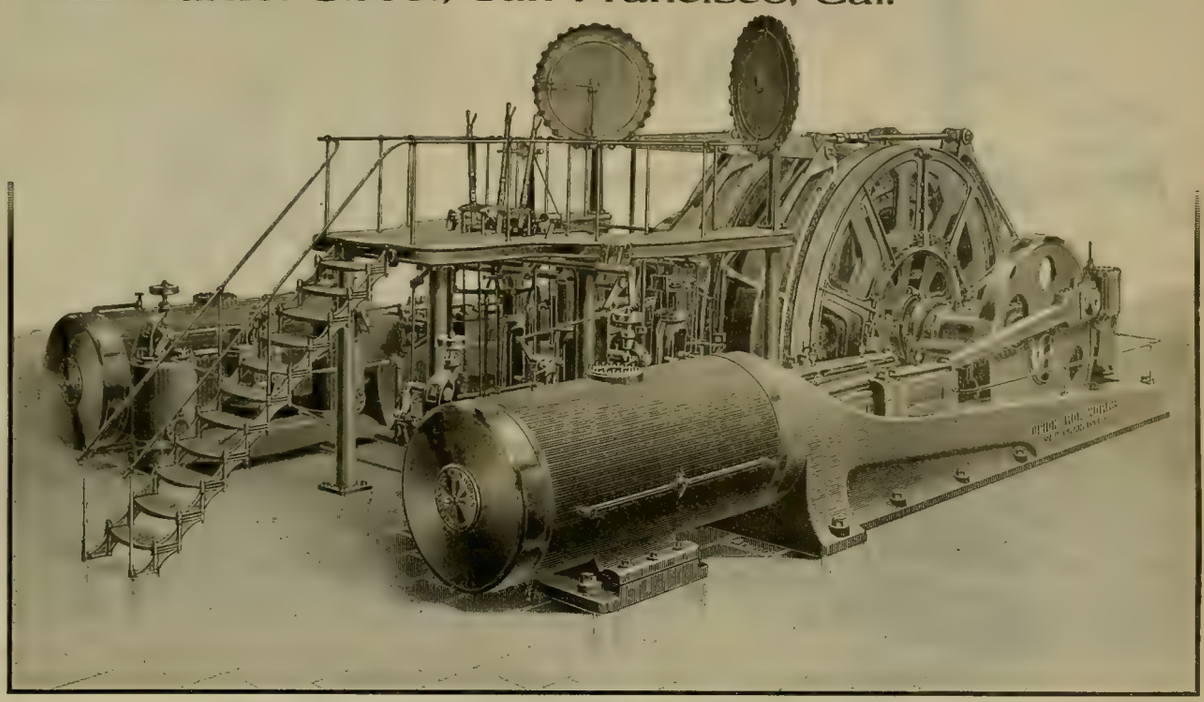
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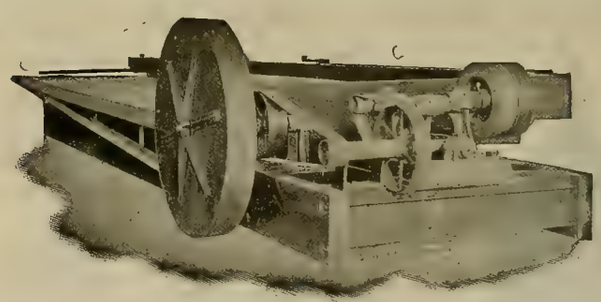
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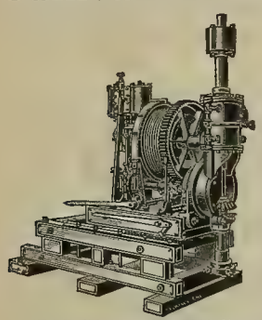
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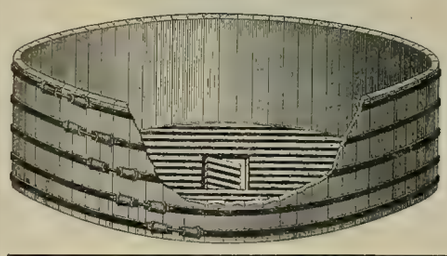
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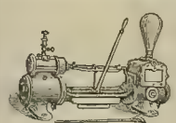
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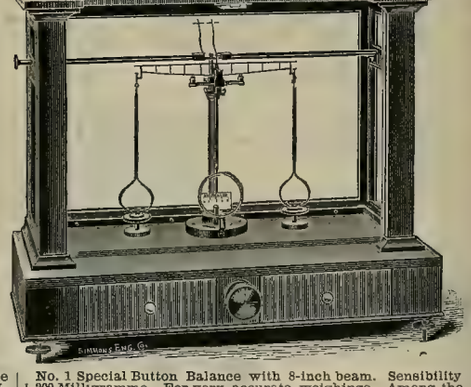
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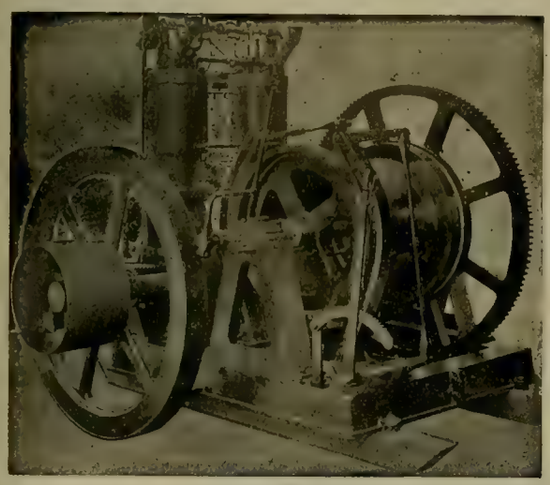
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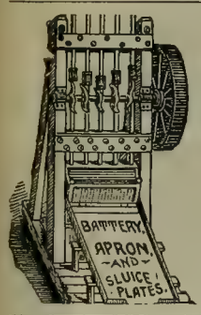
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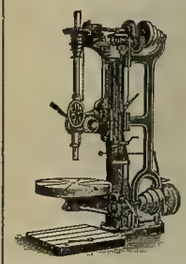


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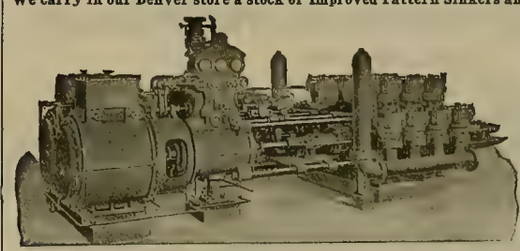
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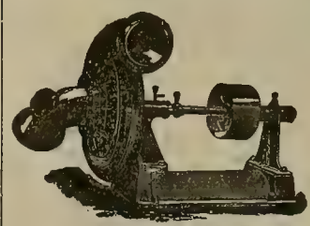
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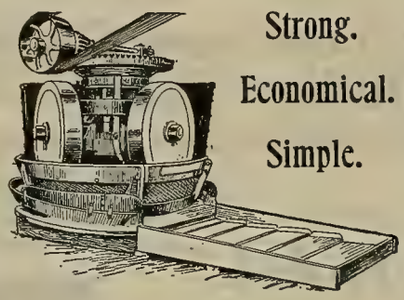
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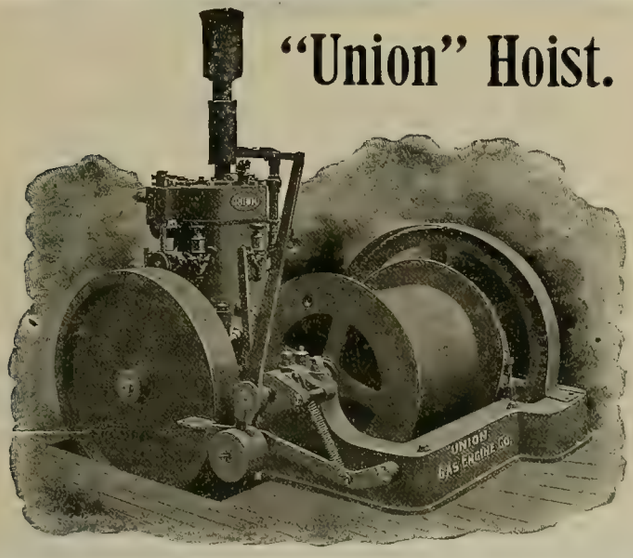
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The BRYAN MILL is constructed on the principle of the Chili Mill, except it has three rollers arranged to run in a continuous discharging pan. It crushes either gold or silver ores. It consists of an annular cast-iron mortar with fixed steel dies arranged in the path of its three crushing rollers. Power is applied direct from a pulley through a bevel gear and pinion secured to stationary center post. We present a few of many advantages it possesses over any other Mill: Larger screen capacity and free discharge. Amalgamates a larger percentage of gold. Quickly and cheaply erected; with regular feed and proper flow of water requires little attention. Crushes hard or soft ore with smaller amount of power per ton and less wear and tear of machinery. : : : :

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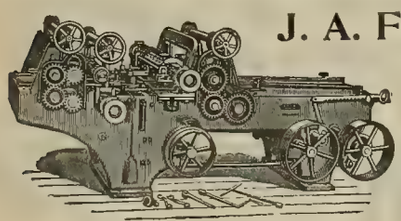
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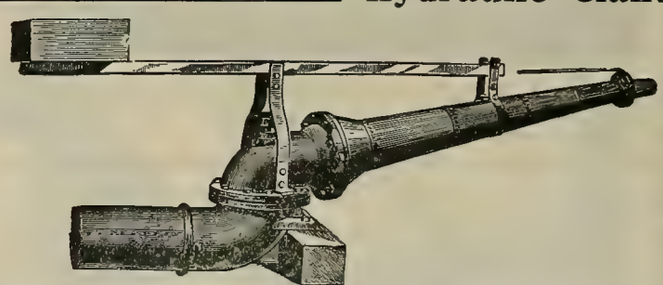
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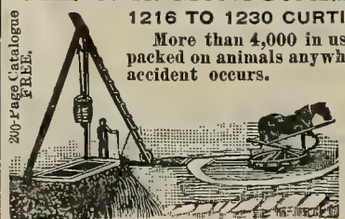


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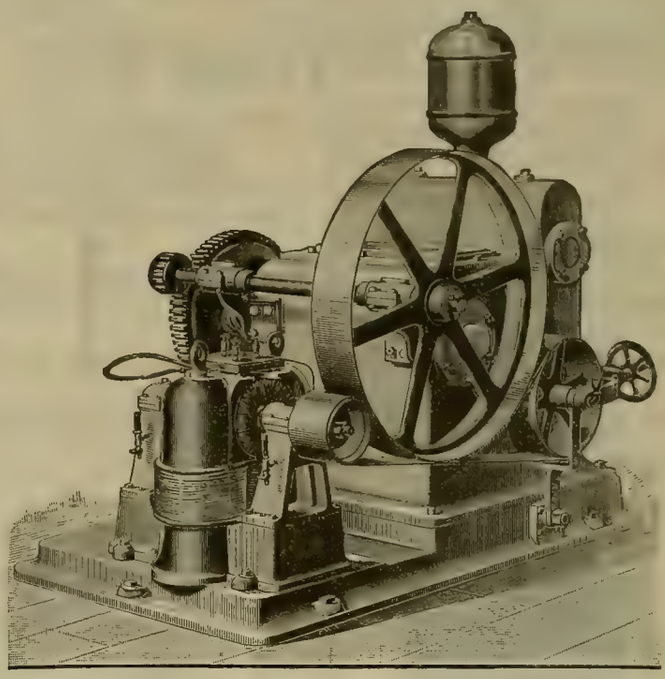
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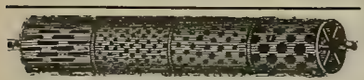
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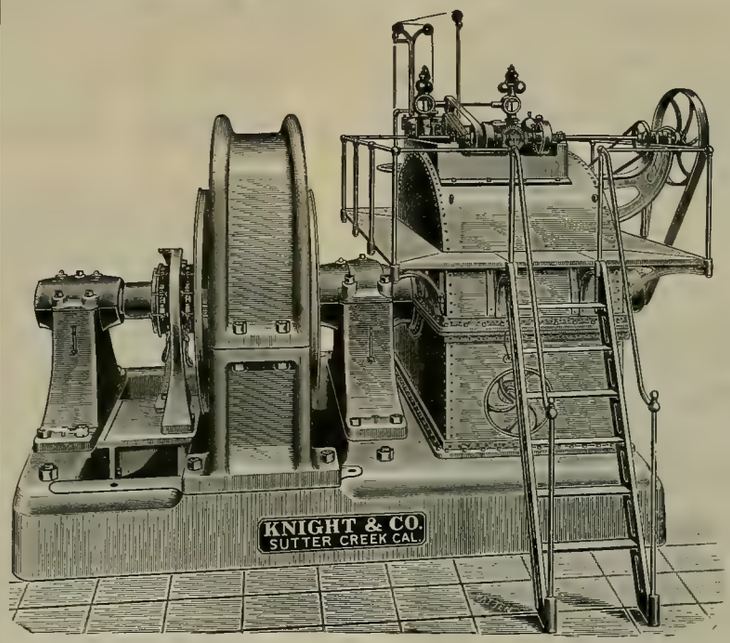
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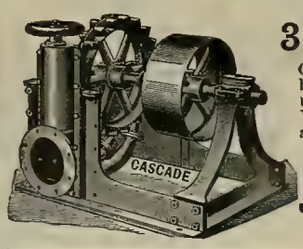
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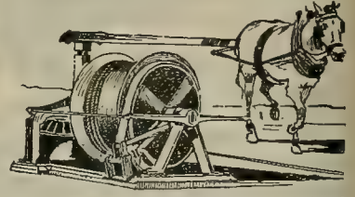


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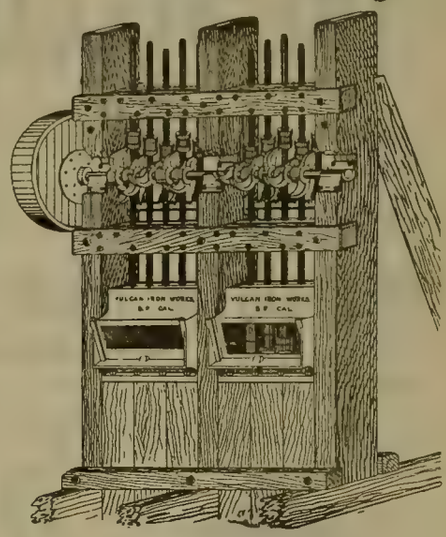
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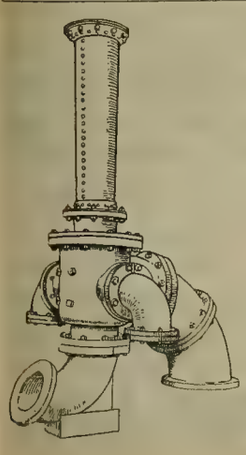
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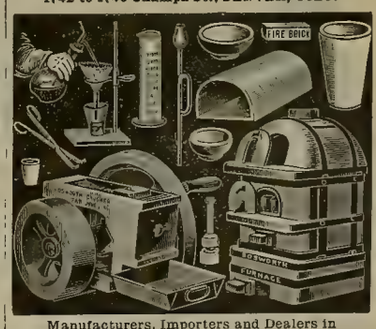
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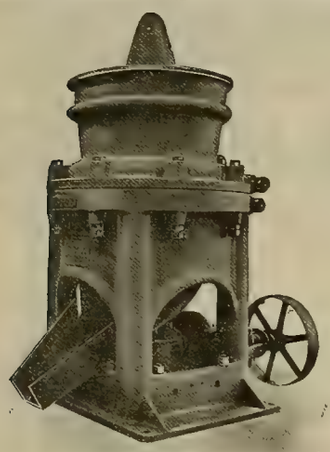
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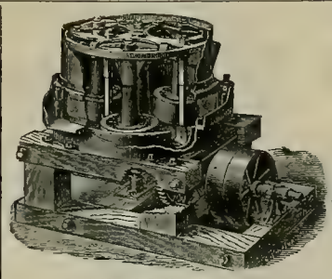
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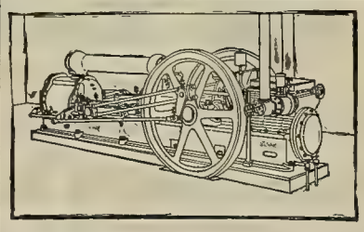
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Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

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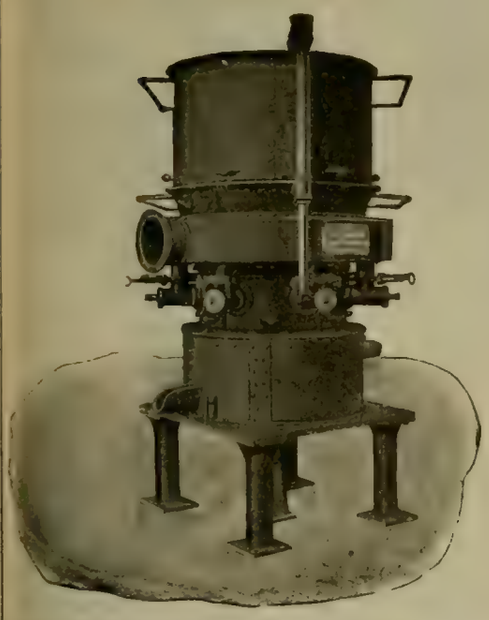
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THIS CLASS OF WORK IS A SPECIALTY WITH US.

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(SEE PAGE 328.)

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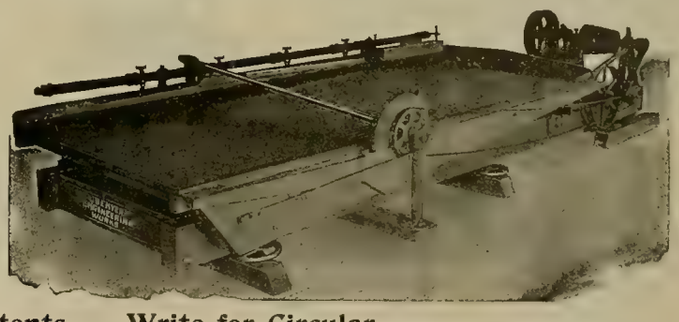
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Watch this Space for Description of the Above Machinery.

Send for Catalogues and Full Information. 32 FIRST STREET, SAN FRANCISCO, CAL.

Market Reports.

SAN FRANCISCO, Sept. 14, 1899.

SILVER. — London, 27¼d; New York, 59; San Francisco, 59; Mexican Dollars, 48@49; New York exchange, sight, 12½; telegraphic, 15 cents premium.

Silver shows a slight decline, both in Europe and America. There has been a downward tendency for several months past, though the decline has been very slow.

LEAD. — New York reports unchanged, $4.60 bid, $4.62½ asked; brokers' price, $4.40. Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake very quiet at $18.50; brokers' price, $18.50. Local —Mill copper plates, 23¾c.

There is a firm appearance to the copper market, with 18¼ bottom notch, while in certain quarters 18¾ has been quoted. The trading is moderate and consumers are not purchasing at current rates. Danger of foreign complications has had no perceptible effect on the market here as yet. London advices report the trading there as insufficient to move prices.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Steady, with sellers' at $32.80; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Unchanged. Local, $45.50; export, $40.50@41; carload lots, special rates.

There is no change to note in quicksilver this week. The demand remains firm and production, being largely under control, is uniform. The newly inaugurated enterprises have as yet made no showing in the market. Mines cannot be opened, furnaces constructed and production commenced without necessary preparation.

PLATINUM. — London, 63½s per ounce; York, $16.25; San Francisco, $16.75.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¾c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ℔ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¾@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@2¾c; California refined, 1⅞@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¾c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16¼c; Astral, 16½c; Star, 16½c; Eocene, 18½c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

COKE. — Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 14, 1899.

9:30 A. M. SESSION.

500 Challar	43c	100 Seg. Belcher	05c
600 Potosi	50c	100 Standard	$2 85
100 Savage	30c		

2:30 P. M. SESSION.

600 Best & Belcher	51c	200 Overman	13c
100 Con. Cal. & Va.	$1 65	200 Justice	10c
300 Challar	43c	500 Union Con	43c
200 Potosi	54c		

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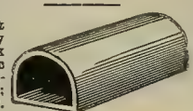
LOST. 500 SHARES SANTA ROSALIA Mining Company's stock, Certificate No. 210, in name of H. M. LARUE. All persons are cautioned against negotiating the same, as transfer has been stopped.

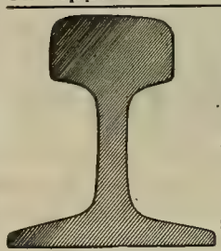
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Assessment Notices.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment (No. 7) of One Dollar per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary

Office—320 Sansome street, room 24, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINing Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 19th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of September, 1899, an assessment (No. 14) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of August, 1899, an assessment (No. 20) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of September, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 30th day of September, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209-11 Claus Spreckels building, San Francisco, California.

POSTPONEMENT.

The date of the delinquency of the foregoing assessment (No. 20) has been postponed to TUESDAY, the 19th day of September, 1899, and the day of sale from the 30th day of September, 1899, to SATURDAY, the 7th day of October, 1899.

By order of the Board of Directors.

J. J. CRAWFORD, Secretary.

Office—1209-11 Claus Spreckels building, San Francisco, California.



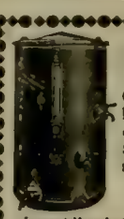
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DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 14) levied on the 19th day of July, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Chas. Peach	23	2,000	$200 00
F. Brey	28	1,250	125 00
M. Raschen	66	250	25 00
Fred Britten	147	150	15 00
George Britten	148	50	5 00
Henry Voll	150	150	15 00
H. Gumbel	160	1,250	125 00
H. Gumbel	161	500	50 00
Chas. Gumbel	162	380	38 00
H. Helfrich	166	250	25 00
N. Prost	186	100	10 00
N. Prost	199	100	10 00
N. Prost	203	50	5 00
F. M. Freund	270	200	20 00
F. M. Freund	271	200	20 00
F. M. Freund	272	200	20 00
H. Goldsmith	278	42	4 20
Chas. Peach	299	388	38 80
N. Prost	308	100	10 00
H. Gumbel	345	500	50 00
H. Gumbel	346	500	50 00
H. Goldsmith	353	148	14 80
Wm. G. Loewe	365	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of July, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office, 237 Twelfth St., San Francisco, California, on MONDAY, the 25th day of September, 1899, at the hour of 5:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

AUG. BERBER, Secretary.

Office—237 Twefth St., San Francisco, California.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each.

JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the Sailor Consolidated Mining Company will be held at the office of the company, 318 Front St., room No. 7, San Francisco, California, on MONDAY, the 18th day of September, 1899, at the hour of 2 o'clock P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting.

M. C. LUND, Secretary.

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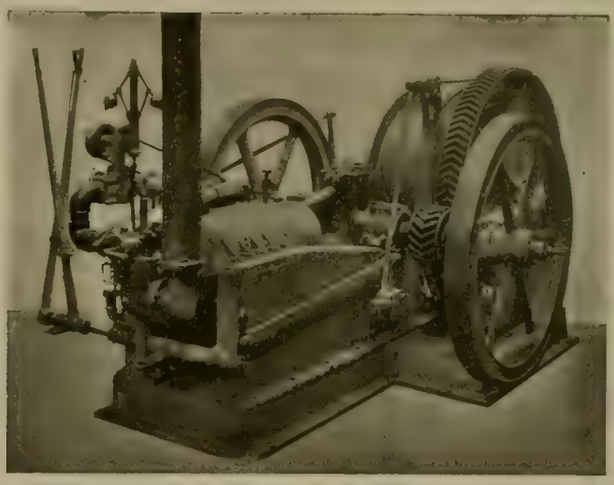
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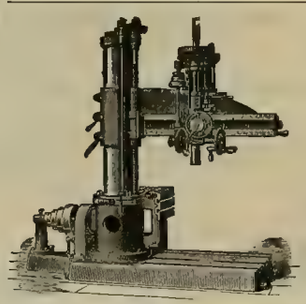
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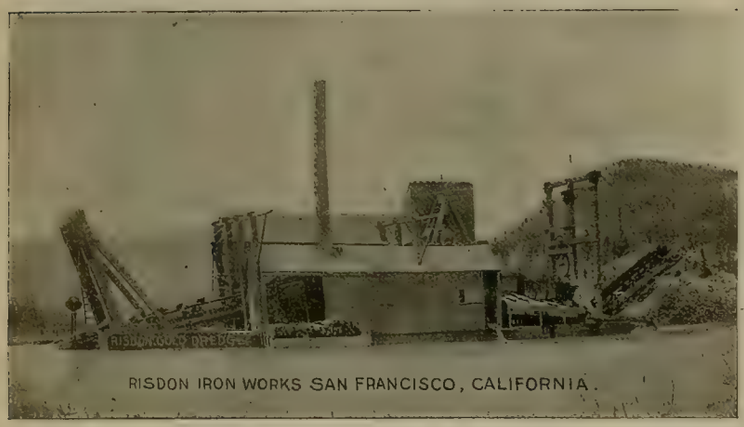
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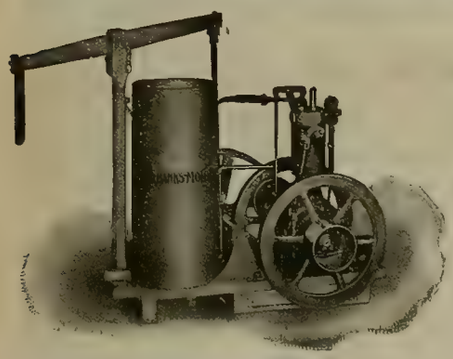
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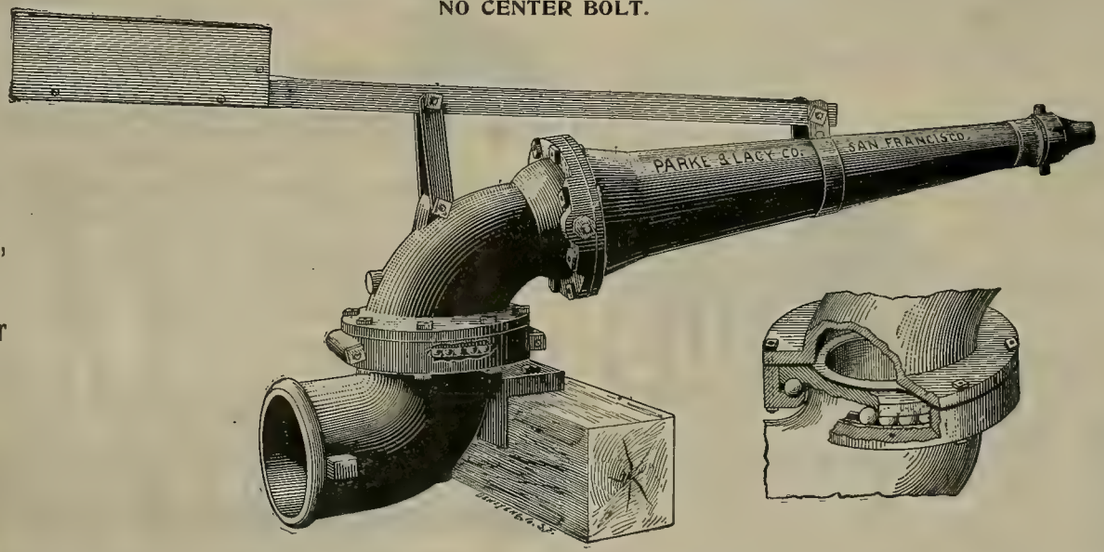
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No. 2046.—VOLUME LXXIX. Number 13. SAN FRANCISCO, SATURDAY, SEPTEMBER 23, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The American Institute of Mining Engineers.

The largest technical society in America is the American Institute of Mining Engineers. It was organized by Richard P. Rothwell at Wilkesbarre, Pa., in 1871. The first president was David Thomas, who is referred to as the father of the anthracite iron business in America. At present the personnel of the official staff is as follows: President, James Douglas, New York City; vice-presidents—E. D. Peters, Jr., Dorchester, Mass.; Albert R. Ledoux, New York City; Leon P. Feustman, Mexico City; E. C. Potter, Chicago, Ill.; Geo. F. Kunz, New York; W. N. Page, Ansted, W. Va.; managers—C. W. Goodale, Great Falls, Mont.; Frank Lymar, Brooklyn, N. Y.; Frank McM. Stanton, Houghton, Mich.; Richard P. Rothwell, New York; W. J. Olcott, Duluth, Minn.; W. B. Devereux, New York; Arthur Winslow, Kansas City, Mo.; William Glenn, Baltimore, Md.; W. J. Taylor, Bound Brook, N. J.; secretary, R. W. Raymond, New York; treasurer, Theo. D. Rand, Philadelphia, Pa. Portraits of a number of these gentlemen appear on this page, from photographs especially provided therefor. James Douglas, the president of the Institute, is a prominent figure in the mining and metallurgical world, and has contributed numerous valuable technical papers to the Institute, which have been published in its transactions.



JAMES DOUGLAS, New York, President.

Edward D. Peters, Jr., one of the vice-presidents now in office, has become familiar to mining men through his works on copper smelting and his contributions to the literature of the Institute.

Rossiter W. Raymond, Ph. D., one of the earliest vice-presidents of the association and at one time president, has for years been the secretary of the institute, performing the manifold and arduous duties of that office with distinction to himself and to the eminent satisfaction of the members, as attested by his regular re-election at each annual meeting. The name of Dr. Raymond has long been familiar in the mining world through his work as United States Commissioner of Mineral Statistics, and through "Mineral Resources West of the Rocky Mountains, issued by the Interior Department in the early '70s. Dr. Raymond is the author of some of the most val-



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TABLE OF CONTENTS.

ILLUSTRATIONS.—Some of the Officers of the American Institute of Mining Engineers—James Douglas, New York, President; Theo D. Rand, Philadelphia, Treasurer; R. P. Rothwell, New York, Board of Managers; R. W. Raymond, New York, Secretary; E. D. Peters, Jr., Dorchester, Mass., Vice-President; L. P. Feustman, Mexico City, Vice-President; A. R. Ledoux, New York, Vice-President, 337. Winnipeg Mine, Wilmington Camp, B. C.; B. C. Mine, Greenwood, B. C.; Mother Lode Mine, Deadwood, B. C., 340. Commemorative Scroll Presented to Returning Soldiers, 341. F. McM. Stanton, Houghton, Mich., Board of Managers; W. C. Ralston, Oakland, Cal.; Arthur Winslow, Kansas City, Mo., Board of Managers; E. H. Benjamin, Oakland, Cal., 342. Latest Mining and Metallurgical Patents, 343. Incline Retarding Conveyor, 349.

EDITORIAL.—The American Institute of Mining Engineers, 337-338.

MINING SUMMARY.—345-346-347.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 366.

MISCELLANEOUS.—Concentrates, 339. Mining in the Boundary District, B. C.; Concentration of Auriferous Sulphides in California, 340. Meeting of the Iron & Steel Institute; A Channel Through the South Pass of the Mississippi River; For the Life-Saving Service; A Commemorative Scroll; Exports of Tin from the Straits to China and India, 341. Not Universally Understood; Entertainment of the American Institute of Mining Engineers; Production of Mines of Grass Valley and Nevada City, Cal., 342. Latest Mining and Metallurgical Patents, 343. Rand Deep Levels, 344. Industrial Notes; Personal; Recently Declared Mining Dividends; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Books Received; Catalogues Received, 347-348. Iron and Steel; Incline Retarding Conveyor; Antique Cement Analyzed; Cyanide Prior to Amalgamation, 349. California's Mineral Product and Values for Twelve Years, 352-353.

uable of the numerous contributions to mining literature.

Theodore D. Rand, treasurer of the Institute, is also first vice-president of the Franklin Institute of Philadelphia, Pa.

Richard P. Rothwell, who organized the American Institute of Mining Engineers at Wilkesbarre, Pa., in 1871, is at present one of the Board of Managers. He is known as a successful mining and metallurgical engineer and has wide fame in current technical literature and valuable statistical compilation. He declined the offered first presidency of the Institute, believing that an older man should have it, and proposed Mr. David Thomas, who was elected. In 1882 Mr. Rothwell was elected president of the American Institute of Mining Engineers.

The objects of the American Institute of Mining Engineers are to promote the arts and sciences connected with the economical production of the useful minerals and metals, and also the welfare of those engaged in those industries, by means of meetings for social intercourse and the reading and discussion of professional papers, and to circulate, by publications among its members and associates, the information thus obtained.

The Institute consists of members, honorary members, and associates. The qualification of members and honorary members is that they shall be mining engineers, geologists, metallurgists or chemists, or persons practically engaged in mining, metallurgy or metallurgical engineering. Associates include all persons desirous of being connected with the Institute who shall be elected in accordance with the rules of the Institute.

The council has power to decide on the propriety of communicating to the Institute any papers which may be received. These contributions from the members form an important and valuable feature of the Institute, as they comprise descriptions of methods and practice in every branch of the mining and metallurgical field, geological sketches, ore deposits, etc., and come from all parts of the world. These papers, valuable in themselves, present the experience and most advanced thought of technically educated and practical operators. They often excite discussions which are as valuable as, if not more so than, the original contribution.

The members of the Institute are critical, though not unkindly so, and the discussions, being just and fair, serve to bring out additional facts and to correct any errors which may have previously appeared.

The scope of the work of the Institute is of the broadest character, embracing not only the precious metal industry, but also that of all base metals, coal, and mineral substances of every kind, as well as accurate geological descriptions of regions familiar in the mining world, and of those in the remotest parts of the earth, for the members of the Institute are in every land under the sun, and many of the papers from those far distant lands are interesting and instructive, because of the inaccessibility of the regions of which they treat. Some of these papers have gone into the classics of mining literature, as, for instance, Posepny's contribution on the "Genesis of Ore Deposits."

The metallurgical branch is also represented in every department.

The transactions of the Institute, with the papers contributed by members, form a valuable chronological history of the advancement of the sciences in mining, metallurgy and manufacturing. In them are found much that is valuable in amalgamation, chlorination, cyanide processes, leaching, smelting, roasting and the treatment of ores and minerals of every description by every known process, old or new. Mechanical construction, concentration, electricity, compressed air, all have their representatives in the field of practice and in literature. Methods of mining are an important feature, transportation under every conceivable condition is described and illustrated, and the technical papers on the steel industry are most valuable to the large number engaged in that branch. It is largely by this comparison of methods that such rapid progress has been made by American mining engineers, and there is no doubt that the American Institute of Mining Engineers has done more to raise the great industry of mining and its kindred pursuits out of the rut of "time-honored methods" than anything else, and it has placed the industry where it properly belongs, in the front rank of advancement and improvement. Engineering feats in mining which a few years ago were not considered practicable are now looked upon as commonplace; and old-time methods in metallurgy have given place to newer, better and more comprehensive ideas, resulting in greatly increased capacity, at a reduction in cost which a few years since would have been deemed impossible.

Glancing through the transactions of the Institute published over twenty years ago, some of the contributions of those days, written in the light of the most advanced knowledge of that time, are obsolete or obsolescent; but the comparison illustrates better, perhaps, than anything else the rapid progress being made, and in twenty years from now it is more than likely that the earnest, profound thought of the present day as set forth in the transactions, will seem as interesting as those of two decades ago do now. Yet in these same old contributions are found papers anticipating by more than twenty years the solution of the difficult problems of that day which are now commonplace matters. These papers show clearly the class of men composing the American Institute of Mining Engineers.

It is twenty-eight years since the Institute was organized, and each year there has been held two or more meetings, but in all this time this is the first visit of the Institute west of the Rocky mountains, though many of the members are not strangers to the Pacific coast.

In the early years of the history of the Institute all the meetings were held in Eastern cities, including Dover, Del., Washington, D. C., Wilkesbarre, Pa., Philadelphia, Pa., Pittsburg, Pa., and Virginia Beach, Va. In 1882, for the first time, a meeting was held west of the Mississippi river, when the Institute met in Denver, Colo., in May.

In July, 1887, during which month a meeting was held in Salt Lake and also at Butte, the engineers visited many of the prominent mines in Utah and Montana. Again, in 1896, a meeting was held in Denver, Colo., but until the present they have never come west of the Sierras. The annual meeting of the present year was held in New York City. That the meeting of September, 1899, will prove one of the most profitable, as well as enjoyable, ever held by the Institute there is no doubt, and Californians, appreciating the visit of the distinguished party, have made preparations to receive them with characteristic Western hospitality.

Numerous letters have been received from Eastern members of the Institute, expressing regret at their inability to attend the meeting, and particularly so as it is the first California meeting; but these gentlemen are detained by press of business, the large interests under their care and direction requiring constant attention. While it is regretted that the meeting will be deprived of the presence of some of the foremost workers in the industrial field, it speaks well for the mining industry that their presence is necessary at home.

The visiting members of the Institute will arrive in San Francisco at 8:15 A. M. on the 25th inst. Headquarters will be at the Palace Hotel. The 25th, 26th and 27th will be devoted to the sessions of the Institute. Following is an outline of the programme of the sessions:

Monday, September 25, 1:30 P. M.

Addresses of Welcome

Presidential Address by PRES. JAS DOUGLAS, LL.D., New York City.

The following papers will be presented in abstract by the authors:

"The Origin of the Yosemite Valley, and the Eroding Effect of Glaciers"—PROF. WM. P. BLAKE, Tucson, Ariz.

"Notes on Mining Cable Tests and Physical Tests of California Timbers"—PROF. FRANK SOULE, University of California.

"The Construction of the La Grange Dam"—E. H. BARTON, Sonora, Cal.

The following papers will be presented in print:

"Stoping With Machine Drills"—BERT. THANE, Sumdum Chief Mine, Alaska.

"Deep Mining at the Utica"—J. H. COLLIER, Tesla, Cal.

"Note on Plate Amalgamation"—ALLAN J. CLARK, Lead, South Dakota.

"The Mines and Mill of the Atacama Mineral Co., Ltd., Taltal, Chile"—SYDNEY H. LORAM, Chingford, Essex, England.

"Investigation of Magnetic Ores from Eastern Ontario"—FRED ERICK J. POPE, New York City.

"The Relative Desulphurizing Effect of Lime and Magnesia in the Iron Blast Furnace"—O. R. FOSTER, Brooklyn, New York.

In the evening a grand promenade concert will be given in the Palace Hotel Court. Music by Cassasa's Band.

Tuesday, September 26.

The following will be read in abstract:

"The Electromotive Force of Metals in Cyanide Solutions"—PROF. S. B. CHRISTY, University of California.

"Some Features of the Economic Geology of Russia"—PROF. A. C. LAWSON, University of California.

"The New Alaska-Treadwell Gold Mills"—ROBERT MEIN, Oakland, Cal.

The following papers will be presented in print:

"The Peculiar Ore Deposit of the East Murchison United Gold Mine, Western Australia"—D. P. MITCHELL, Palo Alto, Cal.

"The Occurrence of Tin Ore at Sain Alto, Zacatecas, With Reference to Similar Deposits in San Luis Potosi and Durango, Mexico"—EDWARD HALSE, Colombia, S. A.

"The Copper Deposits of Vancouver Island"—WM. N. BREWER, Victoria, B. C.

"Rock Salt in Louisiana"—A. F. LUCAS, Lafayette, La.

"The Lee Long-Wall Mining Machine—H. FOSTER BAIN, Des Moines, Iowa.

"Natural Coke of the Santa Clara Coal Field, Sonora, Mexico"—E. T. DUMBLE, Houston, Texas.

"Transcontinental Railway Lines"—JAMES DOUGLAS, New York City.

Wednesday, September 27.

The following will be read in abstract:

"Electricity as Applied in California Mining Practice"—PROF. C. L. CORY, University of California.

"The Geology of Arizona"—PROF. THEO. B. COMSTOCK, Los Angeles, Cal.

"Tangential Water Wheels"—W. A. DOBLE, San Francisco, Cal.

The following papers will be read by title:

"Notes on the Independence Mine at Cripple Creek, Colo."—T. A. RICKARD, Denver, Colo.

"Gold Milling at Minas Prietas"—E. R. ABADIE, Torres, Sonora, Mexico.

"Treatment of Oxidized Ores of the Lake View Consols Mine"—J. W. SUTHERLAND, Boulder, Western Australia.

"The Effect of Heat Treatment Upon the Physical Properties and Microstructure of Medium-Carbon Steel"—ROBERT G. MORAE, Jamaica Plain, Mass.

"Peculiar Forms of Native Gold"—GEO. F. KUNZ, New York City.

"The Cement Rocks of Illinois"—J. A. EDE, Spring Valley, Ill.

"The Temperature at Which Certain Ferrous and Calcic Silicates are Formed and the Effect Upon These Temperatures of the Presence of Certain Metallic Oxides"—H. O. HOFFMAN, Boston, Mass.

"Wolframite Deposits in South Dakota"—A. FORSYTHE, Rapid City, South Dakota.

"Nickel-Steel; a Synopsis of Experiment and Opinion"—DAVID H. BROWNE, Cleveland, Ohio.

CONDENSED PROGRAMME.

WEDNESDAY, SEPTEMBER 27.—*Afternoon*—Visit University of California, College of Mines, and Selby Smelting Works. *Evening*—Banquet at Palace Hotel.

THURSDAY, SEPTEMBER 28.—Visit Stanford University, San Jose, and Lick Observatory.

FRIDAY, SEPTEMBER 29.—Visit New Almaden or Del Monte.

SATURDAY, SEPTEMBER 30.—Visit Grass Valley.

SUNDAY, OCTOBER 1.—Visit Nevada City.

MONDAY, OCTOBER 2.—Visit hydraulic mines in Placer County. Lunch at Auburn. *Afternoon*—Visit Sacramento, Capital City of State.

TUESDAY, OCTOBER 3.—Visit Oroville and dredgers.

WEDNESDAY, OCTOBER 4.—Visit Mother Lode at Sutter Creek and Jackson.

THURSDAY, OCTOBER 5.—Visit Mother Lode. Jackson to Valley Springs. Lunch at Gwin mine.

FRIDAY, OCTOBER 6.—Visit Mother Lode region near Jamestown.

SATURDAY, OCTOBER 8.—Start for Yosemite. Yosemite trip occupies four days—October 8, 9, 10, 11. Yosemite party arrive at Los Angeles, Thursday, October 12.

SUNDAY, OCTOBER 8.—Alternate trip: Visit Fresno vineyards and orchards.

MONDAY, OCTOBER 9.—Visit Carpenteria and Summerland. Arrive Santa Barbara.

TUESDAY, OCTOBER 10.—Visit Santa Barbara.

WEDNESDAY, OCTOBER 11.—Visit Los Angeles and Santa Monica.

THURSDAY, OCTOBER 12.—Visit Mount Lowe. Join Yosemite party at Los Angeles. *Evening*—Proceed homeward, through Arizona.

Concentrates.

SOME ONE has truthfully said: "Good mines make good miners."

THE difference between scientific and judicial geology is sometimes a subject for comment.

IT is claimed that the best grades of Missouri and Kansas zinc blende contain 55 to 60% zinc.

ANTIMONY sometimes occurs in metallic state, but usually as the sulphide of the metal (stibnite).

ZINC ORES which contain iron make a poor grade of spelter and is not saleable as a first-class product.

THE Pittsburg Reduction Co., Niagara Falls, N. Y., can answer any and all questions regarding aluminum.

COPPER sulphides, when roasted prior to matting, produce a higher grade of matte than if not previously roasted.

ELECTRICAL DEVELOPMENT in connection with mine work is at its present highest advance in Cripple Creek district, Colo.

BECAUSE an ore deposit is shallow is not a sign that it is without value. Very rich ore is sometimes found in superficial deposits.

IN Kansas calcite concretions of an amber to brown color have been frequently mistaken for zinc blende, which it somewhat resembles.

TURN PLATES made of rolled steel are superior to turntables in mine workings underground, the latter being unwieldy and requiring many repairs.

THE report of the University Geological Survey of Kansas states that the value of the waste dumps of zinc mines in that section exceeds $1,000,000.

UNITED STATES copper mines last year furnished 243,069 metric tons of copper—55.1% of the world's supply. Spain was second with a total of 54,077 tons.

IF the production of the mines of the Transvaal is not interrupted during the remainder of the year the output will reach about $100,000,000 for the year 1899.

"THE highest mine in the United States" is probably that near the summit of the Sierra Blanca, near Garland, Colo. The mine is 14,400 feet above sea level.

DURING the past eight years mines owned by J. R. De Lamar at De Lamar, Nev., have produced $6,323,000, out of which dividends amounting to $2,350,000 have been paid.

IN ventilation of deep mines is recommended an exhaust fan in the upcast shaft, supplemented by electrically driven fans underground and the discharge of rock drills.

ANY stock in any California corporation is assessable. No by-laws of any corporation incorporated therein can waive the right conferred by the State to assess the stock.

THE hoisting engine formerly in use at the Belcher mine, Virginia City, Nev., which is one of the largest in use on the Comstock, has been sold to an Oregon lumber company.

IT is less expensive to send ore out in trains of half a dozen or more cars and haul them back by horse or other power than to send cars out singly each in charge of a trammer.

THE Secretary of the Interior last week decided that a U. S. patent may issue covering both a quartz and a placer claim, reversing the ruling of U. S. General Land Commissioner Best.

AT the intersection of the Galena and Jordan ledges at Bingham, Utah, 100,000 tons of lead-silver ore were taken out in the early history of the camp. These ores sold for $2,000,000.

PYRITIC smelting is a process of reducing sulphide ores in a blast furnace without carbonaceous fuel, the necessary heat being supplied by the burning of the sulphur contained in the ore.

ORES which contain as high as 15% sulphur should be roasted before smelting. This is a matter of judgment on part of the smelter, for ores containing high values in silver lose silver in the roasting process.

NEARLY every city and village in Honduras, Central America, has been built as the result of mining enterprises in the vicinity, which have been carried on there ever since the settlement of the country.

THE capacity of a blast furnace depends largely upon the quantity of fluxes necessary, the fusibility of the ore and the pressure and volume of the blast. A large quantity of fine material lessens the capacity.

RECENT rope tests at the Royal Testing Laboratory at London resulted in the breaking of a wire rope 3⅛ inches in diameter by a pull of about 250 tons, the full strength of the 1080 individual wires being 330 tons.

SOME ores and also mattes are roasted without salt, the silver combining with the sulphur present in the form of sulphate, which is soluble and is leached out with water. This is the principal feature of the Ziervogel process.

GOOD VENTILATION may usually be secured in a shaft by dividing it into two compartments by a tight partition. When steam is available, powder smoke and other gases may quickly be driven from the bottom of the shaft by turning in steam.

A SUBSTANTIAL track may be made of 2x4 scantling set on the narrow edge and faced with strap iron. In some mines a track of this description is used for empty cars going into the chutes, T rail being used on a parallel track for loaded cars going out.

THE recent discovery regarding the "North Star" at the Lick Observatory, Mount Hamilton, Cal., is that the pole star is three suns or "stars," so close (relatively to terrestial observers) as to appear but one, and that they "revolve around each other."

IT is earnestly recommended to every reader of this paper to keep a file for reference. It is usual to receive several inquiries every week regarding subjects that have been fully treated in previous issues, and so many new and deserving topics constantly merit notice that it is not always practicable to repeat what had hitherto been well said. In many cases reference to the indices of the various volumes would readily show just where could be found the very information desired, in extended form.

JUDGE PRATHER of Spokane, Wash., has handed down a decision enjoining Spokane county from collecting or enforcing a tax levied against the stock of the Le Roi M. Co., holding that the property and not the stock is taxable. The mine is at Rossland, B. C.

THE Transvaal, S. A., gold is worth about $18 40 per ounce. The production of the Rand district for the first seven months of '99 aggregated $55,979,437. England wants that country, and will ultimately absorb it. It means "from the Cape to Cairo," and is inevitable.

THE zinc miners are looking forward to a new market for zinc. One of the new usages of spelter which promises to come in favor is the zinc shingle for roofing. Zinc being a non-conductor of heat and cold, makes it more agreeable for one doing business near the roof.

THE cement made by the Jesuit padres, who established Missions in California more than 120 years ago, has never been surpassed in quality by the product of modern time. Portions of some of the old aqueducts made over a century ago are still in fair state of preservation.

SULPHIDE copper ores may be roasted in heaps out of doors, the copper becoming sulphate. This is washed out with water and the metallic copper precipitated on old scrap iron. The copper in waters coming from mines is in the form of sulphate and may be precipitated in this manner.

Tetradymite consists principally of bismuth and tellurium, and sometimes contains sulphur. It carries from 33% to 48% of tellurium, and from 50% to 61% bismuth. It occurs with native gold in foliated scales, and in laminations with gold, chalcopyrite, magnetite and limonite.

PULVERIZED iron ore has been successfully reduced by mixing with coke dust and smelting in reverberatory furnaces. When the surface of the layer of ore becomes red hot it is gathered in balls, called blooms. These are placed in a machine called a squeezer and compressed to solid masses of iron.

MOLYBDENITE has been found in the following California localities: Cosumnes copper mine with copper ores, El Dorado Co.; Speckerman's mine, Fresno Flat, Fresno Co.; Beveridge mine, near Independence, Inyo Co.; Excelsior mine, Nevada Co.; near Campo, San Diego Co.; South Fork of Kings river, forty-five miles northeast of Visalia, Tulare Co.

THERE can be no reason positively assigned for the segregation of minerals of various kinds to different portions of a vein. A theory advanced is that these minerals were deposited at different times, and that the ascending waters from which the minerals found deposited in the veins were derived, at different times carried varying quantities of the several minerals.

IN the Black Hills of South Dakota the silicious (telluride) ores of the Potsdam and Carboniferous formations must contain at least $6.50 per ton to meet expenses when mined and milled privately; but when treated at custom works the value must reach $10 to $12 per ton. In the Archæan schists the free milling gold ores are mined and milled as low as $1.50 per ton.

THE mines of Bingham canyon, Utah, were first worked for carbonate of lead and silver. The operators quit when sulphides of lead, iron and zinc were reached. Subsequent owners took millions from the sulphide lead zone. The present owners believe they will take even a larger amount from the sulphide copper and gold zone, which by former workers was considered valueless.

Where statement is made that "all the subscribed capital will be applied to the purchase and development of the property," it would probably be more conducive to mutual satisfaction were information vouchsafed as to the proportion of such expenditure. While correct as a general statement, yet if .99 of the amount were applied to the purchase, the result might not be wholly satisfactory—to the investors.

THE Gold Mountain mines in San Bernardino Co., Cal., forty-five miles easterly from Victor Station, are at an altitude of 7500 feet above sea level. The ore shoots occur in a heavy quartzite stratum lying unconformably upon crystalline schists and massive granitic rocks, and overlain by limestone where the latter has not been removed by erosion. At the foot of the hill, near the principal mines of the group, is an alkaline lake covering 200 acres.

PROPYLITE is a rock which has been recognized as a distinct species by several writers of note, among them Zirkel and Stache. Later microscopic investigation has resulted in the general opinion that propylite is altered hornblende andesite, in which the hornblende material has penetrated the feldspars during the process of alteration, and the hornblende crystals are found altered to chlorite and epidote. These rocks contain quartz and are also found without it.

So far as known, Professor Tucker of Columbia University recently produced the greatest heat known to man. By means of a specially constructed electrical furnace and current of unusual power temperature was created of sufficient fervency to vaporize steel, hard quartz, and even platinum. The heat obtained was 6500°. Boiling water at sea level means a temperature of 212° Fahrenheit, red hot iron 800°. Steel melts at 3000° and boils like water at 3500°.

ROCK SALT occurs as the result of crystallization of chloride of sodium from a saturated solution in a natural basin or lake. When so found, it is not always pure, but is mixed with other chemical precipitates and mechanical admixtures as clay and sand. Gypsum often occurs as a residual deposit left by the drying up of a body of water. It is not infrequently associated with rock salt deposits. Rock salt is found in the rocks of all ages. The beds in New York State are Silurian. In California salt occurs in Quaternary dry lake beds.

ON the Pacific coast gold is found in beach sands in several counties of California, Oregon and Washington and on the shores of British Columbia and Alaska. In the southern localities many men at various times have worked the sands by devious methods and obtained a small amount of gold—never enough except in a few isolated cases to pay for the expense of fitting up and the labor required. The gold actually exists, and is found associated with layers of black sand, in part magnetic, having been concentrated by the waves and currents.

TRACHITE is a name which covers a wide range of rocks, and, as these graduate from one variety to another, it is difficult sometimes to draw the line between species. The principal constituents are sanidine, oligoclase, hornblende, sometimes augite, magnesian mica, magnetite and some other minerals. Rhyolite is trachite in which a distinct fluidal structure may be seen with aid of the microscope, and contains distinct blebs of quartz. Liparite is a dense variety of rhyolite.

IN an elevator run by water power in an office building the car is moved up and down by means of a separate hydraulic cylinder, which is fed by a supply pipe. As the water is forced into the cylinder from the supply pipe the car is raised. When the operator wishes to lower the car, he pulls the lever which lets the water out of the cylinder and the car sinks with a speed depending upon the rate at which the water is being let out. An accident causing the withdrawal of the pressure in the cylinder will make the water in it run out rapidly and the car will fall.

ARTICLES on the treatment of amalgamated plates in gold mills appeared in the issues of the MINING AND SCIENTIFIC PRESS of Jan. 7th, July 1st and 15th, '99, respectively; also in "Concentrates" Feb. 11th, '99. The addition of small quantities of sodium has a tendency to collect the globules of finely divided quicksilver. The cause of flouring should be ascertained. It may be due to the character of the ore, to grease dropping into the battery from the cams, or to some mineral substance having a deleterious effect on the mercury. Frequent dressing of the plates has a tendency to keep them in better condition.

A WATER BLAST for ventilating a tunnel in Gunnison Co., Colo., is described as follows: The automatic barrel system of ventilation consists of a barrel set in the stream—outside the tunnel—the bottom a few inches below water level and open; a funnel emptying through a 2-inch center into the top of the barrel, and beside the funnel, also inserted into the top of the barrel, the air pipe leading to the tunnel. In this case 4-inch pipe was used. By a flume water is conveyed to the funnel mouth, into which it pours from a drop of about 5 feet. This fall gathers a great deal of air and drives a constant even current to the breast of the tunnel.

SULPHIDE ORES may be roasted either before or after pulverizing, though the results of lump roasting are not as perfect as when the ore has been previously pulverized. When ore requires roasting preliminary to charging in a cupola furnace the difficulty occasioned by feeding finely pulverized ore to the blast furnace is overcome by slagging the pulverized ore in the roasting furnace. For this purpose a long furnace is constructed, the heat increasing as the fire end is approached. The ores must be mixed so as to form a charge which will slag readily. The pasty mass is withdrawn from the furnace into pots, cooled and broken into lumps, in which condition it is charged to the blast furnace.

The Rosario mine, at San Juancito, Honduras, C. A., is a fissure vein cutting metamorphosed and very hard black clay shales and rhyolite. It is a typical illustration of the banded vein usually found in textbooks but which is rarely seen elsewhere. The value of the ore does not appear to be affected by the change in the country rock, being equally rich in either the metamorphic rock or the eruptive. The ores normally consist of the sulphides of iron, copper, zinc and lead with the usual secondary products of their alteration found in the upper portion of the mine. The values are chiefly in silver, though gold also occurs, and in some parts of the mine is more abundant than the silver. The mine is worked through adits many hundred feet in length. It has paid large dividends.

THE determination of "ore in place" by the measurement of its cubic contents should be made with care; 13 cubic feet to the ton only applies to solid quartz rock, which may contain a nominal percentage of sulphide or other heavy mineral. In lead, zinc and other base metal mines this basis of determination is unsafe, as it requires less than 13 cubic feet to make a ton where these heavy ores are abundant. Some oxidized ores are very porous and relatively light. At the Tiptop mine, in the Lava Beds district, San Bernardino Co., Cal., the ores of the upper portion of the mine required more than 20 cubic feet to the ton in place, and much of this ore contained sixty ounces silver per ton. In Calico, in the same county, the gangue of some of the veins is heavy spar and requires much less than 13 feet per ton.

REGARDING driving belts and how to get good working results, it is to be noted that the good drawing of a belt increases with the friction between belt and pulley, and that the belt should surround as large a portion of the pulley as possible; because of this, crossed belts always pull better than open ones; if practicable, open belts should cover about half the pulley. If the circumference of one pulley be very small in proportion to the other, thus allowing the belt to cover only a small portion of the smaller pulley, a sliding of the belt frequently takes place, especially if the distance between the two pulleys be slight. As slow running of the engine makes strong stretching of the belts necessary, a tightening pulley is often placed midway between the two pulleys, so as to avoid repeated resewing; and if a large power is to be transmitted at little velocity, a broader belt should be employed than would be necessary with greater velocity, or two belts made to run one on top of the other.

A QUARTZ MILL, old or new, should have a larger amalgamated plate than 4 feet. Unless the ore is unusually free milling, twice that length is not too much. When starting a new mill, it is customary to run a quantity of rock of ordinary grade first, to get the plates in condition, and then richer ore may be fed. If the plates are in good condition when starting up, and are kept so, there should be no great difference in the saving in a new or an old mill. Success or failure depends largely upon the amalgamator, and not on the mill, if the latter be properly arranged. Of the gold first passing over new plates a certain quantity is always absorbed, as it were, by the plate, and with time this amount becomes considerable. "Sweating" the plates with scalding water is resorted to by some for the purpose of recovering this gold at the time of the monthly clean-up, but it is a reprehensible practice and damages the plate. Moreover, the next run again absorbs about the amount removed by sweating.

Mining in the Boundary District, B. C.

Written for the MINING AND SCIENTIFIC PRESS.

In visiting a few of the mines of the Boundary district, I went from Grand Forks northwesterly to Phœnix, eighteen miles distant. This point is near the summit which forms a watershed between the Kettle River valley at Grand Forks and the Boundary creek at Greenwood. Near Phœnix are such well-developed properties as the Winnipeg, Old Ironsides, Knob Hill, Stemwinder and Brooklyn. Five miles farther to the northwest is the town of Greenwood in the narrow Boundary creek valley. In the vicinity is the Mother Lode mine and others. Greenwood is well built, with good street improvements, and has a population of 2000. Following down the Boundary creek to the international line, ten miles from Greenwood, is Midway, a growing little town on a beautiful site. Twelve miles northeasterly from Greenwood is Summit Camp and the town of Eyholt, near which are the B. C. mine, the Oro Donoro and others.

The Crow's Nest branch of the Canadian Pacific, building through this section, is locally known as the Columbia & Western. This line is complete as far west as Grand Forks and Columbia, with most of the grading done from the latter place to Greenwood. It will doubtless be operating as far west as Greenwood before the end of the year. Spurs are being built to all the mines of note in the section traversed. The farther destination of the line is Midway, Camp McKinney, Penticton and the Pacific coast.

The Winnipeg mine, of which Duncan McIntosh is managing director, is developed by a 325-foot shaft, following the dip of the ledge. There are 1374 feet of drifting on the vein at the 50, 100 and 300-foot



WINNIPEG MINE, WILMINGTON CAMP, B. C.

stations. The ores are an iron and copper sulphide, with values averaging about $30 gold per ton. Above the 100-foot level there are from 6000 to 8000 tons of ore blocked out, with considerable blocked out below this level. The ledge of ore ranges from 2 to 17 feet wide. There are small values in copper and silver. The Winnipeg has been under development since November, 1897.

The Old Ironsides mine, owned and operated by a Canadian company of that name, has two shafts, 200 and 320 feet deep, respectively, which are connected by a 200-foot crosscut at the 200 level. Drifts on this level in opposite directions aggregate 750 feet. A crosscut of the ore body at this level shows it to be 83 feet wide. On the 300-level a 110-foot drift has encountered the same ore body.

The Granby Con. M. & S. Co. own and operate the Victoria, Phœnix, Ætna and Fourth of July. On the Victoria development is being done through the Old Ironsides levels. A drift extends 350 feet into the Victoria grounds, crosscutting 25 feet of good ore.

The Knob Hill, adjoining the Old Ironsides, is being developed through a crosscut tunnel, which cuts the ledge diagonally and is in 650 feet. Drifts on the ledge aggregate 700 feet, with a 140-foot upraise to the surface. All this work, about 1400 feet, is said to be in ore. The Old Ironsides, Granby and Knob Hill companies are all under the general management of Jay P. Graves, with Wm. Yolen Williams as superintendent. As an evidence of the magnitude of the ore bodies on these properties, the width of the ledge at three different points is given as 83, 145 and 220 feet, respectively. The values in the main are gold, with from 2½% to 3% copper. A 10-drill compressor runs the drills in the mines.

In this vicinity there are four or more parallel lodes, consisting of basic eruptive rock, carrying gold-bearing chalcopyrite. The Brooklyn, Idaho, Stemwinder and others belong to the Dominion Copper Co., controlled by McKenzie & Mann, of Montreal and Toronto, and are in charge of Supt. Frank C. Robbins. The first two are on the same ledge. The Idaho is opened by a shaft 250 feet deep and is equipped with hoisting and compressor machinery. The Stemwinder and others are on a different ledge and are well developed.

The B. C. mine, in charge of Supt. John M. Scrafford, comprises eleven claims, 500 acres. The main shaft sinks on the ore body to a depth of 165 feet, with extensive drifting at the 50 and 150-foot levels. The development aggregates about 1000 feet. On the ledge there are ore shoots which average 27 feet wide. The vein is at contact of porphyry and diabase. The ores are similar to those described above, though the values here are chiefly copper, with small amount of gold. The copper runs from 5% to



B. C. MINE, GREENWOOD, B. C.

10%. On the dumps are 3000 tons of first-grade ore, valued at $75 per ton; 8000 tons of second-grade, valued at about $26 per ton. These values are based on smelter tests. The plant is equipped with a steam hoist and air compressor. A hoist and compressor of much larger capacity have been ordered and will be put in place as soon as the railroad is complete to this point. With new hoisting facilities provided the shaft will be sunk to 1000 feet depth. Thirty-five men are employed. There are building accommodations for 100 men. The Oro Donoro, in the same locality, is opened by a 200-foot shaft, in which are good grades of copper and small values in gold.

The Gold Drop, near Phœnix, belongs to Montreal people and is being developed under the direction of Geo. A. Sonneman, consulting engineer, and Stanley Easton, superintendent.

The Mother Lode, near Greenwood, is the most thoroughly developed mine in that locality. This



MOTHER LODE MINE, DEADWOOD, B. C.

property belongs to the British Columbia Copper Co. of New York, represented on the ground by Manager Frederic Keffer. The mine is well equipped with operating machinery, having two 60-H. P. boilers, with feed-water heaters, 10-drill air compressor, sinking pump, electric light plant, hoisting engine (30-inch drum), and other usual accoutrement. The shaft house is built over a two-compartment, vertical shaft, now at a depth of 250 feet.

The ore at 150 feet depth was found of such grade as to admit of profitable treatment, and so far as the workings go, the grade holds the same. At the 200-foot level 600 feet of drifting and crosscutting have been done, disclosing an extensive body of ore. The property is expected to become a shipper as soon as the railroad reaches the Boundary valley. The outcrop of the ledge appears for 1100 feet. The foot wall is limestone and the hanging wall diabase. The three classes of ores are described by Mr. Keffer as follows: "Calcite carrying copper and iron pyrites, with some quartzite present; a silicate of lime, iron, magnesia and alumina, carrying both copper and iron pyrites; an excessively hard magnetic oxide of iron, with silica and copper pyrites." Practically all these ores carry gold, the calcitic and siliceous carrying small silver values. On the 200-foot level galena and zinc blende were found in the calcite gangue. The gold is carried chiefly in the iron pyrites; samples of copper pyrites contained no gold. One sample assayed 15% copper and $16 gold; while another mass of chalcopyrites, with no iron pyrites, assayed 28% copper and only $1.50 gold. Tests have been made which show that a large proportion of the low-grade ores may be concentrated to the saving of at least 95% of the gold contained therein. The company owning this property have decided to erect a smelting plant on Boundary creek.

In the Boundary country, generally, there are a dozen or more air compressors, having a combined capacity of 90 drills. It is estimated that the entire district can begin shipping as high as 600 to 800 tons of ore per day as soon as the railroad shall have been completed to Greenwood. The wages paid in the district are $3.50 per day for machine drillers, $3.50 for hand drillers, $3.00 for muckers, all shifts being eight hours.

The Granby Con. M. & S. Co. are erecting a smelter at Grand Forks and are well under way with the construction. It will be a matting plant.

The mines herein described are typical of the entire district and illustrate their general characteristics and the extent of developments. WASCOTT.

Greenwood, B. C., Sept. 12th, '99.

Concentration of Auriferous Sulphides in California.

Written for the MINING AND SCIENTIFIC PRESS.

The characteristic gold ores of California are highly siliceous, being in most part quartz, though gold also occurs in feldspar, calcite, and in altered igneous rocks and crystalline schists.

It is pre-eminently a free-gold region—that is, the ores are to a great extent free milling and the larger proportion of the gold is obtained by simple amalgamation. In the early history of mining in California no attempt was made to save the sulphide minerals occurring almost universally in these quartz ores, though in some cases the fact that they contained value was recognized, but having no economical means of separating the sulphides from the gangue nor any way to extract the gold if such concentration were made, nothing of consequence was done in the matter for years and millions of dollars were thus wasted, passing away with the tailings which frequently were swept down the canyons and lost forever. In a few instances the tailings were impounded behind restraining dams and reworked in more recent years with profit. Investigation and experiment has also demonstrated that the tailings contain a variable amount of free gold which has not been taken up by the quicksilver. In some instances this is due to the fact that the ore has not been reduced to a sufficiently fine state of division to release the particles of gold from its matrix and consequently not rendered subject to amalgamation. The loss is also due, in part, to a failure of the mercury to take up some fine particles of gold which had been liberated by crushing, but for which no good reason could be assigned.

Recognizing the constant loss of gold in these various ways, millmen and mechanics with inventive genius commenced to experiment on devices for saving these fine but valuable portions of the ore which were escaping. Many devices were tried and the greater number abandoned after a short trial. Old methods, such as bumping tables, shaking tables—rotary machines with vibratory or jerking motion, and an endless number of mechanical contrivances were employed, and out of them has been evolved the several types of concentrating machines now familiar, including the continuous belt machines, shaking tables, etc. Each of these machines has distinct merit and it seems largely a matter of personal preference among millmen when selecting from the numerous machines now in the market. Undoubtedly some of these machines work better on one class of material than on another, and a machine which does good work at one mine may fail to give satisfaction at another where the material to be handled is different.

In running concentrating machines much depends upon the man in charge of the adjustment and operation of the mechanism. Because he has made a success at one mine where the material was pure quartz with iron pyrite and gold, it does not necessarily follow that he can successfully run the same make of machine with the same grade, speed and quantity of water on an ore composed largely of soft schistose material with a larger percentage of sulphurets, which, owing to their crystalline structure, pulverize much finer than at the former place.

It is to this lack of appreciation of a change in conditions requiring a different application, and to the fact that usually no sizing is done, that concentrating machines have been condemned by some men, while receiving praise from others.

It was recognized that the mechanical concentrators would not save all the sulphurets. A machine which would save the coarser sulphides allowed the fine to escape, and one adjusted to save the finest slimes would not save the coarse. It is not to be expected, without sizing, that they would, but the millman of earlier days knowing no remedy, claimed that he was saving 99% and the tailings were valueless.

This state of affairs led to an attempt to save the finer slimes, which were known to be usually higher grade than the coarse material, by some auxiliary process. The outcome of these experiments is the canvas plant, which has come to be considered a necessary auxiliary to gold mills, not only in California, but in many other parts of the world.

The concentration of slimes on an inclined surface covered with canvas is extensively practiced in California, usually with good results, but with many modifications. Some think long, narrow tables are best suited to the requirements and others are of the opinion that broad, short inclines answer the purpose better. That there is any particular advantage in either type is not demonstrated. Some

strips are not more than 12 inches wide, though usually the narrow type of sluice is made of 22-inch canvas, of which an inch is covered on each edge by the binding cleat, making an exposed surface 20 inches wide and 30 to 60 feet in length. The general principle underlying the construction and operation of a slimes plant is to provide sufficient superficial area to treat the quantity of material which must pass over it, and the width and length must be determined with this fact in view.

To illustrate: A plant consisting of two strips, each 20 inches wide and 1000 feet long, would not accommodate the output of a 40-stamp mill, nominally about 100 tons daily; but forty strips of the same width, each 50 feet long, might be found to accomplish the desired concentration of the fine sulphides, amalgam and gold.

For the reasons already given, the size of a slimes plant cannot be arbitrarily fixed, for, having adopted a certain length and width of sluice, similar to one successfully operated at a given mine, a like arrangement at some other mine, where the character of the ore is different, might accomplish good work with a smaller area, while double the size may be required. In one instance all the material, after passing over a well arranged plant of good size, was found to still contain a large percentage of valuable but extremely fine sulphides, and another canvas-covered incline of equal area was constructed, on which the pulp was further concentrated at a profit.

The grade of the table also varies somewhat in the different plants; but, to accomplish good work, the tables must not be overloaded. The method employed is to conduct the pulp from the concentrating machines to a box which extends across the head of the canvas plant. This box is perforated with holes either in the bottom or in the lower portion of the side, which are provided with means for shutting off the flow. The number of holes varies with the width of the sluice. In some plants a diverging spreader is employed to secure uniform distribution over a wide sluice. The pulp is turned on to the inclined surface and permitted to run from thirty minutes to an hour, care being taken that the pulp does not bank up on the canvas. The length of time during which the pulp is allowed to flow is ascertained by testing the tailings leaving the lower end of the sluice. If experiments demonstrate that values are passing over inside of half an hour, the time must be shortened or the pulp must be passed over a second sluice.

At the end of a stated time the pulp is shut off from this sluice, and, to avoid overloading, an equal volume is turned over an extra sluice at the end of the series provided for this purpose. Clear water is run over the sluice until the sand is washed away, when under the clear water the canvas will be seen to have a bronze-colored metallic surface—the concentrated sulphides. An apron is then placed under the lower end of the sluice, to carry the sulphurets over the waste launder into one specially provided for the sulphides, by which they are conducted to the settling tank.

The sulphides are removed from the canvas either by sweeping with brooms while the clear water continues to run, or they are washed down by means of a flat-nozzled hose, with water under pressure. Where water is abundant, the latter is the preferable plan, as it saves the cost of brooms and the wear of canvas. Having removed the sulphides in the manner described, the clear water is shut off and the pulp again turned on to the table. The next section is cleaned in like manner, and so on across the entire series. Operations are so timed in a well regulated plant that by the time the workman has gone across the entire series it is time to clean up the first again. Where the size of the plant precludes this, two or more workmen are employed. The size of plants in California varies greatly. The amount of pulp passing daily over these plants ranges from 5 tons to 500 tons.

W. H. S.

(To be Continued.)

AT the annual meeting of the Iron and Steel Institute, held in Manchester, Eng., in August, a paper of interest was read by Prof. Wiborgh of Stockholm, on the use of finely divided ore obtained by concentrating process. By the introduction of magnetic and other methods of separation, the power of enriching iron ores by the removal of undesirable constituents has been greatly increased, and the waste in working in the case of magnetic minerals considerably diminished. The advantages were, however, largely qualified by the circumstance that the concentrate was usually obtained as a powder, which limited its utility; and, therefore, the question of how much material could be best applied was now becoming of importance. Prof. Wiborgh followed these general statements with the description of a furnace designed by himself for the conversion of pulverulent ores into spongy iron capable of replacing scrap in the open hearth furnace, and it was stated that the process had been tried with a certain amount of success.

BY authority of Act of Congress in 1875, the Government contracted with J. B. Eads, the noted engineer, to maintain for twenty years a channel through the south pass of the Mississippi river for $100,000 a year. By means of jetties, Mr. Eads cleared and maintained a channel 200 feet wide and 26 feet deep, with a central depth of 30 feet. It was also stipulated in the contract that for every day of failure to maintain the required depth and width the contractors were to extend their contract an equal time without extra compensation. The contract has now terminated, but there remains an accumulation of time, due to occasional or temporary failures of the system, equal to one year, when the contractor's estate will receive the final payment.

AT Marquette, Mich., an ordinary 35-foot lifeboat, fitted with a 12 H. P. gas engine, made satisfactory showing for the life saving service. During the drill of the life-savers the boat was rolled over and over, and showed that the presence of the engine in the airtight chamber in no way affected the ability of the boat to right itself. The engine kept running, no matter what position the boat was in. Up to this time lifeboats have had but sails and oars, and it is thought improved motive power will be of utility.

A Commemorative Scroll.

In the ebb and flow of the great tide of war a wave of patriotism swept over this west half of America that sent 10,000 men from the field, the forest and the mine to fight for the flag in the far-off Philippines. San Francisco sent a full regiment, and, glorying in their valor, has raised $60,000 to properly welcome the returning soldiers. A part of such welcome was the presentation, last Saturday, to each Californian of a scroll with an individual record. The committee to which was delegated the task invited competitive designs, and met with success, many meritorious creations being submitted. That of H. R. Hopps, of the California Art Glass Works, 105 Mission St., San Francisco, was selected—a notable distinction. Through the courtesy of Wm. Schroeder, president of the California Art Glass Works, a portrayal of the scroll, as designed by Mr. Hopps, is here presented. The stirring theme has received classic treatment. The stately march of the Roman soldiery when in triumph returning was timed to the resounding cry: "A cuspide corona" (a crown for a spear). This motto has been chosen for the scroll.



COMMEMORATIVE SCROLL PRESENTED TO RETURNING CALIFORNIA SOLDIERS.

To the left is the star-eyed angel of peace; behind her floats the flag that has never known defeat. In her right hand is a spear; in her left the crown she bestows. Scenes of strife by land and sea are grouped around this central figure. The Olympia, a California-built vessel, that carried Dewey and won the fight at Manila, is shown in the upper right-hand corner; the Oregon—another California-built battleship—that smashed Spain at Santiago, is portrayed in the lower left-hand corner. In the lower center is depicted the death of a California soldier, and the repulse of an attack upon an ammunition train. Below are the branching palms of the southern seas, and above the State seal of California.

In the past fifteen months 30,000 soldiers have marched past this office. Among them, rank and file, and officers of all grades, was a large percentage of miners, electricians and engineers, and when the returning flag rounded proudly into port with not a stripe torn nor a star missing, the pæans of triumph that hailed the victors were not too loud to wholly drown the low refrain of grief for the fallen, for in many a miner's home there is a vacant chair.

Meanwhile other States will warmly welcome their returning sons. California so does in the presentation of a bronze medal, and an appropriately engrossed scroll, as herewith depicted, the artistic design for which is deemed worthy of a place herein.

THE exports of tin from the Straits to China and India for the first six months of the present year were only 592 tons, while for the whole of 1898 they amounted to 2551 tons, and for 1897 and 1896 were 3214 tons and 6118 tons respectively, which goes to show that there has been a large falling off in production this year. Statistics published give the total visible supply, exclusive of America, as 12,552 tons, compared with 14,076 tons on the 1st ult., and against 17,855 tons in 1898 and 32,267 tons in 1897. The estimated stock in America is about 3000 tons, and the total afloat for the United States is 4010 tons. The shipments from the Straits during August totaled 3750 tons. The output of tin is not keeping pace with the demand, resulting in a higher price, which has not, as yet, seemed to stimulate production.

Not Universally Understood.

A proffer of $200 for a "write-up" of a mining property shows that the province and purpose of this paper are not wholly understood. The individual offering that amount for a notice of his mine cites the illustrated account of dredging operations in the Boise basin, Idaho, and the illustrated account of the Sumpter, Or., district, in the issues of Aug. 5th and Aug. 19th, as sufficiently illustrative to him that "that sort of thing is done right along," and, because his mine is "just as good as theirs," thinks it strange that his offer was courteously declined.

Several times through the years it has been thought in order to make a few remarks on this subject, and the present instance (not an isolated one, but the latest), affords the opportunity.

The policy of this paper is best exemplified in its proud boast that since its establishment in May, 1860, it has never yet taken a dollar to put anything in or keep anything out of its reading columns. If a statement is believed to be so, it goes in without charge; if it isn't, it stays out. There is no assumption of superiority of any kind in this: it is considered to be the correct principle—that's all. What other papers do or do not do is not pertinent. They do as they think best; so do we. If they are right, then we are wrong; but we have a right to be wrong. We simply do not put in paid "write-ups" of mines, or anything else, in the guise of "reading matter." Our reason is that it would not be fair or just to our subscribers. Thousands of men weekly read this paper; they have a right to belief in what they read: they have that belief: they know that, while this paper may be mistaken—sometimes is—yet it is honestly so, and that it is its honest intent to present all things fairly and truthfully, "unawed by influence or unbribed by gain." That some can not understand or will not believe that this paper does not take payment for such articles, has nothing to do with it. The fact does not depend upon their belief nor upon their ability or inability to understand the spirit that actuates the paper in such course.

Instead of taking pay for such articles, the thing is just the other way—those articles constitute one of our biggest items of expense. We pay for the article, instead of getting paid for it. In the cases cited, as in countless other similar instances, a trusted attache of the paper, conservative and experienced, secured the data, personally wrote the article, got the photos and sent the MSS. His only pay was his regular salary, which, with his traveling expenses, was all at the cost of the office. For instance, in last week's issue was an article on Republic district, Wash., written by one of our traveling correspondents who visited that camp at a special expense to this office of about $75, and who wrote from there the article that appeared on page 312 of the issue of Sept. 16th. That article is probably worth $10,000 to that camp; not a dollar was asked or received. Its value to the paper is the fact that our readers who know that the statement was unbought can rely on it as being a truthful and hence valuable account of existing conditions therein. All that this paper gets is the consciousness of affording anyone who reads what is believed to be correct accounts of interesting mining sections; valuable articles that attract attention to the regions of which they treat and thus prove of ultimate value to the mineral industrial development of this west half of America. That is what this paper is for; not to get a few miserable dollars for a paid "puff" of some locality or individual, but to convey to the mining world a correct portrayal of different sections.

When what is here written was stated to a man who recently made a similar proposition to that referred to in the opening lines of this article, his answer was: "I don't believe it. I think, if it were so, that that is a foolish idea. You might as well take the money; that article that you say cost you so much looks as if you were paid for putting it in. If it is so that you don't or won't take pay for such things, how the devil do you pay your way? What *are* your sources of revenue?"

His phrase might have been more silky, but there was no mistaking what he meant. He had no idea of being insulting; he simply didn't believe that any paper was run on such principles, and his words quoted above were simply his way of expressing such disbelief.

This paper has only two sources of revenue: it is sent postpaid to subscribers for $3 per year; single current numbers are 10 cents each; it sells space to advertisers for so much or so little per inch. That its subscribers are pleased with its course is shown by many unsolicited, weekly, laudatory letters from intelligent, discriminating men whose judgment is good and who admire our course; that its advertising space is in demand is shown by a look through our advertising columns, which are really the newsiest and most interesting part of the paper. Inasmuch as both readers and advertisers are satisfied and the publisher preserves his own self-respect, the paper can afford to ignore such occasional misunderstanding of its province and its purpose as is manifested by the circumstance referred to, and good humoredly notices the matter as illustrative of how mistaken men may be in judging motives and intent, and how different the point of view.



F. McM. STANTON, Houghton, Mich., Board of Managers.

REPORTS of mineral discoveries always create interest, but no discovery has the magic effect produced by the announcement of the discovery of gold. It electrifies men in every walk of life alike, which fact accounts for the cosmopolitan character of the population found in new mining camps.

Entertainment of the American Institute of Mining Engineers.

Arrangements for the entertainment of the American Institute of Mining Engineers while in California were taken up by local members of the Institute, who, acting as a committee, appointed an executive committee, of which W. C. Ralston is chairman and E. H. Benjamin general secretary. This committee includes representative mining men throughout the State, and in each county to be visited by the Institute the committee have made arrangements to receive and entertain the visitors. A reception committee has also been appointed, which includes H. T. Gage, Governor of California, J. D. Phelan, Mayor of San Francisco, and other prominent citizens.

The engravings on this page are those of Arthur Winslow, of Kansas City, Mo., and Frank McM. Stanton, of Houghton, Mich., members of the board of managers of the Institute, and W. C. Ralston and E H. Benjamin, who are the chairman and secretary, respectively, of the local executive committee.

The visitors will be met by the reception committee at Montague, Cal., on the 23rd inst. The first trip will be a visit to Shasta Springs. On the 24th the Keswick copper mines and smelters in Shasta county will be visited and in the evening a reception will be given the Institute by Northern California.

Production of Mines of Grass Valley and Nevada City, Cal.

TO THE EDITOR:—Although gold is widely distributed over the Sierra Nevada, in veins and placers, there are few regions in it which show such a concentration of valuable deposits within so narrowly circumscribed an area as occurs in the districts described below. The mines in the Grass Valley district have been and are especially productive. Next in production follows the Nevada City district, and the Banner Hill district comes third. Statistics for the first decade succeeding the discovery of gold in 1849 are very defective; but it is estimated that the mines in the three districts together have produced $120,000,000 up to the present time. Most of the production of early days came from the placer mines, which were often of extraordinary richness. Of late years the gold from Grass Valley is derived almost exclusively from the quartz mines, while in other districts the placer mines still contribute a small part of the product. Since 1889 the product of Nevada county has been regularly about $2,000,000 per year. Of this, from $1,100,000 to $1,500,000 comes from the areas of these special districts, including the Brunswick area and the smaller mines on Deadman's Flat. Grass Valley and vicinity leads with a production of from $1,000,000 to $1,250,000, while Nevada City and Banner Hill follow with from $400,000 to $800,000. The larger amount of the production from Grass Valley has come from a few prominent mines, such as Eureka-Idaho, Empire, North Star, Omaha, W. Y. O. D., Pennsylvania, Electric and Osborne Hill. In the vicinity of Nevada City the mines west of the town, namely, Providence, Champion, Merrifield, Home, Reward and Mt. Auburn, usually referred to as the "Creek mines," have yielded the largest quota.

JOHN C. ROBERTS.

Grass Valley, Cal., Sept. 21st, '99.



W. C. RALSTON, Oakland, Cal.



ARTHUR WINSLOW, Kansas City, Mo., Board of Managers.



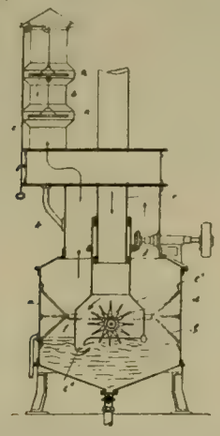
E. H. BENJAMIN, Oakland, Cal.

Latest Mining and Metallurgical Patents.

Patents Issued Sept. 12, 1899.

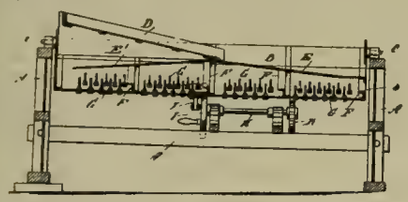
Specially Reported for the MINING AND SCIENTIFIC PRESS.

DUST ARRESTER. — No. 632,370; L. Rossler, Munich, Germany.



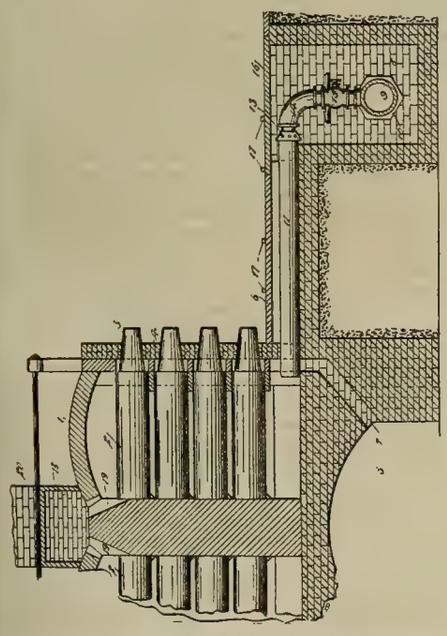
A dust-arresting apparatus comprising a liquid chamber, an inlet pipe having a revolving head in the chamber, a beak c^0 on the head, means for rotating the head, and an outlet pipe. A liquid chamber, an inlet pipe leading thereto, an outlet pipe having enlargements h having conical surfaces, and the plate i with means for raising and lowering the plate.

CONCENTRATOR.—No. 633,059; J. Woodham, Longbeach, Wash.



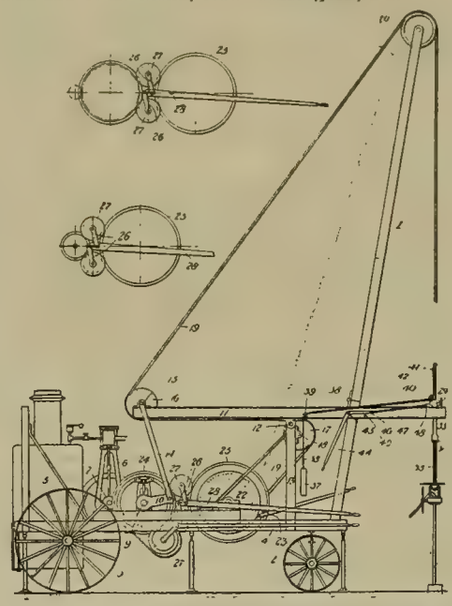
A concentrating device, comprising a semicylindrical trough journaled to oscillate upon its axis and having one end lower than the other and open, inclined aprons carried by the trough and extending from a central point downward toward each end, one apron discharging beyond the lower end and the other terminating short of the upper end of the trough, an inclined screen or grizzly carried by the trough above the upper apron and discharging at the center upon the lower apron, transverse undercut riffles within the trough, stirring pins projecting upward from the trough and means for oscillating the trough.

SMELTING FURNACE.—No. 633,035; J. V. Otten, Iola, Kansas.



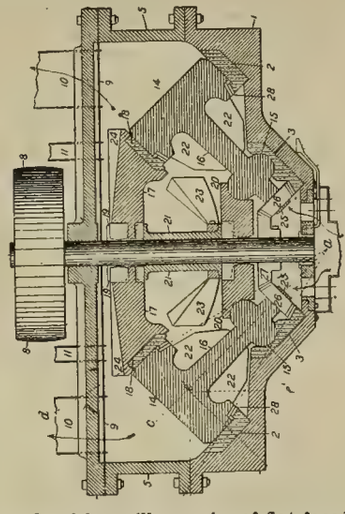
A smelting furnace provided with retorts arranged in pairs side by side and in tiers, one retort above the other, a main gas pipe, a controlling valve in gas pipe, burners communicating with gas pipe and extending into the interior of the furnace below the front ends of the retorts, and located in line between the retorts of each pair of tiers, the burners being provided with air inlets, and a flue extending along the upper portion of the furnace adjacent to the rear ends of the retorts and provided with flue openings located between adjacent pairs of tiers of retorts, the flue openings being located at the opposite side of the retorts to that at which the heat is applied. In a zinc smelting furnace, retorts arranged in the furnace in tiers, a flue at the upper part of the furnace and provided with openings located between adjacent pairs of tiers, gas burners extending into a chamber below the retorts and located in line between the retorts of each pair, the burners having shells at their outer ends provided with air inlets whereby the gas under pressure passing through burners will draw in the necessary air, a pipe for receiving gas under pressure, arranged in a subway and provided with a regulating valve, and pipes provided with valves and connecting the shells of the burners with the main gas receiving pipe.

PORTABLE DRILLING MACHINE.—No. 632,921; H. S Glenn and C. E. Glenn, New Kensington, Pa.



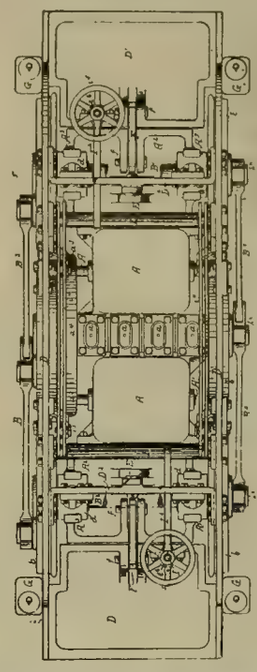
In a drilling apparatus, the combination of a main frame; an engine or motor carried thereby; a shaft 9 driven by motor and provided with friction wheel 24; windlass or dum 21 turning upon a shaft or axle in the main frame and provided with friction wheel 25; friction wheels 27 interposed between the friction wheels 24 and 25 and on opposite sides of a line drawn through their axes; and means for drawing the interposed wheels into the spaces between 24 and 25. The wheel 24 having V-shaped periphery; a drum or windlass 21 turning upon a shaft or axle in the main frame and provided with a wheel 25 having V-shaped periphery; friction wheels 27 interposed between wheels 24 and 25 on opposite sides of a line drawn through the axes of wheels, a peripherally grooved to receive the V-shaped edges of wheel; an operating lever 28 pivoted midway between the driving and driven wheels 24 and 25; and links 26 pivoted to the lever at each side of its fulcrum and serving to support and carry the friction wheels 27; the drilling apparatus provided with a double walking-beam and an adjustable tem per screw support mounted therein; temper screw reins pivotally mounted therein; and retracting springs adapted to separate the reins.

PULVERIZING MILL.—No. 632,721; F. G. Johnson, New York, N. Y.



In a pulverizing mill, a series of flat-faced rollers and a series of spheroidal rollers rigidly coupled together two by two by intervening shanks having 45° upward divergency from the horizontal plane and having a series of radial blades, the flat-faced rollers having an annular treadway and a motorplate fitted to revolve on and rotate the rollers and the spheroidal rollers having an annular channel treadway and a motorplate having an annular channel fitted to revolve on and rotate the spheroidal rollers, two motorplates being coupled together by clutch connection with an intervening sleeve having mounted thereon a fanwheel having a series of diagonally upward extending wings turned at right angles upon themselves, in combination with steel dies, a central motorshaft and a suitable inclosing case.

MINE LOCOMOTIVE.—No. 633,064; D. L. Barnes, Chicago, Ill., and W. P. Henszey, Philadelphia, Pa.



The combination in an electric locomotive, of the axles, an electric motor hung to one of the axles, its armature shaft being geared thereto, extensions on the motor, boxes adapted to the extensions and to the axle, a frame resting on the boxes and from which the free end of the motor is suspended. The combination in a mining locomotive, the central axle, wheels thereon, axles at each side of the central axle and having wheels, which are coupled to the central wheels, motors pivoted to the central axle and geared thereto, each motor having an extension, boxes adapted to extensions, platforms at each end of the locomotive and on a line with the motors and their extensions, curved frames secured to the platforms, springs mounted on the boxes and supporting the curved frames and the platforms and suspension rods extending from the frame to the motors.

ORE CONCENTRATOR.—No. 632,892; I. A. Cammett and F. E Shepard, Denver, Colo.



An ore concentrating table having riffles extending from end to end of the active surface of the tables, the riffles being reduced in height toward the foot end, and the reduction in height occurring along an oblique line or area from the feed side to the tailings side of the table and the riffles extending from the head end of the table increased in width toward the foot of the table. An ore concentrator table provided with a series of riffles which are each of a constant height for a portion of their length and of a constant but lower height for a portion of their foot ends.

Rand Deep Levels.

By JOHN YATES, Johannesburg, S. A. R.

NUMBER II—CONCLUDED.

Before proceeding further I should like to touch upon what we may see on these deeper levels regarding the relation of the number of shafts to the number of claims and stamps. The great expenditure, both capital and working costs, which these shafts will entail will compel us to keep their number down to the lowest possible. Now the number of shafts in undisturbed ground is influenced mainly by the requirements of the law, by ventilation, hoisting, underground tramming, the time taken by the men and boys to reach their working places, and capacity for development. The law permits of any property having but one shaft, provided that this is connected up with another, so that as all the deeper levels will ultimately be connected up on one or more of their boundaries they may have but one shaft. Let us see, therefore, whether one of these contemplated 5000-foot shafts is adequate for working (say) 1,000 claims and supplying 400 stamps. Take the 1,000 claims to be a rectangular block extending 11,900 feet horizontally to the dip (to the heat limit) and 5000 feet along the strike. The distance between this shaft and that of an adjoining property similarly laid out would be a little less than a mile, and the longest tramming and drive would be about half a mile. The ultimate length of the incline shaft would be 14,000 feet.

To supply 400 stamps each underground shift would have to number about 2000 men and boys. Allowing 70 cubic feet of air per man per minute and an air velocity in the down take section of the shaft of 1500 feet per minute, I find that a bratticed shaft 38 by 7 feet, inside timber, would serve both as downcast and upcast for the 140,000 cubic feet of air needed per minute. With large fans placed in the intake, both at the bottom of the vertical and at the stations on the incline, with an independent ventilation for each pair of levels by means of supplementary fans, and with a fan on the surface at the upcast, the maintaining through one shaft of an adequate supply of air even at the extreme southern boundary would appear quite feasible. Further, it must be remembered that the securing and maintaining of very liberal ore reserves for 400 stamps would not call for the incline shafts to be down more than 4000 feet below a level connecting the two shafts, and that by the time the full milling stage was reached, in about three and one-half years after cutting the reef, the two shafts would have levels connected (ten) to permit of a joint system of ventilation. The first level would be connected in twenty-seven months after cutting the reef, as against the ten to twelve months of some of the present deeps, and if we can carry on a one-shaft ventilation for the latter period, what difficulty is there in the way of extending it to the former time, more especially seeing that the ventilation will be a mechanical one, and that with fans, etc., there is no very great difference between ventilating a 2000-foot drive and one of half the length.

As showing what can be done in the way of mechanical ventilation, I would cite the St. Gothard tunnel. The length of this tunnel is nine miles, and according to *Engineering*, the number of trains passing through per twenty-four hours is over sixty, yet two fans 16 feet 5 inches diameter (running sixty-five revolutions per minute) placed at one end of the tunnel, were found sufficient to change a natural southern current of two meters per second into a northern one of .75 meter; the fans sent an ample supply of fresh air right through the nine miles of tunnel.

In the matter of development the width of the property influences the capacity of a shaft. Thus with the lateral boundaries 2500 feet distant from the shaft it would take twenty-seven months to connect, driving at the rate of 90 feet per month, and in this time the incline would be sunk 2700 feet at the rate of 100 feet per month. Taking the levels as being 150 feet apart, the number of those unconnected would be limited to eighteen, and the number of development machines to twice this, or thirty-six. Therefore for the development to keep pace with the 400 stamps it would necessitate each machine opening up only 1,700 tons per month, thus allowing an ample margin even on a 3 feet milling width.

I would point out that placing the shafts but 2500 feet apart—like those of the present Angelo Deep—instead of 5000 feet, does not increase the ultimate average monthly development capacity of the property, which is explained by the fact that development must wait on the incline shafts.

The underground trams, I have already pointed out, would have a maximum run to the shaft of about half a mile, a not excessive distance.

Coming now to the important matter of hoisting capacity, with the 38 by 7-foot shaft needed for ventilation, I find that, taking the 5000 feet vertical section first, if this is divided into five 7 by 7-foot compartments—four hoisting and one pumping compartment—that with four ten-ton skips (the same size as in the Red Jacket shaft of the Calumet and Hecla mine, as described by Mr. Seymour) and an average hoisting velocity of 2500 feet per minute, each pair of skips would raise 1400 tons per twelve hours, or 2800 tons (sufficient for 400 stamps, allowing for 30 per cent waste being sorted out) for the four compartments in the same time. By continuing this 37 by 7-foot shaft on the incline to the head limit, and having four winding stages, each of 3500 feet length with ten-ton skips and an average velocity of 1800 feet per minute, the hoisting capacity of the incline would equal that of the vertical, and it will be noticed that by having the skips and velocity stated the hoisting in both vertical and incline is really in duplicate; one pair of compartments could, if necessary, supply the 400 stamps by hoisting the whole twenty-four hours.

The preservation of the shaft timbers in these deep levels is a matter of vital importance, and arrangements should be made for keeping the timber thoroughly wet, this not only effectively preventing dry rot, but doing away with any possibility of fire. It is also advisable that the rising mains of the pumps, both in the vertical and in the incline shafts, should have branches for hose connections for special or emergency service.

In the ordinary course the night shifts would be available for repairing the shaft, and having bins of four days' capacity underground, and of the same capacity on surface, would tide over any stoppage of hoisting which might be reasonably expected.

Mr. Spengel appears to think that the capacity of inclines is very limited. Compared with verticals the speed attainable is less, but, nevertheless, the capacity is much as you make it, and is directly proportional to the velocity, the size of skip, and the number of stages introduced; if, for instance, you substitute two stages for one of similar velocity and size of skip, you double the capacity by really reducing the length of hoist to half the former distance. Thus by dividing a 14,000-foot level into four stages of 3500 feet each, the incline has the same capacity as a single stage of the latter length. With the hoisting system mentioned and four-deck cages in the vertical and coupled skips on the incline, carrying eighty men at a time, the whole shift could be put down in an hour, which is the time it would take to put a 200-stamp shift down the 6000 feet vertical shaft mentioned by Mr. Miller, using four-deck cages carrying thirty-six men. The nearer working places would be reached in a few minutes, and it is of interest to note that if one hour is allowed between shifts for the clearing of fumes, and a man is the last of his shift to descend and the first to ascend, he would still be able to put in seven hours' work on the remotest part of the property—a time quite sufficient for a fair machine man to put down four 5-foot to 6-foot holes in a stope. To put eighty men in a cage might be objected to by some as involving too many lives in any one catastrophe, but if such an argument is to be admitted we must also object to any steamship or train carrying more than (say) a dozen persons for the same reason. The objection applies as much in the one case as the other. Provided that the factor of safety of rope and winding engine is right—and 2½-inch diameter improved plow steel ropes have a safety factor of over eight: one with a ten-ton ore load to lift 5000 feet—there is no reasonable objection to sending down this number of men, or more, in one cage.

From these considerations it is apparent that there is much that might be urged in favor of working everything below 5000 feet vertical through shafts of this depth which do not need stage winding, allotting each shaft 1000 claims and 400 stamps, thus giving the property about twenty-three years milling life on the very moderate basis of a 3-foot milling width. Of course it is likely that there will be isolated cases where circumstances will make it advisable to have the deepest vertical shafts possible, say 7000 or 8000 feet, when, unless the present quality of ropes is improved upon, stage winding in the vertical will have to be resorted to, but even in these instances it is evident that if the heat and payable limit is going to be at 12,000 feet vertical, we will be confronted with the task of sinking and working long inclines merely a degree shorter than those I have been discussing.

So far I have not placed before you the financial aspect of the matter, but I will now review this, and will first take the working costs attending the two methods of winding Mr. Miller instances for the 6000 feet vertical shaft—one a direct hoist and the other a three-stage wind. The capacity of the shaft is taken as he gives it, viz., 1400 tons per day. I find that, with three stages instead of one, the extra cost for wages, stores and coal is about 7d per ton milled, and even allowing for renewing the more costly 6000-foot ropes every two years, there still remains a difference of over 5d per ton milled to speak in favor of a direct wind to this depth—a weighty argument, seeing that it is upon heat and the relation of working expenses to value of reef that the ultimate extent of the workings on this field will depend. The figures set before us in the paper show that the straight shaft is also somewhat less costly to sink and equip. Mr. Miller suggests that for an 8100-foot vertical shaft four-stage winding might be adopted. For this depth I would consider a two-stage wind equally practicable and far preferable on the score of simplicity and economy. It is noticeable that Mr. Seymour, at the last meeting, expressed himself as being favorable to longer stages than those mentioned by Mr. Miller. Coming now to the capital expenditure needed by the shafts of the future, I will take the hypothetical 1000 claims, measuring 5000 feet on the strike by 11,900 feet to the dip, and find how the expenditure is affected by working the whole of this area through a 5000-foot vertical and an incline, as against working it through two vertical shafts—one 5000 feet and the other 9000 feet deep, with inclines. With the first system we would have:

One vertical shaft 5000 feet deep, 38x7 feet inside timber, at say £42 per foot	£210,000
One incline shaft 14,000 feet long, 38x7 feet inside timber, at say £30 per foot	420,000
Total	£630,000

With the second system we have:

One vertical shaft 5000 feet deep, 26 feet by 5 feet 6 inches inside timber, at say £26 per foot	£130,000
One incline shaft 8000 feet long, 26 feet by 5 feet 6 inches inside timber, at say £20 per foot	160,000
One vertical shaft 9000 feet deep, 26 feet by 5 feet 6 inches inside timber, at say £32 per foot	288,000
One incline shaft 6000 feet long, 26 feet by 5 feet 6 inches inside timber, at say £23 per foot	138,000
Total	£716,000

These figures, which are necessarily very rough approximations, are exclusive of the surface and underground power installations and ropes, which would add materially to them, but would not, I think, greatly affect the difference shown. The magnitude of the figures is such as to arrest attention, but dividing the sum by the number of claims gives only about £700 per claim, which compares favorably with the £600 of some of the properties at present working. The enormous sums, however, which will have to be spent on the mines of the future to bring them to their full milling stage—sums of £800,000 to twice that amount—affords food for thought, and inclines one to ask whether it would not be advisable to keep a few capitalists on hand.

If, now, I take a case where the 1000 claims, measuring 5000 feet by 11,900 feet, are given two shafts instead of one, each consisting of a 5000-foot vertical and a 14,000-foot incline, I get:

Two 5000-foot verticals, 26 feet by 5 feet 6 inches inside timber, at say £26 per foot	£260,000
Two 14,000-foot inclines, 26 feet by 5 feet 6 inches inside timber, at say £22 per foot	616,000
Total	£876,000

the capital expenditure being thus increased £246,000, or £246 per claim, a figure which would be considerably augmented by the more expensive power installation needed by the two shafts as compared with the one. Further, the extra shaft would increase working costs by about 3d per ton milled for wages alone. To this would be added extra coal, stores and shaft maintenance.

I quite agree with Mr. Miller in thinking a recovery of 50s per ton would be satisfactory. I believe that developments will enable much less than this to yield a handsome profit. The certainty that the working of the 5000-foot deeps will result in improved mining methods and appliances being discovered is of itself a plea for the postponing for a time of work on deeper zones, and indirectly favors everything below 5000 feet being worked through the 5000-foot verticals. I would here point out that though Mr. Seymour indicated that stage winding in verticals would probably not be unknown on the deeper levels, he also gave it as his opinion that these levels are likely to be opened up and worked by the inclines of the adjoining northern deeps. Whether the saving effected by giving the block of 1000 claims mentioned one shaft only and one mill of 400 stamps is dearly purchased at the cost of the concentration of hoisting, longer headings, levels and shafts to ventilate, the longer underground tramming and the risk of trouble arising from disturbed ground and complicated workings, is a matter upon which there may be difference of opinion, but as this saving amounts in the case of substituting two shafts to over £700,000, and in the case of substituting four shafts (two of them lower deeps) to over £2,000,000 for capital expenditure and working costs connected with the sinking, equipping and working of the shafts—exclusive of interest—during the life of the mine, it is not a point for hasty decision. In these cases it is assumed that the 1000 claims are given one mill of 400 stamps. If, instead of this, two independent ones of 200 stamps each are erected, the capital expenditure per claim and the working costs will be still further increased. But if the magnitute of the interests at stake calls for an excess of caution in the laying out of the work, even at the expense of increased capital charges and working costs, then would not three 5000-foot shafts—one central one of 400-stamp capacity and two side ones each of 200-stamp capacity—placed about 3300 feet apart along the strike, quite suffice for two such properties as are mentioned (each with 400 stamps and 1000 claims) and fully meet the case?

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Mining Summary.

ALASKA.

Wm. McGillivray writes from Cape Nome that men refuse $15 per day, averaging more with rockers on the beach, where for twenty-two miles coarse gold is found at a depth of 3 to 5 feet below the surface.

Skaguay has incorporated her first mining company, under the laws of Washington, to work a molybdenite mine. The new corporation is the White Pass M. & D. Co., having a capital stock of $500,000. Its property consists of a lode of molybdenite 1 foot wide, discovered 1000 feet below the White Pass Railroad tunnel. The molybdenite is found in a mineralized ledge varying from 5 to 8 feet wide, which has been uncovered 800 feet, the ore assaying $53 73 in gold and silver. One of the agents of Vivian & Co., owners of the metal refinery at Swansea, Wales, was at Skaguay five weeks ago and is said to have offered to purchase all the molybdenite that could be delivered at Seattle for his firm, which led to the incorporation of the company.

ARIZONA.

GILA COUNTY.

The smelter at the Old Dominion mine is reported to be turning out 800,000 pounds of copper per month, at a cost of 9 cents per pound, indicating a monthly profit of $68,000.

Globe *Silver Belt*: The mines owned and operated by the Live Oak Copper Co. are seven miles west of Globe. The property has been developing for a year under the management of F. J. Kaldenberg, secretary of the company, and J. Kesser, Supt., and large bodies of sulphide ore are exposed. The company has been shipping to Silver City and El Paso for six months, and shipments will be increased. The two-compartment shaft is down 40 feet, and from 6 feet below the collar has been in 6% copper ore. It is the intention to continue sinking to 200 feet.——Higdon & Haverly, owners of the Black Copper mine, which adjoins the Black Warrior, have been shipping ore all summer. They are sending out two carloads a week.——The Eureka Copper Co. has large bodies of ore near the surface running 10% to 15%. The company will ship ore to Silver City.

YUMA COUNTY.

Yuma *Sun*: Prescott men will begin operations on a placer mining and irrigation scheme on Bill Williams Fork, in the northern part of this county. The stream will supply water for working the beds of gold-bearing gravel and irrigating land in the valleys below.——A. Modesti and F. Avila are making regular shipments of ore from their lead mines in Castle Dome district, twenty-two miles northeast of Gila City. The ore yields a net return of over $1100 per carload. The force of miners will be increased and a hoist will be placed at the main working shaft. There are three shafts on the property; 175 feet, 150 feet and 75 feet respectively. At 200 feet the shafts will be all connected. The ledge is 3 feet wide, almost solid galena. Two carloads a week are being shipped, which is to be increased to a carload per day.——C. L. Josselyn, owner of the Guiding Star group of gold and copper mines in the Copper Mountain district, has let a contract for 100 feet of work on a shaft now 115 feet deep.——The Mariquitta gold mine, eighteen miles southeast of Ehrenburg, owned by Mrs. J. Traves of Los Angeles, is bonded.

CALIFORNIA.

Amador.

A rich strike is reported from the Keystone mine, at Amador City, on the 800 level. This ore was found on the east wall, near which $60,000 was found last year.

Within the past year the Oneida mine, between Sutter Creek and Jackson, has shown great improvement. The main shaft is down to 1900 feet, and the drifts run on the vein at that and higher levels have opened large bodies of pay rock and it has been determined to build a 60-stamp mill. It is reported that the stock of the company will be increased for the purpose of making this improvement.

The new vertical shaft at the Wildman mine in Sutter Creek is sinking at the rate of 60 feet per month.

The mines in Pioneer district, on the East lode, are reported doing well. The ores are high grade and the formation granodiorite.

Sutter Creek *Record*: Sinking at the Lincoln mine is progressing. The shaft is down 1130 feet. The crosscut being run at the 500 level for the west vein is in 100 feet and is near the vein. A drift is also being run north on the east vein and is in 138 feet. This drift is in a mixture of mineralized quartz and slate. It is the intention of the company to install power drills. The first work will be done at the 1200 level, where drifts will be driven north and south on the vein.

Jackson *Republican*: The Vaughn & Kruger mine, south of the Amador Queen No. 1, owned by Champion & Whitford, is to be developed.——The new hoist at the old shaft at the Oneida mine, which is 700 yards from the new shaft, is finished, and unwatering of the old shaft is in progress. O. Reichling is the engineer at the new hoist.——At the Amador Queen No. 2 the tank at the 800 level is finished, and sinking resumed.——At the Central Eureka a station is being cut at the 1500 level. On the 1350 level the north drift is in 200 feet on the vein. Reservoirs are being cut at the 500, 900 and 1300 levels to catch up water. There are 100 tons of rich ore on the dump.

Jackson *Republican*: At the Amador Queen No. 2, near Jackson, rich ore has been found by Supt. Phillips.——At the Central Eureka, near Sutter Creek, a station is being cut at the 1500 level. It is estimated that there is $20,000 worth of ore on the dump, taken out since the clean-up at the Zella mill a few weeks ago.——The Hepburn G. M. Co., owner of the Bellwether mine, at Jackson, resumed work last Monday. Several men under Supt. W. A. Knapp's supervision are repairing the shaft preparatory to sinking.

Butte.

Oroville *Mercury*: At the Magalia mine work in the lower portion of the mine has been discontinued, pipe and tracks have been taken out, and that portion of the mine will be abandoned. Supt. Gassaway states that they had reached the limit of power, the face being 4500 feet from the bottom of the shaft. Mr. Gassaway says that the channel which was followed into the mountain from Little Butte creek, and which developed into the Perschbecker or Magalia mine, was a branch of the main channel. He is taking gravel from the main channel above the point of its intersection with this branch. The mine employs sixty men. The entire working of this mine was illustrated and described at great length and technical detail in the issues of the MINING AND SCIENTIFIC PRESS of April 8th and 15th, '99.——There is activity in gravel mining all over the Magalia ridge. The Bader mine is working steadily. It is reported that the Parry mine is to be opened on a large scale.——At the Big Butte quartz mine, near Nimshew, a 10-stamp mill is running.——There is some talk of the Princess mine being reopened.

Calaveras.

Work at the Ford mine at San Andreas is to be resumed. E. Kane is the foreman in charge. The water will be pumped out and work commenced on the 700 level.

It is reported that H. F. Voget, who has a placer mine on the Mokelumne river at Spanish Bar, three miles above Mokelumne Hill, has arranged with the Standard Electric Co. for electric power to operate his mine.

The new Gwin mill will be completed about Dec. 1st. The old mill will not be shut down, as has been locally reported. The new mill will not be started up until water power is available, as steam power is considered too expensive for hoisting ore. The development will be considerably extended in the meantime.

The Demarest mine, six miles south of San Andreas, has been transferred to G. E. Stickle for $80,400. It is understood he has San Francisco partners in this deal, which extends to 1901.

The Boston mine, two miles northeast of Mokelumne Hill, is to start up. Four hundred thousand dollars has been spent on this property and the shaft is down 1000 feet. It is owned in Boston.

It is reported that the Edna mine, three miles northeast of San Andreas, near Spring gulch, has been bonded to San Francisco parties, who are to begin work Nov. 1st, '99. This property has a shaft 165 feet deep and 1000 feet of drifts and tunnels. It has two veins, one 40 feet wide and another 116 feet wide. The latter is a dyke rock carrying auriferous iron sulphide, with the occurrence of quartz veins within the dyke.

The Paragon, on the Licking Fork, is working twenty men and keeping the 10-stamp mill in operation. Percy Shuman is the chief owner and Supt.

The Lockwood, three miles from West Point, is being pumped out, it is reported preparatory to resuming work.

San Andreas *Citizen*: In the Commodore mine, two miles north of San Andreas, which is being worked under a bond by W. H. Clary Jr., the ledge has been struck in the 180 level and is found to be wide and rich. The same ledge was struck on the upper level.

San Andreas *Prospect*: The hoist at the Big Bonanza mine, south of Angels, is near completion. Fires were started Wednesday and the new engine was given a trial. Sinking will commence, and the main shaft, down 400 feet, will be sunk 200 feet deeper before crosscutting. A mill is to be erected.

Del Norte.

Crescent City *Record*: Returns from the Selby Smelting Co. to operators of the Union copper mine on 21,540 pounds of ore netted $307.95. The ore assayed 19% copper.

Fresno.

Fresno *Republican*: To furnish water for the Coalinga oil fields, the Los Gatos & Oil City Water Co. has been organized. The incorporators are E. O. Miller of Visalia, G. L. Hoxie, J. A. Hanna, W. G. Holland and F. H. Short. The main supply of water will be from White creek. The reservoir will hold 100,000 gallons, which will supply all the well-boring rigs in the Coalinga district.

Inyo.

The final payment of $50,000 on the purchase price of the Ratcliff mines was made to H. C. Ratcliff, former owner of the property, by O. O. Howard Jr., president of the Ratcliff Consolidated Gold Mines, Limited, on the 12th inst. at Los Angeles. The company have recently completed a survey of all their claims and underground workings. The 10-stamp mill is being enlarged to twenty, and the 50-ton cyanide mill increased to 100 tons' daily capacity. The company is running five tunnels, the lower one of which is 800 feet (on the dip of the vein) below the upper, and is developing a large and promising ore body, the last sampling from which showed an average value of $11.60 on a width of 25 feet. The stopes above tunnel No. 1 were last week showing a breast of ore 40 feet in width which assays nearly $30 per ton. The nearest developed mine is at Randsburg, seventy-five miles distant, and there are no precedents to go by as to what the ore bodies will do in depth.

Kern.

Randsburg *Miner*: The Red Dog mill has been crushing ore from the Wedge and Reedly mines the past week. The Reedly ledge averages 3 feet in width and carries good value.——Goler is once more looking up, nearly one-quarter million dollars having been taken from its placer claims. When the Rand was discovered all the residents of that camp went there, and few returned to their former ground. Now there are fifteen men making wages at dry washing in lower Goler. A few days ago Mr. Baker picked up a nugget weighing $41.86. Rich quartz has been found in many places at upper Goler. A. Castro recently found quartz that will mill $60 to the ton. Goler gold is worth $17.60 an ounce.

A new 130 H. P. gasoline hoist has been placed at the new shaft of the Yellow Aster mine.

The Yellow Aster mine, at Randsburg, employs 168 men; wages are from $2.50 to $3.50 per day.

Bakersfield *Californian*: It is reported that C. Whitaker has struck oil on his claim on Cottonwood creek at a depth of 100 feet.

Los Angeles.

On the north ridge of the San Gabriel mountains, ten miles from Acton Station, are a number of gold mines, some of which have development. The veins carry free gold and auriferous iron sulphide. Though so situated that their operation should be successful, little is done with them, for the reason that the owners do not know how to treat the ores, which are not particularly refractory.

Madera.

On the O'Neal ranch and in the granite country of that section are numerous gold-bearing veins which afford encouraging prospects. Some of these mines have been developed superficially and others have considerable development. The Lilly mine, near O'Neals, is a notable example of the latter class. The quartz contains besides free gold, auriferous iron, lead, copper and zinc sulphides.

Mariposa.

Mgr. MacKenzie, the new grant manager, has his headquarters at Princeton, near Mariposa, and is hiring a large number of miners.

The Merced G. M. Co., F. Klepetko chairman, J. H. Vivian Sec'y, has increased the capital stock from 100,000 shares at $15 per share to 150,000 shares at $15 per share.

Mono.

Henry Trevathan recently finished crushing eighty tons of ore in a stamp mill in the Mono Diggings, near Bodie. He did all the work lone-handed.

Bridgeport *Chronicle*: At the Castle Peak mine, 12 miles south of Bridgeport, formerly the Dunderberg, the new tunnel is being pushed by Supt. Kirmeen, and several men have been put on this week. It is said a sawmill will be built for the use of the mine.

Nevada.

(Special Correspondence).—Clark & Brown are reported to have taken out $7000 from a pocket in the Old California ledge at Meadow Lake. Already prospectors are beginning to search for the precious metals and no doubt some will be successful, as there is plenty of good float, and some one will have the patience to trace it up.

The Orion No. 1 mine, near Old Man mountain, has rich streaks of ore going from $100 to $200 per ton in free gold, but it is not high-grade ore the owners are after, although the higher the grade the better. They realize that a large body of ore running $15 to $18 per ton is worth more than the small streaks of high-grade, and they are satisfied with the lower figures.

The Washington mine—being the old Pullman—has fine ore. Some of the decomposed rock is sprinkled with gold. It recalls to mind the ore that Felix Chappelet packed down to the Mohawk mill from there in the early days of the camp.

Meadow Lake, Sept. 17th, '99.

Grass Valley *Union*: Capt. J. W. Morrell of San Jose, Cal., will reopen the Hudson mine in Rough and Ready district, which he has bonded from the owners. San Francisco men are backing the enterprise. There is a stamp mill, hoisting and pumping plant on the property. It has produced between $25,000 and $30,000 to a depth of 184 feet.——The El Dorado mine, on the ranch of H. B. Nichols, has been bonded to a company, at the head of which is W. Goodwin, C. Wickes, T. Van Overhatton, and C. M. Brust. A tunnel 700 feet has been run. The ledge is small, but in places it has been rich.

Placer.

Auburn *Argus*: The new company controlling the Bellevue mine, Ophir district, is making a 36-foot water wheel to replace one of 18 feet. In the mine drifting is progressing on the 200 level. P. S. Lozano is Supt.——The California mine is west of the Bellevue and is owned by F. F. Pellow. Fifty thousand dollars was taken from rock milling $50 to the ton in early days. The property has five veins and a shaft 240 feet deep on the largest ledge.

Auburn *Herald*: At the Jupiter Consolidated the drift up the channel has run out of gravel. The drift down is still in gravel. For the month 120 ounces have been taken out in running the drifts.——W. E. Whitney is working the old Dixon mine at Deadwood.——It is reported that F. Chappelet, Sr., who has examined the Buckeye gravel, considers the lead a part of the old Mayflower channel.——The MacDonald Company have the old Dardanelles slope nearly pumped out.——At the Herman mine, near Last Chance, in the lower tunnel 300 feet below the old works, the ledge has been struck. It is 10 feet wide and runs $15 to $50 per ton. Dr. O. L. Barton is superintendent. The mine has paid well from the outset.

Colfax *Sentinel*: E. M. Armstrong, Supt. Oro and Mountain View mine near Iowa Hill, has bought a three-fourths interest in the Van Riper drift claim. The remaining one-fourth interest is retained by T. Gostlin.——The new mill at the mine of the Dutch Flat Blue Lead is running. A larger force will be put on in the mine as soon as the drifts and shafts can be put in shape.

Auburn *Leader*: The Gold Blossom mine, above Ophir, will resume work the first of October with a full force. J. E. Walsh will superintend.

Sacramento.

M. K. Miller is building a dam to turn the course of the American river to enable him to mine a portion of its bed.

San Diego.

The Pasadena mine is one mile north of the Cargo Muchacho mine and six miles east of Ogilby. The mine has been developed through tunnels and considerable rich ore extracted but little profit realized owing to the expensive manner of handling the material, which was shipped by wagon to the railroad, loose in wagons and thence to the old mill at El Rio, on the Colorado river. Had the ore been worked at the mine it should have paid a good profit. The property is not worked out, however, and under the improved conditions now obtaining in that district a much lower grade of ore will pay.

Shasta.

(Special Correspondence).—H. Oliphant & Son are developing six claims near Harrison gulch. They have three ledges that average 3 feet each and give assay values of 4% copper and $18 gold.

O. LaPlant is shipping ore from his mine near Copley. The ledge is 22 inches wide and the ore yields $16 gold and two ounces silver per ton. He is also shipping ore from a claim near Keswick that yields an average of $35 per ton.

At the Black Diamond copper mines, near Stillwater, extensive development is in progress. Sixty men are employed. This property is controlled by a company of Cologne, Germany, bankers.

Hunter & Fry are developing a group of copper claims near Copper City.

Near Shasta, J. Meier is developing fourteen claims. He makes occasional shipments of high-grade ore from one claim to the Selby Smelting Works.

Shasta, Sept. 18th, '99.

Shasta *Courier*: Engram & Davis are opening a mine south of Shasta, between Middle Creek and Gold Hill. The claim is on the Muchmore property. The ledge runs north and south, and is cut by a tunnel at 125 feet. The owners drifted south on the vein, taking out ore that runs $40 to $60 at the Keswick smelters. The face of the drift is in rich sulphurets. Much free gold can also be seen. Another vein of sulphurets, running north and south, was cut in driving the tunnel. Bunches of free gold quartz are often encountered.

Redding *Free Press*: A mine discovered by J. A. Wilson in the Afterthought country is named the Alta. Mr. Wilson has opened the ledge 20 feet and sunk on the pay. The vein dips at an angle of 45° and is 3 feet wide, carrying free gold all the way, in crystallized quartz, much of it forming beautiful specimens.

Sierra.

The Sierra County Miners' Association holds its annual meeting October 14th to elect officers for the ensuing year and select delegates to the State convention.

Isaac Copeland reports that the water has decreased 200 inches in the North Fork within the last three weeks, due to the extreme heat and hot winds.

E. Brown, representing Ross & Phelps, has taken a bond on the Last Change claim, owned by J. Nipp. The claim adjoins the Magnolia, and both will be worked under one management.

The Bald Mountain extension drift mine, consisting of 1300 acres, through which runs large gold-bearing ancient rivers, is reported bonded to English people. The property is between Downieville and Forest City, 6000 feet above sea level.

Siskiyou.

Yreka *Journal*: During the week M. Schuler of Scott Bar has taken contracts of purchase on the ground on which the town of Scott Bar is situated, and for two miles of river frontage above the town. Through this land runs three channels, reported to be rich. Of these channels, the one nearest Scott river is below the channel of that river. All these channels have been opened in many places and worked by drifts and tunnels, producing heavy, coarse gold.——The company working the Nehrbass ranch, adjoining the Blue Gravel mine, on Greenhorn, has shut down work temporarily, but will resume with a new company. The shaft is down 130 feet, and good prospects obtained. Machinery for pumping and hoisting is required.——The Sheba quartz mine, at Patterson creek, is to have new concentrators, compressed air outfit and other apparatus, which necessitates shutting down operations for a couple of months.——The mines lately located in the Gazelle district, on the headwaters of Willow and Squaw creeks, are attracting attention. The ledges are large.

Yreka *Journal*: Wetzel & Co. are in charge of the Greenhorn Blue Gravel mine, and are working a full force day and night. They will sink a new shaft.—— There is a boom in mining at the Mt. Sterling section of Cottonwood district, near the Oregon line. Rich quartz has been found on the summit of the mountain. At the base of the mountain good placer ground has been discovered and located. There is a scarcity of water at present.

Sonoma.

The prospect for petroleum in the neighborhood of Santa Rosa is to be investigated. It is claimed seepages of oil have been noticed in numerous wells in that part of the county.

Santa Rosa *Democrat*: The quicksilver mine at Cloverdale will soon be in operation again. There are thirty employes in the mine and the force will be increased to 100. A new boiler and other machinery are being put in.

Tulare.

It is reported that a large body of ore has been struck in the 400 level of a claim owned by B. Bailey and others near Visalia. Claims are being filed upon in the surrounding territory.

Tuolumne.

At the Star mine, on Rose creek, development work is being done. A steam plant is

to be placed at the mine, the water supply failing each summer in the past.

In July the Jumper mill ran twenty-three days, crushing 3500 tons of ore, yielding $27,500; from the Golden Rule, east vein, 810 tons of ore were crushed, yielding $4350 on a twenty-nine days' run with ten stamps; from the middle vein 700 tons of ore were crushed in a run of twenty-five days with ten stamps, yielding $1110. The profits for the month of June from these mines are stated to have been $15,720.

United States Marshal Shine has interested several wealthy Chinese merchants of San Francisco in the Republican mine at Jacksonville.

L. H. Bartlett and E. E. Houghton, of Boston, interested in the Draper mine, have recently visited that property, near Soulsbyville. G. F. Dyer is superintendent. A 10-stamp mill will be erected. A 4-foot vein has been uncovered at the bottom of the 300-foot shaft which is heavily sulphureted with free gold in sight.

There are 175 men at work on the Sierra Railroad branch from Jamestown to Angels, near Tuttletown. On the main line track laying has progressed beyond Sonora to within a mile and a half of the Black Oak mine, near Soulsbyville.

Five hundred men have been laid off the past ten days by the mining companies in this county on account of the Tuolumne Water Co.'s supply failing as usual at this time. The Jumper Co. has laid off 145, the Consolidated 130 and the Eagle Shawmut 100. These companies still retain small forces developing new ground, but many of the smaller mines have closed entirely. The electric power company has closed down its plant, and Sonora, Jamestown, Quartz and Stent use coal-oil lamps.

Sonora *Union-Democrat*: Machines in the Republican mine at Jacksonville were stopped Monday and sinking continued by hand drilling, owing to a lack of water to drive the compressors. The shaft is down 350 feet.——The Providence mill, near Carters, which is operated by steam, keeps ten stamps working at night by securing water for the battery from the Grizzly, the mill of which crushes during the day time. ——At the Grizzly the main shaft has passed 600 feet, and sinking is continued by hand, the compressor closing down so that the entire water supply could be used to drive five stamps of the mill. In the bottom of the shaft and in the south drift at the 600-foot level there is a vein 3 to 4 feet wide carrying free gold.

COLORADO.

BOULDER COUNTY.

The Crystal Dream mine near Glenwood, Ward district, has opened a vein of free milling ore, and the shaft will be sunk 150 feet. The ore averages $150 to the ton from the surface. L. G. Orr is Supt.

The Venture Corporation of London has paid $10,000 on the $45,000 for the Kekionga mine of Magnolia. The mine is to be developed.

The upraise to connect the workings of the San Blas, Ward district, with the surface has been completed. It will now be the main working shaft, and a shaft house will be erected and a steam hoist installed.

The Baltimore on Ni Wot hill, Ward district, is being equipped with a new shaft house, steam hoist and a boiler. Everything will be in running order in two weeks.

CLEAR CREEK COUNTY.

Silver Plume *Standard*: During August there were shipped from Silver Plume 105 cars of ore, an increase of 37 cars over the month of July.——The Bellvue-Hudson people have struck rich ore near the junction of the lower crosscut tunnel and the vein. The ore runs 1700 ounces in silver and four to five ounces in gold per ton.

CHAFFEE COUNTY.

The Mary Murphy mine of Buena Vista district, once a silver producer, has opened a body of gold ore. The gold values are now in excess of the silver.

On the eastern slope of the range in Chaffee county several claims located the past season have opened into good ore bodies.

Near Winfield, the Tasmania M. & M. Co. is erecting a pyritic smelter, and expects to have it blown in within thirty days. It will have a capacity of forty tons per day. The smelter will be employed mostly on ores of the company from the Tasmania, Barracouta and the Silverdale group, where there are large bodies of sulphides.

Munroe & Henderson are working a group in Mystery gulch and another on Hope mountain. In the latter is a 4-foot vein of copper and iron sulphides carrying galena. It runs $20 a ton.

GILPIN COUNTY.

The Gunnell G. M. & M. Co. has let a contract for 500 feet of flume to connect with the upper Fullerton mill above Black Hawk. The company is preparing to put its thirty-three slow-drop stamps in operation.

The August shipments from Black Hawk amounted to 380 cars of concentrates and smelting ore, 6840 tons in all.

The Topeka mine will be equipped with new machinery and increase its working force.

At the Enterprise mine on Yankee hill the smelting ore runs $50 to the ton and the mill dirt six ounces to the cord.

Central City *Register-Call*: In cutting a station for a pump at a depth of 425 feet, west of the shaft in the West Notaway mine, a shoot of ore has been discovered.——During the month of August there were shipped from the Cook mine, on Bobtail hill, 4303 tons of mill ore, which produced 95 tons of smelting ore, besides concentrates, showing an increase over the previous month of 828 tons. It shows a daily average shipment of 141 tons. The Cook property is the heaviest shipper in the county, a position to which it has been worked by slow degrees by Mgr. Colvin.

GUNNISON COUNTY.

The Maid of Athens mine, in Mineral Farm Basin, near Tin Cup, which last year made an output of $25,000 worth of ore from grass root shafts, now has ore which averages $25 a ton, smelting returns, in silver and gold. The vein is 7 to 24 feet wide, all ore. Seams of galena occur, carrying 600 to 1300 ounces of silver and 60% lead. The ore shoot has been opened on the apex of the vein along its strike at intervals for a distance of 200 feet. The vein is in porphyry, lime and black shales and is nearly perpendicular.

HINSDALE COUNTY.

The Climax mine on Henson creek has opened into a body of gray copper ore, which is being drifted upon.

LAKE COUNTY.

The A Y & Minnie, operated under lease by Newton & Douglas, is now making an output of 150 tons per day.

The Fanny Rawlings mine of Leadville has produced $200,000 from November, 1898, to April 1, 1899, and paid $20,000 in dividends from the royalties on ore production. The leases expire December 31, when the company will install machinery and deepen the shaft 200 feet.

Leadville *Chronicle*: A discovery of lead ore has been made in a new shaft sunk on the Stone claim, on Rock hill, by F. Peterson and partner. Peterson has a sub-lease from the Vivian M. Co., and the shaft was down 72 feet when a big body of lead was uncovered. The remarkable feature of the find is the large quantity of crystallized cerussite. Two or three bins have been filled with this, besides large quantities of ordinary lead ore. The bin samples average 35% lead, with some silver and an excess of iron. Deposits of cerussite are of frequent occurrence on Rock hill, but this is one of the first discoveries of cerussite made in Leadville in commercially valuable quantities. Heretofore the pieces which have been discovered have found their way to specimen cases.——The Nubian M. Co. is preparing to do development work, and a new surface plant is being erected by Mgr. Schlessinger. The Nubian Co. has leased the Glass-Pendery, Midland and Hidden Treasure lodes and will sink a new shaft.

MINERAL COUNTY.

Creede *Candle*: For the week past the ore shipments from Creede were 3480 tons.——Supt. Rowley of the United mines has retimbered the old shaft down 100 feet.——M. King says by March 1st he will have completed his contract on the Nelson tunnel, when the tunnel will be 10,000 feet long. The Big Kanawah Co. will continue the tunnel to the United mines.——Bachelor No. 1 is working a larger force than at any time during the year, and the property is producing more ore than at any time during the lease. The ore found several weeks back has proven to be continuous.

OURAY COUNTY.

Ouray *Herald*: The Treasury Tunnel & Reduction Co. is composed of Pittsburg capitalists, who have a group of claims in Red Mountain district, 10,500 feet above sea level. They have run a tunnel in a westerly direction to intersect the veins running from Marshal and Virginius basins. Air drills will be put in and the force increased. It is the intention to drive the tunnel 8000 feet. Forty men are employed under Supt. Wihnnerah.

PUEBLO COUNTY.

The Philadelphia Smelting & Refining Co. has been operating since June 14 on an eight-hour basis, the announcement having been made on that date that eight hours for furnace men would be the rule during the hot months; but it is the opinion of Mr. Guggenheim that the men will elect to work twelve hours at the scale of 1893—an advance of 10% on the scale prior to the strike. This is the same scale that is paid by the other valley smelters.

SAN MIGUEL COUNTY.

The Cimarron mine lost by fire last week the compressor plant, engine house, bunk and boarding houses; loss estimated at $20,000.

The Smuggler-Union mine, near Telluride, is putting new concentrating machinery in the mill.

Ophir *Mail*: Forty-two cars of ore were sent to the smelter from Ophir during August.——C. Enderich, owner of the May Queen group, has completed his work on the group. H. G. Gilkerson has surveyed the claims. This group is compact, and several of the veins show good values in gold and silver.——The vein struck two weeks ago by Brewster and Hathaway on the Little Eva group was found by drifting, and was unexpected. The vein carries gold, silver and iron. The ore will be concentrated at the Ilium mill. The tunnel has been driven over 700 feet.——The Lookout tunnel is in 600 feet, and near the vein. This is the second tunnel run by A. Easterday, the owner, the former one being above 600 feet.

SAN JUAN COUNTY.

A rich copper discovery is reported from Sinbad, northeast of the La Sal peaks, near the Colorado line.——J. H. Clark has doubled the force on his tunnel at Gold basin.——The La Sal M. Co. at Paradox will resume operations this mouth. An air compressor has been put in. The company has also secured copper properties near Geyser pass.

Silverton *Standard*: Three thousand tons of ore and concentrates are shipped out of Silverton to the smelters each month.——The Red & Bonita tungsten mine has the largest vein containing that mineral yet found in that part of the country. From two surface diggings there has been mined three cars of ore that will concentrate five into one.——F. Jones has completed a survey for two mill sites and a tram for the Tom Moore mine. One of the sites is below the mine and the other above the town of Eureka. The latter, being the most desirable, was selected, and a mill will at once be erected and a pipe line laid.——The American Mining & Tunnel Co. will build a mill near the Gold King plant in Gladstone. The tunnel driven by this company in Bonita gulch is in 700 feet and nearing the A. P. Hill vein, for which the crosscut was started. In the tunnel four veins of ore have been cut, not previously known to exist, one of which is 14 feet across and said to be good milling ore. The other three veins vary from 12 to 18 inches and are better grade.

SUMMIT COUNTY.

The shipments of ore from the Park City mines the past week were:

	Tons.
Silver King, crude	700
Daly West	490
Ontario	487
Apex	37
Valeo	19
Total	1,033

A diamond drill is to be set up to prospect the formation in Cucumber gulch (the Spaulding district) under the supervision of F. C. Alsdorf of Telluride.

At the Ontario mine the force is being increased. At the mill the rebuilding of the furnace is being hurried, and at the Marsac mill 100 tons of tailings are being run daily.

Breckenridge *Journal*: After a shut down of a year the Jessie mill in Gold Run is again in operation. The North American Gold Dredging Co. are working the property under bond and lease.

TELLER COUNTY.

Victor *Record*: A discovery has been made on the surface of the Hoosier Boy on the south slope of Beacon hill. A vein, thought to be the extension of the Black Belle lead, has been cut and traced a distance of 700 feet through Hoosier Boy ground. Two assays gave 3 58 and .86 ounces respectively. The first across 18 inches and the lower returns on 3 feet of the lead. Samples taken at a depth of 18 feet across 2 feet of mineral went 3.30 ounces gold and 3.70 ounces silver to the ton. ——Crosscutting 400 feet from surface in that portion of the Gold King owned by the International G. M. Co., Supt. Sherburne has cut the vein first opened in the upper workings. He reports 18 inches to 2 feet of pay, which assays $80 to the ton.

Cripple Creek *Times*: At the Walker lease on Vindicator shaft No. 8, Cripple Creek, last Saturday, the explosion of six sticks of powder in the shaft house wrecked the building. Much of the flying debris fell over and into the shaft. The powder had been placed in the shaft house by the shift coming off duty in the morning, and was lying on sacked ore a few feet from the engineer. At 3 o'clock he left the room, when the powder exploded. The explosion was supposed to have been caused by the powder getting warm, causing the glycerine to run.

IDAHO.

BOISE COUNTY

A mining deal has been made on nine claims located on Clear creek, on Miller mountain. The claims were sold by L. M. Johnson and H. Sommercamp of Weiser to E. G. Hathaway, for $46,000. Ten per cent has been paid. During the winter the purchaser, according to the agreement, is to expend $5000 in development. The ledges are from 20 to 30 feet wide and gold is visible in many places. Assays show from $6 to $75 per ton.

BLAINE COUNTY.

Mining about Hailey is reported in good condition. A number of investors have been there recently. The Black Cinder mine is being opened by Mr. McClure, who promoted the Granite mountain, Montana, property in St. Louis. It is reported large bodies of ore have been opened, while pockets are found that run several thousand dollars to the ton.

The Croesus is being worked and is shipping high-grade ore.

IDAHO COUNTY.

Coston Bros. recently made a rich find in Buffalo Hump, the ore carrying more free gold than any yet exposed in the camp. S. Irwin has made a strike south of the Jumbo. Other discoveries have been made during the past month by Colorado parties.

It is reported coal has been discovered on Rapid river by prospectors near Pollock mountain.

SHOSHONE COUNTY.

The Panhandle M. Co. is a new corporation formed to operate the Panhandle group of six claims in Nine Mile gulch, three miles from Wallace. The company's office will be in Wardner, and its officers are: Pres., A. Burch, Supt. Bunker Hill & Sullivan; Sec'y, C. H. Wentz; Treas., G. W. Harris. The company is stocked for 1,000,000 shares of a par value of 10 cents. The development consists of a tunnel in 800 feet with a winze sunk 60 feet which is 360 feet from the tunnel mouth. The vein shows $12 silver and 40% lead. There are four crosscuts off the main tunnel and a raise started in solid ore. The vein is 5 feet wide with neither wall showing. Shipping will begin within sixty days.

MISSOURI.

JASPER COUNTY.

The sale of zinc ore in Joplin district the last two weeks has not been as active as usual, owing to the war between the smelter men and the Zinc Miners' Association. The smelter men claim that the schedule price set by the association a few weeks ago, which price should remain for six months, is an advance over what they can afford to pay for the ore at present prices of spelter. In order to break the association schedule they reported they should seek other fields for their ore. By reducing the purchase of the ore the smelter men hope to create a surplus of zinc ore in the mines, and a scarcity of spelter, with the hope of reducing the price of one and increasing the price of the other. The zinc miners, however, have shut off their night shifts, only working half time, and have not produced a surplus. The facts are the smelters have no ore on hand, and there is very little ore in the bins at the mines.

MONTANA.

LEWIS AND CLARKE COUNTY.

A rich strike is reported in the property of the Standard Mining Co., near the Drum Lummon, at Marysville.

MADISON COUNTY.

Butte *Inter Mountain*: At Rochester F. R. Merk has sold the Watseka mine for $40,000 cash to Butte and Salt Lake capitalists, C. H. Hand of Butte negotiating the deal. The Watseka is one of the old-time producers of Madison county. Water was encountered with depth to such an extent that the pumping machinery was inadequate to handle it, and work was abandoned. Hoge, McCune and others took the property a year ago, and have been sinking a new shaft, which work has been seriously handicapped by water.

SILVER BOW COUNTY.

Last week the uncovering of a rich lead in digging the foundation for a new building at Butte was reported. An effort was made to have the building stopped, but it has been decided to sink the shaft elsewhere. The site has been purchased and mining will commence. The company recently incorporated in Spokane under the name of the Smokehouse Copper M. Co. owns the lead. This company owns nearly all the big leads under the business portion of Butte and is going to explore them.

At the Anaconda mine the boiler plant is to be replaced by a new one, consisting of six marine boilers. They will be of 200-H. P. each, with a pressure of 170 pounds. The gain in power will be over 50%. In place of the smokestacks being torn out there will be a single self-supporting steel stack. It will be 125 feet high. Over the boilers a new steel building will be erected which will be 110x53 feet. The ropehouse has also been enlarged. About 5000 feet of cable are used, 7 inches wide and half an inch thick.

At the lower works of the Anaconda smelter a new matte furnace is being put in, 42 feet 8 inches interior length, 17 feet 4 inches exterior width. Eighteen cars can be put in a single charge and 150 tons of ore per day can be smelted. This is the third and largest put in this year.

NEVADA.

ELKO COUNTY.

Tuscarora *Times-Review*: The new hoisting works at the Young America's new shaft is near completion. The shaft is down 175 feet and sinking. Several small veins have been cut in sinking, but the main ledge is still below.

EUREKA COUNTY.

A rich strike is reported on Adams hill near Eureka, the ore running $130 in gold and about $70 in silver.

Nearly all the ores in Eureka district contain gold. The ores have never been worked extensively except by smelting, and those running less than $40 a ton in precious metals and 18% to 30% lead could not be made to pay by that process.

LYON COUNTY.

Lyon County *Times*: J. H. Rae and G. W. Bennetts have bonded their copper location to John and J. H. Gregory, of Gibson City, Ill., for $10,000. The mine was formerly owned and worked by the Birdsall Co.

Carson *Appeal*: A plant is to be established at the Morgan mill to work the gypsum deposit near the Mound House. Twenty tons of the raw material is awaiting shipment to San Francisco, where the process by which it is to be converted into plaster of paris will be tested.

STOREY COUNTY.

Since the reinstallation of elevator No. 2, which was taken out for repairs recently, the water has gone down rapidly in the C. & C. shaft of the Comstock. The official telegram of the manager to San Francisco is as follows:

VIRGINIA, NEV., Sept. 21, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 84 feet 2 inches below the 1950-foot level station. No. 2 elevator has been running continuously. JOS. R. RYAN.

Andrew Charles has found a vein of high-grade copper ore on Cedar hill on ground claimed by the Sierra Nevada M. Co., at Virginia City. Supt. Kyle notified Charles that he was trespassing on the ground of that company, but Charles claims that the ground he is working on was formerly known as the Phil Sheridan.

WASHOE COUNTY.

Reno *Journal*: Several weeks ago, C. D. Burton, L. H. Williams, Capt. Mills and W. G. Caffrey discovered a large cropping seven miles southeast of Reno, that stands 30 feet out of the ground and is 70 feet wide. Assays return $10 a ton in gold. The footwall was also tested in a number of places, and found to carry $1.04 on an average in gold. The hanging wall is limestone. Six claims are located, and the group has been named the Rattlesnake.

WHITE PINE COUNTY.

At Ely the Chainman, Robust and Huntington mills are all running and making money.

New York parties have bought nine copper mines near Ely, and Mr. Bray of Austin has gone with men to commence work.

NEW MEXICO.

BERNALIELO COUNTY.

Santa Fe *New Mexican*: The Lone Star group of mines at Bland has been bought by the Cochiti G. M. Co., owner of the Albemarle. Some time ago O. P. Posey bought from C. Greenwood one-third interest in this property, and the other two-thirds, owned by H. M. McFarlane, of Chicago, has been purchased. The price paid for the two-thirds is said to be $150,000. It is located on the west side of

Pino canon. It has 2000 feet of development. The vein is 25 or 30 feet wide on the surface, and 40 to 93 feet in the lower level. The site for a mill has been selected. The mill will be operated by electric power generated at the company's plant at Madrid.

SANTA FE COUNTY.

Laswell & Walker, prospectors, have bonded their mine near Bear mountain for $30,000. The mine contains corundum and vesuvianite, and it is the intention of the persons holding it to erect a factory thereon for the manufacture of sandpaper.

OREGON.

BAKER COUNTY.

The Bauzette mine, in the Red Boy district, which was lately sold by J. M. Burke of Spokane to Southern capitalists, has been incorporated with H. B. Brannon of Knoxville, Tenn., president; C. J. Johns, vice-president, and H. Armstrong, secretary and treasurer.

Baker City *Republican*: F Clark has bought a half interest in the Humboldt mine from J. C. Martin. The price was not stated. The Humboldt adjoins the Virginia in the Robinsonville district, the ore assaying high. Mrs. Gardner of Baker City owns the other half interest in the mine.

JACKSON COUNTY.

The formalities of the sale of the Ashland mine to the Ontario & Oregon Gold Mines, Ltd., show the consideration to have been $125,000.

UNION COUNTY.

Allen and Younger have struck a rich ore shoot in their claim, the Bonny Blue, three miles south of Sparta on the Powder river slope. It is developed by 180 feet of tunnel and 80-foot vertical shaft. At the bottom of the shaft ore was found, from which $20 in gold to the pan was taken. In conjunction with the rich streak a 2-foot ledge of sulphuretted ore has been found which assays well. The lower tunnel is being driven to tap it.

SOUTH DAKOTA.

LAWBENCE COUNTY.

The Golden Summit mine at Lead City is taking out high-grade wolframite.

At the Durango mine in Lead City the owners are working the old dumps for wolframite and have a large quantity on hand awaiting shipment. The dumps are also being worked for gold, the ore carrying that metal.

Otto Grautz has made a discovery of wolfram rich in gold on the divide between Lead City and Terraville, near the Highland mine of the Homestake group.

TENNESSEE.

POLK COUNTY.

Miners at the Ducktown copper mines are rioting. The men who struck in the Mary mine last week have been joined by union miners from the Carterstown, Isabella and Hiawasse mines. These mines are all owned by the Ducktown Copper & Sulphur Co. A heavy force of guards, armed with Winchesters, are patrolling the property. The mines are all shut down. The strike grew out of the company's refusal to employ union men, and the discharge of men who had joined the federation.

UTAH.

Salt Lake *Tribune*: The records of strikes and dividends from Utah mines this year surpass all prior records in this regard. The investment of Eastern money in Utah mines this year is greater than the aggregate for a decade past. The gold product of Utah mines has gone forward this year by bounds, and already surpasses the gold product of any former entire year. Strikes are of almost daily occurrence, and many of them are of importance. Increased activity throughout the State will show an output in 1899 which will surpass all previous records. This increase will be largely in gold and copper.

JUAB COUNTY.

Mgr. J. T. Hodson of the Tesora at Silver City reports a 4-foot vein of copper ore exposed in the west drift of the 250-foot level of the Tesora. The ore resembles the high-grade copper ore at Bingham. Assays show 45% copper, thirty-one ounces silver and $4.10 in gold.

E. W. Lambkin of Kansas City, Mo., and others are reported negotiating for the properties of the St. Joe M. Co., embracing a dozen claims on the east slope of the mountain and adjoining the Old Telegraph, of the United States Co.

The Utah Con., Sioux Con. and Mammoth No. 2 properties, at Tintic, are to be reopened under direction of D. B. Gillies, former superintendent of the Parrot mines, as general superintendent, with Robt. Grant as general manager.

SALT LAKE COUNTY.

(Special Correspondence).—The New Mammoth cyanide mill at Bingham has started up.

The Bingham Copper & Gold M. Co. are developing the copper-iron ledges of their property in Bingham canyon, which were formerly worked for oxidized ores. The copper-iron sulphide vein is wide and extensively opened. A crosscut tunnel is being run from Bailey gulch, which will cut the vein at 500 feet depth. Col. Heffron states that work will begin soon on a pyritic smelter.

Bingham, Sept. 16th, '99.

The United States M. Co., which recently purchased the Centennial-Eureka in Tintic district for $2,100,000, on a basis of 30,000 shares at $70, has organized a new corporation with 200,000 shares, of which one-half goes to pay for the mine and the balance is placed in the treasury. The 100,000 shares are placed on the market at $25 per share. In consideration of the magnitude of the enterprise and the fact that the purchasers, in addition to the large sum paid for the property, have expended $140,000 in improvements, etc., the price at which the mine is floated is very reasonable, as the owners of this stock will participate in the treasury stock also.

TOOELE COUNTY.

(Special Correspondence). — The Kismet mine, on West Dip, recently put in a hoisting plant, and are sinking from the 400-foot level. Considerable drifting has also been done on the 300 and 400 levels.

The Omaha development continues from a 400-foot shaft. J. B. Williams is now Supt.

In La Cigale lower workings a great deal of talc has been encountered, necessitating additional roasters in the mill. About thirty-two tons of ore per day are being run from the upper levels, which do not require roasting. This property has an 860-foot incline, from which there are 1000 feet of drifts on the fourth level. There are two additional shafts 500 and 400 feet deep, respectively. In the main workings there are raises connecting levels every 100 feet along drifts.

The Daisy mill is being enlarged to 180 tons capacity, by the addition of four leaching tanks. A. Murphy is Supt.

Adjoining the Daisy is the Helvetia group, belonging to a French company, whose interests are in charge of J. D. Spargo. From their 700-foot shaft there are 1000 feet of drifting. The plans are to develop by blocking out the ore before erecting a mill.

Three new furnaces now being put in at the Golden Gate mill, making nine, will increase the mill's capacity to 1000 tons per day. New rolls are also being added. The refining department, which was for some time closed down, has resumed work, turning out fine copper bullion.

The Sacramento is mining and cyaniding 150 tons of ore per day. The cars convey the ore from mine to mill by gravity.

The Mercur mill, now treating 400 tons of ore per day, will soon have its capacity increased to 600 tons.

A new electrically-operated air compressor has been put in at the Mercur mine, the hoisting and drill work being done by compressed air. In the mine there has recently been found a small stratum of base ore, which will require roasting, but for the present the management has decided to defer putting in roasters at the mill on this account. In the lower workings still larger bodies of oxidized ore were recently opened. The 650-foot incline shaft goes through three ledges — the first near the surface, the second 40 feet lower, and the third 100 feet lower than the second. The Lulu, between the Mercur and Sacramento, also belongs to the Mercur company, and treasurer Geo. Dern states that it is now a shipper of high-grade ore, much of it running $30 per ton.

The Little Pittsburg, situate in the Chloride Point section of the district, has about 2000 feet of development, which takes it through the gold and silver formations of the district. Their silver vein forms the foot wall of the gold ledge. The work of drifting on the veins has been commenced. Supt. Harris states that the values thus far encountered are of good grade, and the indications are favorable. WASCOTT.

Mercur, Sept. 13th, '99.

(Special Correspondence).—The Galena King mine, near Stockton, is running a 2000-foot tunnel to cut the present lower workings which were opened through a shaft. The tunnel will strike those workings 500 feet below the surface. A concentration mill has been ordered of the Gates Iron Works for this property. Its capacity will be seventy-five tons per day. The ores are silver-lead, with a small percentage of gold.

Stockton, Sept. 16th, '99.

WASHINGTON.

KING COUNTY.

Seattle *Times*: A new mill for the Golden Tunnel mine is almost completed. The ore being soft, a pulverizer will be used having a capacity of thirty tons a day. There is water power available for 250 tons per day. A thirty-ton aerial tramway will be used, but contracts have been let for one which can carry 250 tons per day. The mine itself is five miles south of Barlny station, between Index and Skykomish. There is an opening into a natural cave 4000 feet above the sea, and the walls, top and bottom, are lined with soft ore, which runs $16 to $500 per ton. This tunnel is 70 feet high and 50 feet wide. The ore runs 1500 feet in the tunnel. The principal vein is 24 feet wide, carrying small streaks of sulphide which yield gold.

OKANOGAN COUNTY.

Spokane *Chronicle*: At the Palmer mountain tunnel 45 feet were made the last ten days in driving the tunnel, and 20 feet in the west drift on the main ledge.

STEVENS COUNTY.

Spokesman-Review: At the Deer Trail No. 2 mine in Cedar canyon, two stopes of rich ore, measuring 100 and 82 feet respectively, are being opened. The former is a foot wide, and the latter from a few inches to 5½ feet of ore. Thirty-five men are employed in and around the mine. Since March of 1898 the company has paid fifteen dividends of $2500 each, besides buying interests in other claims that go to make up its holdings. The profits came from ore extracted from the Deer Trail No. 2 and the Legal Tender, and there is now sacked about fourteen tons taken from the Elephant claim. The vein dips 30 degrees and in places less than this, and is in limestone. The ore contains chloride, bromide and sulphuret of silver, with 5% to 20% lead. It will run in carload lots from $100 to $200 to the ton.

WYOMING.

ALBANY COUNTY.

A new copper district has been discovered twenty-five miles north of Laramie, and the district of Copper Ridge formed by the miners. The discovery was made by ranchmen in the vicinity. The district covers several square miles on the west side of the Black Hills range. The formation of the country is granite, overlaid by sedimentary strata intruded by eruptives. The mineral is found between porphyry and limestone and between hematite and a metamorphic rock. The ore is copper glance, running 40% copper, twenty-two ounces silver and a trace of gold to the ton.

CARBON COUNTY.

It is reported that in the new shaft on the Rudefeha the lead is 22 feet wide. The ore is sulphide of copper running from 15% to 35%. This lead was struck at a depth of 130 feet. It is the intention of the company to sink to 400 feet. The mine is equipped with steam hoists, pumps and air compressors.

FOREIGN.

BRITISH COLUMBIA.

The Black Jack hydraulic mine, near Barkerville, is reported to have cleaned up 400 ounces for the season.

A crosscut in the Morrison mine in Deadwood camp at a depth of 220 feet is 66 feet in length, and has not reached the hanging wall. The ore will average $12 in gold per ton and 36% copper.

Three Americans report they have discovered large copper-gold deposits on the east and on the north forks of Kettle river, fifty miles from Grand Forks. A stampede followed the announcement. The three Americans say they have staked all they can hold.

Spokane *Chronicle*: The double comparment shaft, completed to the 600-level of Le Roi, is being sunk to the 700, and is within 20 feet of the level. A station is being cut at the 900 level in the main shaft. Stoping is in progress on several levels. On the 700 west, owing to the heavy nature of the ground, it is necessary to use hand drills. Twenty-seven machine drills are in operation.——The ore bin for the Lake Shore mine, near Moyie, is finished. A large shoot of ore was struck in the No. 1 tunnel this week.——A water right has been filed by J. C. Drewry on Wilson creek, six miles north of Moyie. The water will run the concentrator which is contemplated.

Spokesman-Review: S. H. Hayes, Supt. of the Camp McKinney Mines, Ltd., reports the mill running sixty-three days, during which time $5340 has been produced. This result was with a 5-stamp battery, and an additional five stamps will be put in operation. The company owns the Granite and Banner properties, adjoining claims on the south slope of Cariboo mountain in Camp McKinney.

MEXICO.

A. R. Norton at Casas Grandes, Mexico, from the Yaqui river country, says there have been two more companies formed for putting machinery in the placer district of the Yaqui river, making four in all. The placer grounds are not especially rich, but they cover hundreds of acres. Along any one of the streams gold can be found.

NORTHWEST TERRITORY.

(Special Correspondence). — Since the discovery of the Dawson region there have been no new strikes of importance, excepting two creeks, each about twenty miles long. The Big Salmon strike proved to be another up-river steamboat boom, and is a fizzle.

One of the two creeks discovered is American creek, a tributary of Seventy-Mile creek. For several seasons this creek was prospected without success, but last winter the pay streak was found, and are now taking out $75 to $100 per day per shovel — that is, the amount of ground a man can pick up and shovel into the sluices in ten hours.

Jack Wade creek is the other stream above referred to. The pay was located there last fall, after having been prospected and abandoned by former locators. It is paying well. On a fractional claim between Nos. 3 and 4 a shaft was sunk 10 feet to bedrock, and $10 to $16 per pan obtained, nearly $500 being gotten from 4 feet square. On No. 7 one man picking and shoveling picked up from the dirt twelve and one-half ounces of gold in thirty minutes, and later, on the same claim, another man picked up two and one-half pounds in half an hour, and a third party picked out $20.20 in twenty minutes. Five men last week took out $1600 in ten hours. Other claims are better. Thirty thousand dollars has been offered for Nos. 13 and 14, and refused. Both American creek and Jack Wade creek are in American territory.

Forty-Mile Post, August 16th, '99.

SOUTH AFRICA.

At the Transvaal diamond mines the original plan of crushing the "blue" as it came from the mine had been abandoned, it having been found that the larger stones were injured in the process. The old system of weathering the matrix, in use at Kimberley and elsewhere, has been adopted, and the ground is said to be pulverizing satisfactorily, so that washing will be possible at an early date. The diamonds found are stated to be of superior quality and size. There are 117,000 loads of "blue" upon the floors, about 50,000 loads of which are ready for washing, and the estimated cost would be covered at 1s 6d to 2s per load for the entire treatment.

Personal.

ELIHU THOMSON'S address is Lynn, Mass.

W. H. FAWCETT is now Supt. Keep Cool mine, Lakeview, Idaho.

SAM'L NEWHOUSE will return from Baden to Salt Lake City, Utah, Oct. 1st.

W. H. KINNON of Denver has charge of the new smelter near Vernal, Utah.

W. L. AUSTIN has left Denver, Colo., on a professional tour through Mexico.

LEO VON ROSENBERG of New York City is examining mines in southern California.

WM. WETMORE'S address is earnestly desired by an Ouray, Colo., correspondent.

PH. DEIDESHEIMER of San Francisco, Cal., is in Nevada county, Cal., examining mines.

BENEDICT CROWELL of Cleveland, O., who had been in the Lake Superior region examining iron ore properties and later in California on similar business, has returned.

EDW. HORNE is the new superintendent of the North Swansea mine, Mammoth, Utah.

N. DANVERS POWER has resigned the management of the Beacon G. M. Co., Australia.

G. H. FOWLER is the newly appointed manager of the Calcifer mine, Chillagoe, Queensland.

COL. J. R. SOUTHWORTH of San Francisco leaves on the 25th for a business trip through Mexico.

PROF. W. L. WATTS is investigating oil lands in San Benito Co., Cal., for San Jose capitalists.

J. P. EVANS, of the Colorado Iron Works Co., is in Arizona putting up a copper furnace at Valverde, near Prescott.

CHAS. G. YALE was this week re-elected for the seventh time secretary San Francisco County Mining Association.

W. C. RALSTON has succeeded F. M. Williams as president and manager of the Bonanza M. Co. at Sonora, Cal.

LIEUT. HERBERT DEAKYNE, U. S. Corps Engineers, has returned to San Francisco from an official visit to Nevada Co., Cal.

E. A. RIX of the Rix Engineering Co., who has charge of the Alaska mine, Sierra City, Cal., has returned to San Francisco.

A. EKMAN, in charge of the California mineral exhibit at the Paris Exposition, is collecting specimens in Nevada county.

SUPT W. A. DENNIS, of the Mountaineer mine, Nevada Co., Cal., has gone to Los Angeles, Cal., for permanent residence.

P. W. GATES, Pres. Gates Iron Works, Chicago, Ill., is in London, Eng., and expects to return to the United States next month.

NORMAN ROWE succeeds R. S. Masson as electrical engineer in the San Francisco office of the Westinghouse Electric and Mfg. Co.

JNO. I. SABIN of San Francisco, president Pacific Coast Telephone Companies, has gone to Europe to note telephone development there.

MR TYLER HENSHAW, of the firm of Henshaw, Bulkley & Co. of San Francisco, Cal., has returned from a business visit to Seattle, Wash.

LEE COCHRANE, with the Mine & Smelter Supply Co., has gone from that company's Salt Lake branch to the one in the city of Mexico.

F. C. VON PETERSDORFF has left the employ of the Ibex M. Co., Leadville, Colo., to accept the management of a mining property in Sonora, Mexico.

C. W. MERRILL, who is putting in a cyanide plant at Marysville, Mont., will, upon its completion, place a similar one at the Homestake, South Dakota.

A. R. C. SELWYN, late Director of the Geological Survey of Canada and of the Geological Survey of Victoria, Australia, is visiting Sumpter, Or., gold mines.

J. A. FERSON, formerly of the Satellite mine at Campo Seco, where he was assayer, is superintendent of the California Copper Smelting Co., at Madera, Cal.

CAPT. A. M. GRANT, the Salt Lake, Utah, representative of the Colorado Iron Works, of Denver, Colo., has returned to his Utah headquarters from a northern visit.

MRS. PHOEBE HEARST of California is credited with intention to erect two of the buildings of the new University of California at Berkeley, Cal., one of these to be for the School of Mines.

H. RIDER HAGGARD, the English novelist, is developing some quartz claims at Atlin, B. C., and is locally credited with the intention to put up "the second largest stamp mill on the American continent."

MR. A. P. BRAYTON, SR, Pres. Pelton Water Wheel Co, San Francisco, Cal., arrives in New York to-day, returning from a successful European business trip, and will be in San Francisco about Oct. 25th.

JOHN HAYS HAMMOND has been appointed consulting engineer for the Mijnpacht Randfontein G. M. Co., Ltd.; Pope Yeatman has been appointed general manager, and J. B. Pitchford consulting mechanical engineer.

H. H. HIRST of the University of California has been appointed by Washington, D. C., authorities as Special Agent National Irrigation Bureau. This is the first step in the work of conservation of the waters of California.

W. A. CARLYSLE, Supt. Le Roi mine, Rossland, B. C., is considering the relinquishment of the $8000 per year salary to accept $20,000 per annum as superintendent of the old Rio Tinto, Spain, mines, from which copper has been extracted with profit for over 1000 years.

RICHARD A. PARKER, consulting engineer of the United States M. Co., at Bingham, Utah, has returned to San Francisco, Cal. Mr. Parker recently spent a month with assistants making an examination of the Centennial-Eureka mine at Tintic and the property has been taken over by the United States M. Co., for $2,100,000.

J. F. WARDNER has returned from Cape Nome and advances the theory that the gold deposits extend out to sea. He says that two miners placed a caisson 120 feet from low tide. The first lot taken out ran from 15 to 50 cents per shovelful. He asserts that similar experiments were tried at a farther distance from tide mark with even better results.

COL GEO. STONE, who has charge of coast railroad work between Elmwood and Surf, Cal., voices the universal complaint as to scarcity of desired labor throughout the coast and says that railroad operations in Santa Barbara county are greatly delayed in consequence of inability to get men. He has made the final payment on the Merrimac, Nevada Co., Cal., mine, of which he is now the owner.

Industrial Notes.

—Kingman, Arizona, has a tax rate of $3.85 on the $100.

—Wyoming's coal mines are producing 22,000 tons per day.

—The Paraffine Paint Co., 116 Battery St., San Francisco, has declared dividend No. 33, of 25 cents per share, payable at the company's office Sept. 29th.

—Figures recently compiled show that over three-quarters of the world's pig iron production is converted into steel. Thirty years ago not over 4% was so used.

—The armor for the battleship Wisconsin, in course of construction at the Union Iron Works, San Francisco, is now arriving, and the vessel will shortly be ready for her builders' trial trip.

—It is stated this week that the Crocker stock holdings in the Southern Pacific and Central Pacific Companies, representing about $13,000,000, have been bought by Speyer & Co., of New York City.

—The American bridge is spanning the rivers of Egypt, Siberia, Japan, China and Peru, and twenty-six American builders have gone to Rangoon, British India, where an American company is building a bridge.

—Kansas City, Mo., has an order for 500,000,000 feet of Southern yellow pine, said to be the largest single order in the history of the lumber trade, for use in the construction of Cecil Rhodes' proposed Cape-to-Cairo road in Africa.

—At Great Falls, Mont., manufacturing and coal mining industries show a monthly payroll of more than $250,000. Copper interests are booming; the annual output of the town was 60,000,000 pounds, and is now being increased.

—A. L. Ledioux, receiver of the Harney Peak M., M. & M. Co., has been authorized to convey to the Burlington & Missouri River Co. the right of way to construct a railway from the Addie mine spur, a distance of seventy-seven miles, to Keystone, S. D.

—The products of the mineral industries of Kansas for 1898 amounted to more than $7,000,000. The output of zinc ore was of the greatest value ever known in the State. The production of coal was valued at $4,000,000, and of salt more than half a million dollars.

—Amador Co., Cal., has appropriated $300 to entertain the visitors of the American Institute of Mining Engineers, who visit that section of California. Tuolumne, Calaveras and other California counties have also appropriated through their Boards of Supervisors similarly.

—The Cascade, Wash., tunnel is finished a distance of 7000 feet, out of 13,000 feet required before the work is complete, and from 500 to 600 men are working day and night. This tunnel will be completed in October, 1900. Its total length will be two and one-half miles.

—Messrs. Woods of Colorado have incorporated the Pike's Peak Electric Power Co. The lines of the company, conduits, transformers, etc., will be located in Fremont, El Paso and Teller counties. Mining and milling will be a branch of the business. The principal office will be in Victor, Colo.

—The Monterey foundry at Monterey, Mexico, employs 235 men regularly. Most of the mechanics are Americans, who receive on an average from $5 to $8 per day in silver. The other laborers are Mexicans, who receive 75 cents to $1 per day. About 1000 tons of pig iron are imported from the United States each year by this company.

—A narrow-gauge railroad is to be built from Phœnix, Arizona, southwesterly via Gila Bend, thence south via the Ajo mines to the territorial line at the town of Quitovaquite—130 miles. Another line is projected from Phœnix to Jerome, thence to the Grand canyon—105 miles. A third line is planned from Phœnix to Globe and Morenci.

—The Sisquoc mines, Santa Barbara Co., Cal., in addition to a high-speed electric light generator, has put in an engine to supply the current for the shop motors, and their crane excavator is also operated electrically. The latter is a large dredger applied to asphalt digging, and its current is supplied by an overhead trolley line. A navy searchlight illuminates the asphalt mine at night.

—This paper has received over 100 personal letters this month from manufacturers in all parts of the country, each one practically saying that not in ten years was the industrial outlook so good, and never before were orders booked so far ahead. In some cases the statement is made that great difficulty is found in getting enough material to keep the men going. So far as iron and steel are concerned there is a present difficulty of that nature on the Pacific Coast.

—U. S. Consul Allen reports that the American gold mines in the northern province of Peng Yang, Korea, are in active operation. The company employs about forty Americans at its mines, which includes the whole district of Woon San, about 1000 square miles. The company works sixty stamps. Nearly 1200 Koreans are employed in and about the mines in various capacities. The concession is upon a payment to the Korean Government of one-fourth of the net proceeds.

—The local telephone company has stretched aluminum wires between The Dalles and Prineville, Oregon. These wires were stretched too tight, and, being susceptible to climatic conditions, contracted and snapped when the weather became cold. Since having been slackened, no difficulty is anticipated. The Snoqualmie falls power transmission plant, which transmits 30,000 H. P. from the falls—a distance of forty-five miles over two lines to Tacoma and Seattle, Wash.—and which uses large aluminum wires, experienced the same difficulty, having miscalculated the coefficient of expansion of these wires, but by slackening them have no difficulty.

—The foreign commerce of the United States in the month of August, '99, is the largest in the history of that month, being nearly 25% higher than those of August of the phenomenal year '98 and 33% higher than the average of August in the years '94, '95 and '96, while for the eight months of the calendar year ending with August they are the highest in our history, reaching $792,595,332, against $778,632,207 in '98, $641,979,330 in '97, and $602,298,472 in '92.

—The iron situation throughout the South is interesting, says the *American Manufacturer*. Many furnaces in the Tennessee and Alabama districts are sold so far ahead that it is impossible for foundrymen and smaller consumers to obtain iron from them at any figure. Most of the furnaces have orders sufficient to consume their full production far into next year. Iron in the Chattanooga and Birmingham districts is selling as high as $18 and $18.50 per ton, and it is freely predicted that $20 iron will be a reality within the next thirty days.

—The British Consul at Mariupol, Russia, says: "There is still a large market in Russia for machinery, machine tools, leather belting, wire ropes, shovels, coke forks, mining and other tools. I prevailed upon some of the local dealers to pass some trial orders for tools from England, but they informed me that English prices were too high, and that they could have bought the same articles from Germany or the United States more cheaply. I am at no loss to account for the American competition, when one takes into consideration the heavy cost of transport, and especially when it must be admitted that the goods are said to be in no way inferior to those of British manufacture."

—"Labor Day" in Minneapolis, Minn., on the 4th inst., started a novel exposition. The skilled workmen of that city opened a labor and industrial exposition after their parade, which is to be representative of the work of the members of the fifty-four local trades unions. The machinery and exhibits are installed in a building 210 feet long. The machinery includes machines for the use of the metal-working and wood-working crafts, who exhibit the various processes by which staple articles in daily use are produced from iron, steel and wood. Others are exhibits of the allied printing trades crafts, in which the process of printing, engraving, lithographing, ruling, book binding, etc., will be shown from the job work to newspaper printing, including artists, engravers and transferers, illustrating preliminary work in lithographing. The exhibit of the electrical workers is also of interest. In lines requiring heavy and cumbersome machinery the exhibits are confined to the manufactured product, including brick making, broom making, stone cutting, etc. About 200 feet of shafting, provided with a 35 H. P. electric dynamo, furnishes motive power for the machinery. The exposition is different in some ways from the present exhibition of the San Francisco Mechanics' Institute.

—J. F. Stevens, chief engineer of the Great Northern, has given out the following information relative to the improvements now in progress on his line: At Minot and Williston, N. D., and Glasgow, Mont., new yards are being built to give 3000 feet of room. New twenty-stall roundhouses are going up at all of the three places, each to cost $25,000, and a new brick freight and passenger depot is being built at Glasgow that will cost $12,000. The entire Montana division of the line, extending from Minot to Blackfoot, is being reballasted, which gives employment to 800 men, six steam shovels and thirty engines and work trains. On this line thirty new steel bridges are being built and 200 others are being filled and fitted with stone culverts. The work this year alone has resulted in the reballasting of 350 or 400 miles of the track, besides the general widening of the grade and cutting out sags, etc. On the line from Blackfoot to Havre, 150 miles long, thirty miles of new roadbed is being built to lighten the grade. Near Blackfoot, Mont., the contract has been let for the construction of two of the largest railroad bridges in America. One of them is 125 feet high and 1800 feet long, and the other (which will be the highest wooden bridge on the continent and probably in the world) will be 214 feet high and has a total length of 1000 feet. This latter is to be at Two Medicine. These bridges will require 2300 tons of steel and will cost from $180,000 to $200,000.

—One man who claims to have outgeneraled the trust, says he was at the head of a small concern making, let us say, car wheels (that's not exactly it, but pretty nearly,) and about a year ago he got a private hint that the other car wheel people were arranging a combine. He said nothing, but immediately communicated with several of the largest consumers and by offering confidentally a reduction of about 15% secured advance orders that would occupy him over two years to fill, running at full capacity. At the price named every wheel would be made at a loss, and his partners were scared. He told them to keep their mouths shut and wait. In a few months the trust was organized according to programme, and one day a bland agent dropped in and offered him a fair price for the plant. He said he didn't care to sell. The trust thereupon proceeded to cut rates, but the little wheel maker did'nt seem to care. Then they made another and much larger cut which was what he was waiting for, and through a third party he instantly placed orders covering all the contracts he had made at a figure that left him a handsome margin of profit. Without suspecting that the large order came from him, the trust people, alarmed at the losses incurred in the freezing out-process, made another and much better offer for his plant, which he promptly accepted. Now the trust has the concern and is running it day and night to make wheels at 25% under actual cost for the man it tried to freeze out. As fast as he gets them he turns them over on his contracts and reaps the intermediate profit, while, needless to say, the trust howls every time it makes a delivery. The little wheel maker says it is great fun to see a trust on the gridiron.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING SEPTEMBER 12, 1899.

632,829.—HYDRAULIC ELEVATOR—S. L. Berry, S. F.
632,863.—CHILD'S BIB—C. A. Blank, Berkeley, Cal.
632,833.—WAVE MOTOR—W. A. Cheney, Los Angeles, Cal.
632,806.—PASTE BOTTLE—G. P. Cragin, Spokane, Wash.
632,996.—HARNESS BUCKLE—J. A. Gavit, Waitsburg, Wash.
630,840.—CAN BODY FLANGING MACHINE—A. Lotz, S. F.
632,843.—DENTAL FORCEPS—N. B. McGhee, Orange, Cal.
633,023.—SPECTACLES—C. E. Miehle, Riverside, Cal.
633,099.—SAFETY HOOK—W. Miller, Chloride, Ariz.
632,845.—BADGE FASTENER—J. P. Petsch, Los Angeles, Cal.
632,826.—WAVE MOTOR—M B. Rice, Tustin, Cal.
632,856.—ICE CREAM FREEZER—S. Sweeney, Los Angeles, Cal.
632,954.—RIFFLE PLATE—H. Tuttle, Quartz, Cal.
632,797.—BICYCLE—G. Van Horn, High Grove, Cal.
633,059.—CONCENTRATOR—J. Woodham, Long-beach, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CHILD'S BIB.—Chas. A. Blank, Berkeley, Cal. No. 632,863. Dated Sept. 12, 1899. This invention relates to a bib or device which is especially designed to protect the clothing of young children while being fed, the object being to provide a durable, clean, light and easily handled and cleansing device. It consists of a rigid impervious sheet having the upper portion concaved to fit about the neck and the lower portion formed with a receiving roll having an inwardly curved side, the edges of which are turned upwardly to form conductors so as to convey the spilled material into the roll.

CAN BODY FLANGING DEVICE.—A. Lotz, San Francisco, Cal., assignor to F. A. Robbins, same place. No. 632,840. Dated Sept. 12, 1899. This invention relates to an apparatus for flanging can bodies. It consists in a mechanism by which the end flanges of the can bodies are turned outwardly, and comprises a chuck having a shouldered portion of diameter equal to the interior of the can, a similarly shaped independent ring, the contiguous face of which is coincident with that of the shoulder yielding supports by which the ring is normally retained in line with the shouldered portion. A roller is adapted to be brought into contact with the exterior of the can which is fitted over the ring and shouldered portion, and by suitable mechanism the parts are rotated so that the roller will force the ring out of line with the shoulder portion and thus turn a flange upon the can end; the yielding portion, being made of rubber or similar material, allows for these parts being forced out of line for the above purpose.

Book Notices.

"*Aaron's Assaying*," Parts II and III, third edition, rewritten and revised; printed from new type, in convenient form, and reduced in price to $1.50, postpaid; out to-day; a fine edition of this favorite work, the standard on the subjects of which it treats; 170 pages, octavo; published by the Mining and Scientific Press, 330 Market St., San Francisco, Cal.

"*El Territorio de la Baja California, ilustrada, Mexico*"—the Territory of Lower California, Mexico, illustrated—is the title of an unusually fine folio written and compiled by J. R. Southworth, 23 First street, San Francisco, Cal., descriptive of the resources of Lower California: its agricultural, commercial, mining and other industries. It is official; the statistics and much of the matter are furnished by the Government, and are authentic. Great care has been taken by Col. Southworth to have the work reliable, and for the first time in the world's history appears a comprehensive and elaborate account of the Lower Californian peninsula, extending from 23° to 32° 30′ N. Lat. It is a region that deserves intelligent attention, and the subject is admirably arranged. The typographical excellence of the work is also worthy of notice, the large volume being an edition de luxe. It is printed in Spanish and English, magnificently illustrated, and will undoubtedly direct attention to that Territory. A fine map—the first really authentic one of the kind—accompanies the work, correctly depicting the entire peninsula. The work complete will be sent postpaid, superbly bound, by J. R. Southworth, 21-23 First St., San Francisco, on receipt of $2.50; or, in paper covers, $1.50.

Commercial Paragraphs.

FLINT & LOMAX, electricians of Denver, Colo., have moved into larger quarters at 1939-1943 Curtis street.

J. GEORGE LEYNER, machinist of Denver, sold seven air compressors last week, which went into various parts of the West.

SINCE last June, the Colorado Iron Works Co., Denver, Colo., have received orders for eleven blast furnaces, two of which go to Arizona, five to Mexico, two to Colorado, one to Utah.

L. PETERSON, the pioneer manufacturer of experimental machinery and inventors' models, has removed from his old quarters, 226 Market St., San Francisco, Cal., to 544a Mission St., between First and Second, San Francisco, where he has increased facilities for work.

THE Jackson Drill & Manufacturing Co., 1756 Larimer street, Denver, Colo., H. F. Crippen manager, report the following sales: The Markeen Copper Co., Clifton, Arizona; Nodolgo, Dressel & Co., Monterey, Mexico; S. B. Wilson, Ohio City, Colorado; Black River Mining Co., Ironton, Missouri; Baxter & Kearns, Walsenburg, Colorado; British American Gold Mining & Trading Co., for Buster mines, near Prescott, Arizona.

THE Denver Branch of the Jeanesville Iron Works Co., A. Middlebrook, Mgr., reports recent sales of two electric power-driven sinking mine pumps for Mexico; two large station pumps for coal mines in Colorado; one station pump, 700-foot lift, and No. 7 sinker, for Salt Lake; the factory shipped direct to the Le Roi Co. at Rossland, B. C., three compounds, August 31st, and a compound condensing pump, 1000 gallons capacity, to S. E. Missouri. They have an order for one 16 in. and 30 in. by 14 in. by 48 in., and one 16 in. and 30 in. by 14 in. by 36 in. compound condensing pump, with condenser, to an iron and steel company in the East—the fourth order for this class of pumps from the same company.

IN the issue of the 2nd inst. some reference was made to the action of Judge Hallett in the roasting furnace controversy, and his conclusions were published. The Parke & Lacy Co., 21 and 23 Fremont street, San Francisco, representing the Ropp furnace, has issued a pamphlet in answer to Fraser & Chalmers concerning the matter, which they will be pleased to send to any one interested in the controversy. It is illustrated with cuts of the Brown furnace, the George, Ropp, O'Harra & Allen furnaces, graphically depicting the difference, and concludes with the statement: "We are building the ROPP FURNACES, and will continue to build them. We will stand between our customers and secure them from any loss or damage from any action brought by Brown or others, based upon Brown's patent or patents."

Recently Declared Mining Dividends.

American Zinc, Lead & Smelting Co., $1 per share; payable Oct. 2nd.

Deer Trail No. 2 M. Co., Washington, dividend No. 16, $2500; payable Sept. 25th. Total, $40,000.

Bonanza M. Co., Washington, $2500; Sept. 20th.

New Idria, San Benito Co., Cal., 10 cents and extra 20 cents per share; payable Oct. 2nd.

Napa Con., Cal., 10 cents and extra 20 cents per share: payable Oct. 2nd.

Boston Quicksilver Co., Cal., 10 cents per share; payable Oct. 2nd.

Ætna Quicksilver Co., Cal., 10 cents and 5 cents extra; payable Oct. 2nd.

Isabella M. Co., Cripple Creek, Colo., $22,500; Sept. 20th. Total, $472,500.

New York & Honduras Rosario Co., San Juancito, Honduras, $15,000; Sept. 20th.

Raven M. Co., B. C., $10,000; Sept. 20th.

Santa Rosalia, Mexico, 5 cents per share; payable Sept. 25th.

Champion M. Co, Nevada City, Cal., 49th dividend, 25 cents per share; Sept. 23rd.

Boston-Aurora Zinc M. Co., regular monthly dividend, two-thirds of 1%; payable Sept. 25th.

Homestake M. Co., 25 cents per share; payable Sept. 25th; also extra dividend of 25 cents; payable at the same time.

Petro M. Co., Utah, $5000; payable Sept. 30th.

Catalogues Received.

CATALOGUE No. 3, fourth edition, of Fraser & Chalmers, Chicago and London, is a 170-page octavo treating of roasting, smelting and refining machinery. Amid much that is new and all that is good is noted a technical treatise on lead refining, and a sectional view of a modern refinery. Circular No. 99, of simultaneous issue, is devoted to "Increased Milling Capacity," a statement of a method designed to increase the capacity of existing stamp mills. Either or both of the above will be sent from the Chicago office on request.

CATALOGUE No. 8, of Fraser & Chalmers of Chicago, in the usual complete style of that firm, treats exhaustively of crushers and pulverizers. Considerable prominence is given to the testimonials from users of the Comet crusher, an appliance that is thoroughly illustrated and explained in detail. The treatise will be sent free on request.

A TWENTY-FOUR-PAGE descriptive catalogue of the Mogul draught springs and special high-grade steel coiled springs for all purposes, with illustrated description, classification, tables of weights and sizes, directions for attachment, testimonials from numerous mining companies, practical points on a practical subject: The Wilson Manufacturing Co., 147-149 Cedar St., New York City.

Iron and Steel.

Tests recently made upon Swedish iron and steel show that when the steel contains less than 0.90% of carbon it can be welded and hammered up to 900° C. When it contains 1.10% it can be welded with borax and hammered at 850° C.; 1.30% can only be welded with difficulty and hammered at 800° C. When the carbon is as high as 1.50 the steel cannot be welded at all and cannot be hammered at a higher temperature than 750° C. The purposes for which such steel is suitable are as follows: 0.10% to 0.30%, for carriage axles and strong machinery parts; 0.15% to 0.30%, for boiler tubes; 0.30% to 0.50%, for springs hardened in water; 0 75% to 0.90%, for tubes; 0 45% to 0.60%, for hardened wire; 0 50% to 0.75%, for spiral springs; 0.90% to 1%, for surgical knives and circular saws; 1% to 1.10%, for hand saws; 0 60% to 0.90%, for cabinet-makers' tools, cold chisels and axes; 1% to 1.20%, for cutters' drills, etc.; 1.20% to 1.40%, for turning and planing steel; 1.35% to 1.50%, for scrapers and special tools.

The Demenge process of hardening steel ingots, which is in use at one of the principal steel works of France, consists in directly carburizing one of the faces of the ingots, at the time of casting, by lining one of the vertical sides of the mould with carburizing substances. The carburizing action is prevented from penetrating too deeply into the inside of the ingot by casting the vertical side opposite to the carburizing side. The case-hardened surface is rather rough, but all irregularities disappear in forging, which may be effected without special precaution, and at a comparatively low temperature, by the press.

R. A. Hadfield has recently made some investigation into the properties of iron and nickel alloys which show that the addition of nickel to iron or steel appears to produce an effect similar to annealing. Chernoff, the Russian scientist, has stated that steel is composed crystals of metallic iron cemented together by carbide of iron. Probably in nickel-iron alloys the intercrystalline spaces are more completely filled, thus increasing the cohesion.

Incline Retarding Conveyor.

Lowering coal from high to lower levels is a problem which in the past has, as a rule, been accomplished by means of a system of tramcars. It therefore makes the accompanying illustration of special interest, as the device shown displaces the old tramcar system and has in its favor special points of advantage. The first cost of a conveyor system is less than a tramcar system; it is simple and requires little power and no expert attendance. In the plant illustrated herewith the coal is discharged over the ordinary tipple at the head into a large feed hopper from which it is fed on to the conveyor. The conveyor in this case is made of one of the Jeffrey special wire ropes with coupling attachments, operating over sheaves at the terminals, while the conveyor is carried in a special V-shaped trough. When the conveyor is loaded its full length, and when the feed is continuous, this conveyor acts as a retarder in keeping the coal from running away from itself. To start the conveyor a small motor is necessary; while, when running full, a brake is used to keep the conveyor in check. By the use of this system the coal is carried to the coal chutes or cars below without any breakage at the rate of from 100 to 140 tons per hour. In the plant illustrated herewith the distance from the upper to the lower level is 500 feet. Formerly tramcars were used, and as this system has proven a practical, as well as a commercial success, it will no doubt find favor with others who are operating under similar conditions. This plant was installed by the Jeffrey Manufacturing Co. for the Logan Consolidated Coal & Coke Co., whose mines are at Matewan, West Virginia.



INCLINE RETARDING CONVEYOR.

Antique Cement Analyzed.

Samples of cement used in the antique water conduits about Ephesus and Smyrna were recently subjected to chemical analysis and the various samples were found to be quite similar in composition. The water works from which the samples of cement were taken were constructed from a period several centuries before Christ to 300 years after. The chief constituent of the samples was carbonate of lime, but mixed with it was from 2% to 8% of organic material. This was ascertained to consist of a mixture of fatty acids. Experiments were made with a cement consisting of burned lime and olive or linseed oil, but it was not found to be permanent. On the other hand, a mixture of two-thirds air-slaked lime and one-third olive oil hardened readily, and possessed great endurance, leading to the belief that this was the composition of the ancient cements which were analyzed.—Railway and Engineering Review.

Cyanide Prior to Amalgamation.

To the Editor:—In various districts there are stamp mills with amalgamation plates and facilities for cyanidation of tailings. A Utah millman—Mr. M. D. Stackpole—suggests the advantage of reversing this process. That is, he would cyanide the ore at about ten-mesh, then run it through Huntington mills and over the amalgam plates afterwards. He claims that to crush and pulverize the ore sufficiently fine for amalgamation usually makes it too fine to leach advantageously. Then rusty particles of coarse gold which do not yield to the cyanide will be left in condition to amalgamate readily.

WASCOTT.

Mercur, Utah, Sept. 12th, '99.

SELBY SMELTING AND LEAD CO.,

REFINERS OF GOLD AND SILVER BARS, GOLD DUST, ETC.

Buyers of Gold, Silver, Lead and Copper Ores, Gold Concentrates, Lead Bullion, Cyanide Product, Etc.

ORE AND BULLION ASSAYERS.

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MINE Hoists and Locomotives.

Let us tell you about them.

Westinghouse Electric & Mfg. Co.,

PITTSBURG, PA.

Westinghouse Electric Co., Ltd., 32 Victoria St., London, S. W., England.

Other Principal Cities in U. S. and Canada.

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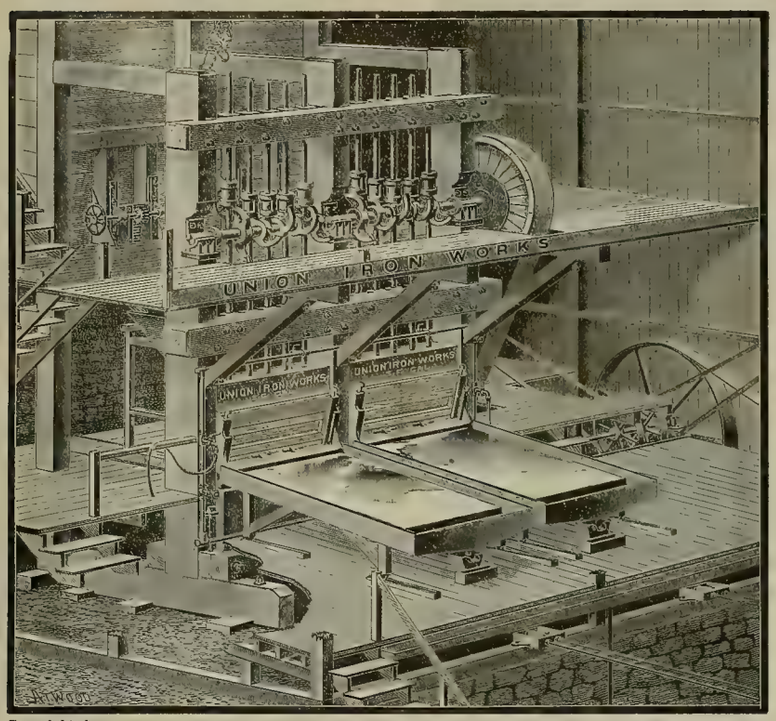
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UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

BUILD THIS

MODERN TEN-STAMP BATTERY.



Copyrighted.

The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

SEND FOR CATALOGUE No. 5.

If Your Work is Being Delayed by the : : :

BOILER FAMINE,

Then Draw from Our Large and Complete Stock.

Small Boilers, Vertical Boilers, Portable Boilers,
Large Boilers, Horizontal Boilers, Stationary Boilers.

BAKER & HAMILTON,

SAN FRANCISCO. SACRAMENTO. LOS ANGELES. NEW YORK.

Parke & Lacy Company,

21 & 23 Fremont Street,

SAN FRANCISCO, CAL.

ROPP

Roasting Furnace Controversy.

= BROWN =

Roasting Furnace Patents

NOT VALID.

If interested in this controversy, write us for pamphlet showing the contention between H. F. BROWN and the METALLIC EXTRACTION COMPANY.

THE USE OF THE "ROPP" FURNACE OR "ROPP STRAIGHT LINE" FURNACE NOT RESTRAINED.

MINING, MILLING AND SMELTING

MACHINERY.

AGENCIES: London, Eng. Sydney, N. S. W. Spokane, Wash. Los Angeles, Cal.

CALIFORNIA'S MINERAL PRODUCT

- - - FROM 1887 TO

DATA COMPILED BY THE CA

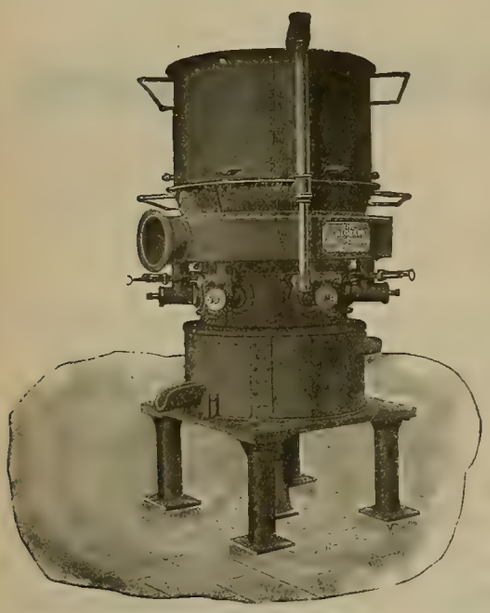
PRODUCTS.	1887		1888		1889		1890		1891		1892		
	Quantity.	*Value.*	*Quantity*	*Value.*	*Quantity.*	*Value.*	*Quantity*	*Value.*	*Quantity.*	*Value*	*Quantity*	*Value.*	*Quant*
Antimony ..... *Tons*	75	$ 15,500	100	$ 20,000	.....	.....	.....	.....	.....	.....	.....	.....	
Asbestos ..... *Tons*	30	1,800	30	1,800	30	$ 1,800	71	$ 4,260	66	$ 3,960	30	$ 1,830	
Asphalt ..... *Tons*	4,000	16,000	3,100	39,500	3,000	30,000	3,000	30,000	4 000	40,000	7,550	75,500	9
Bituminous Rock . *Tons*	36,000	160,000	50,000	257,000	40,000	170,000	40,000	160,000	39,962	154,164	24,000	72,000	32
Borax ..... *Lbs*	2,029,380	116,698	2,809,088	196,636	1 939,650	145,473	6,402,034	480,152	8,533,337	640,000	11,050,495	838,787	7,910
Cement ..... *Bbls*	.....	.....	.....	.....	.....	.....	.....	.....	5,000	15,000	5,000	15,000	
Chrome..... *Tons*	3,000	40,000	1,500	20,000	2,000	30,000	3,599	53,985	1,372	20,580	1,500	22,500	3
Clay (brick)..... *M.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103
Clay (pottery).... *Tons*	75,000	37,500	75,000	37,500	75,000	37,500	100,000	50,000	100,000	50,000	100,000	50,000	24
Coal..... *Tons*	50,000	150,000	95,000	380,000	121,280	288,232	110,711	283,019	93,301	204,902	85,178	209,711	72
Copper ..... *Lbs.*	1 600,000	192,000	1,570,021	235,303	151,505	18,180	23,347	3,502	3,397,455	424,675	2,980,944	342,808	239
Gold.....	.....	13,588,614	.....	12,750,000	.....	11,212,913	.....	12,309,793	.....	12,728,869	.....	12,571,900	
Granite.....	.....	150,000	.....	57,000	.....	1,329,018	.....	1,200,000	.....	1,300,000	.....	1,000,000	
Gypsum ..... *Tons*	2,700	27,000	2,500	25,000	3,000	30,000	3,000	30,000	2,000	20,000	2,000	20,000	1
Infusorial Earth.. *Tons*	.....	.....	.....	.....	39	1,335	.....	.....	.....	.....	.....	.....	
Iron Ore ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Lead..... *Tons*	580	52,200	450	38,250	470	35,720	400	36,000	570	49,020	680	54,400	
Lime and Limestone..	.....	368,750	.....	381,750	.....	416,780	.....	350,000	.....	300,000	.....	300,000	
Macadam ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	271
Magnesite ..... *Tons*	600	9,000	600	9,000	600	9,000	600	9,000	1.500	15,000	1,500	15,000	1
Manganese ..... *Tons*	1,000	9,000	1,500	13,500	53	901	386	3,176	705	3,830	300	3,000	
Marble	.....	5,000	.....	5,000	.....	87,030	.....	80,000	.....	100,000	.....	115,000	
Mineral Paint.... *Tons*	.....	.....	.....	.....	.....	.....	40	480	22	880	25	750	
Mineral Water.. *Gals.*	618,162	144,368	1,112,202	252,990	808,625	252,241	258,722	89,786	334,553	135,959	331,875	162,019	385
Natural Gas.....	.....	.....	.....	10,000	.....	12,680	.....	33,000	.....	30,000	.....	55,000	
Onyx and Travertine.	.....	900	.....	900	.....	900	.....	1,500	.....	2,400	.....	1,800	
Petroleum ..... *Bbls.*	678,572	1,357,144	690,333	1,380,666	303,220	368,048	307,360	384,200	323,600	401,264	385,049	561,333	47
Platinum ..... *Ozs.*	100	400	500	2,000	500	2,000	600	2,500	100	500	80	440	
Pyrites..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Quicksilver .... *Flasks*	33,760	1,425,000	33,250	1,413,125	26,464	1,190,500	22,926	1,203,615	22,904	1,036,386	27,993	1 139,600	3
Rubble ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Salt ..... *Tons*	28,000	112,000	30,800	92,400	21,000	63,000	8,729	57,085	20,094	90,303	23,570	104,788	
Sandstone	.....	175,000	.....	150,000	.....	175,598	.....	100,000	.....	100,000	.....	50,000	
Serpentine.... *Cu. Ft.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Silver.....	.....	1,632,003	.....	1,700,000	.....	754,793	.....	1,060 613	.....	953,157	.....	463,602	
Slate ..... *Squares*	.....	.....	.....	.....	4,500	18,089	4,000	24,000	4,000	24,000	3,500	21,000	
Soapstone ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Soda ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Sulphur ..... *Tons*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Tin ..... *Lbs*	.....	.....	.....	.....	.....	.....	.....	.....	125,289	27,564	162,000	32,400	
Totals		$19,785,868		$19,469,320		$16,681,731		$18,039,666		$18,872,413		$18,300,168	

ND VALUES FOR TWELVE YEARS,

398 INCLUSIVE. - - -

NA STATE MINING BUREAU.

	1894		1895		1896		1897		1898		Totals for 12 Years.		PRODUCTS.
	Quantity	Value	Quantity	Value	Quantity	Value.	Quantity.	Value	Quantity	Value.	Quantity	Value.	
250	150	$ 6,000	33	$ 1,485	17	$ 2,320	20	$ 3,500	40	$ 1,200	485	$ 52,255	Antimony..... *Tons*
200	50	2,250	25	1,000	.....	.....	.....	.....	10	200	392	21,400	Asbestos ..... *Tons*
150	11,698	233,800	25,525	170,500	20,914	362,590	22,697	404,350	25,690	482,175	140,324	2,045,665	Asphalt ..... *Tons*
236	31,214	115,193	38,921	121,586	49,456	122,500	45,470	128,173	46,836	137,575	473,859	1,790,277	Bituminous Rock. *Tons*
392	11 540,099	807,807	11,918,000	595,900	13,508,000	675,400	16,000,000	1,080,000	16,600,000	1,153,000	110,242,000	7,323,136	Borax ..... *Lbs.*
	8,000	21,600	16,383	32,556	9,500	28,250	18,000	66,000	50,000	150,000	111,883	328 406	Cement ..... *Bbls.*
935	3,680	39,980	1,740	16,795	786	7,775	.....	.....	.....	.....	22,496	301,400	Chrome..... *Tons*
150	81,675	457,125	131,772	672,360	24,000	524,740	97,468	563,240	100,102	571,362	538,917	3,590,577	Clay (brick)..... *M.*
734	28,475	35,073	37,660	39,685	41,907	62,900	24,592	30,290	28,947	33,747	711,437	531,479	Clay (pottery).... *Tons*
765	59,887	139,862	79,858	193,790	70,649	161,335	87,449	196,255	143,045	337,475	1,068,961	2,712,136	Coal..... *Tons*
1,11	738,594	72,486	225,650	21,901	1,992,844	199,519	13,638,626	1,540,666	21,543,229	2,475,168	48,101,897	5,547,779	Copper ..... *Lbs.*
2,11	.....	13,923,281	.....	15,334,318	.....	17,181,562	.....	15,871,401	.....	15,906,478	.....	165,801,941	Gold .....
3,12	.....	295,797	.....	297,667	.....	278,588	.....	223,259	.....	169,457	.....	6,929,058	Granite .....
4,10	2,446	24,584	5,158	51,014	1,310	12,580	2,200	19,250	3,100	23,600	31,034	297,308	Gypsum ..... *Tons*
2,10	51	2,040	.....	.....	.....	.....	5	200	.....	.....	145	5,575	Infusorial Earth.. *Tons*
2,10	200	1,500	.....	.....	.....	.....	.....	.....	.....	.....	450	3,500	Iron Ore..... *Tons*
4,15	475	28,500	796	49,364	646	38,805	298	20,264	328	23,907	6,026	451,405	Lead ..... *Tons*
1,16	.....	337,975	.....	457,784	.....	332,617	.....	291,456	.....	278,558	.....	4,116,946	Lime and Limestone..
6,15	441,967	369,438	840,650	700,987	646,646	510,245	487,911	313,087	452,691	369,082	3,141,365	2,519,714	Macadam..... *Tons*
0,10	1,440	10,240	2,200	17,000	1,500	11,000	1,143	13,671	1,263	19,075	14,609	147,916	Magnesite ..... *Tons*
4,10	523	5,512	880	8,200	518	3,415	504	4,080	440	2,102	6,879	60,766	Manganese ..... *Tons*
0,00	.....	98,326	.....	56,566	.....	32,415	.....	7,280	.....	23,594	.....	650,211	Marble .....
6,95	610	14,140	750	8,425	395	5,540	578	8,165	653	9,698	3,663	74,873	Mineral Paint.... *Tons*
0,57	402,275	184,481	701,397	291,500	808,843	337,434	1,508,192	345,863	1,429,809	213,817	8,697,834	2,601,125	Mineral Water.. *Gals.*
8,00	.....	79,072	.....	112,000	.....	114,457	.....	62,657	.....	74,424	.....	648,790	Natural Gas.....
7,00	.....	20,000	.....	12,000	.....	24,000	.....	.....	.....	.....	.....	91,400	Onyx and Travertine.
08,92	783,078	1,064,521	1,245,339	1,000,235	1,257,780	1,180,793	1,911,569	1,918,269	2,249,088	2,376,420	10,605,167	12,600,985	Petroleum ..... *Bbls.*
47	100	600	150	900	162	944	150	900	300	1,800	2,817	13,501	Platinum ..... *Ozs.*
	.....	.....	.....	.....	.....	.....	.....	.....	6,000	30,000	6,000	30,000	Pyrites..... *Tons*
0827	30,416	934,000	36,104	1,337,131	30,765	1,075,449	26,648	993,445	31,092	1,188,626	352 486	14,045,404	Quicksilver .... *Flasks*
9900	219,933	295,400	414,038	394,952	313,973	329,639	333,212	287,025	724,674	445,395	2,105,430	1,951,611	Rubble ..... *Tons*
1300	49,131	140,087	53,031	150,576	64,743	153,244	67,851	157,520	93,421	170,855	510,870	1,504,858	Salt..... *Tons*
2614	.....	113,592	.....	35,373	.....	28,378	.....	24,086	.....	46,384	.....	1,024,725	Sandstone .....
	.....	.....	4,000	4,000	1,500	6,000	2,500	2,500	750	3,000	8,750	15,500	Serpentine.... *Cu. Ft.*
3757	.....	297,332	.....	599,789	.....	422,464	.....	452,789	.....	414,055	.....	9,287,753	Silver.....
2100	1,800	11,700	1,350	9,450	500	2,500	400	2,800	400	2,800	23,450	137,339	Slate ..... *Squares*
1750	.....	.....	25	375	.....	.....	.....	.....	.....	.....	425	18,125	Soapstone ..... *Tons*
	1,530	20,000	1,900	47,500	3,000	65,000	5,000	110,000	7,000	154,000	18,430	396,500	Soda ..... *Tons*
	.....	.....	.....	.....	.....	.....	.....	.....	2	50	2	50	Sulphur ..... *Tons*
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	287,289	59,964	Tin..... *Lbs.*
61		$20,203,294		$22,844,664		$24,291,398		$25,142,441		$27,289,079		$249,731,303	..... Totals



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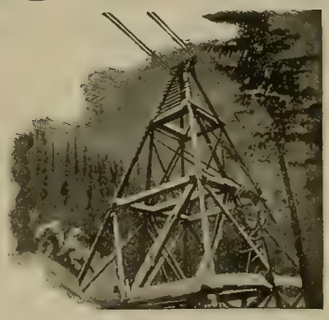
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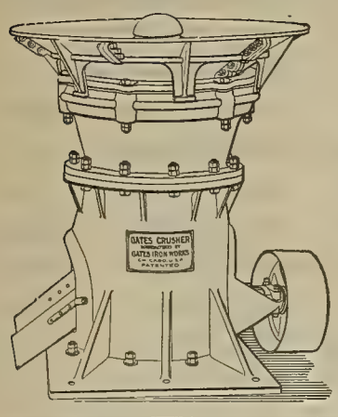
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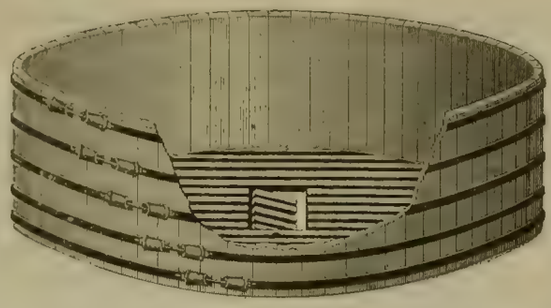
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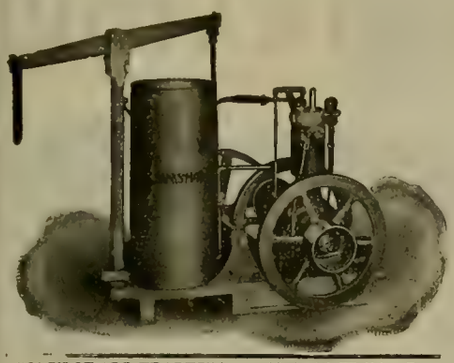
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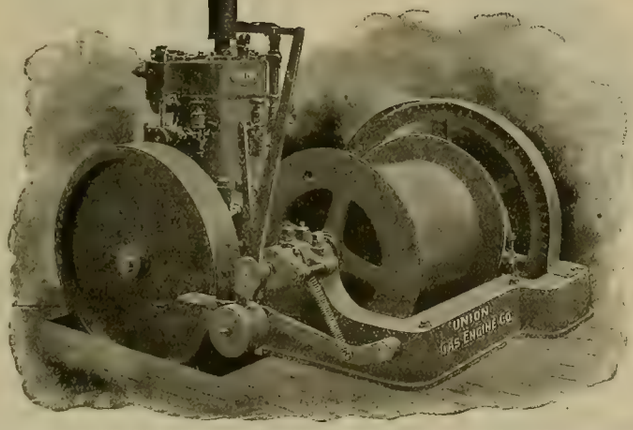
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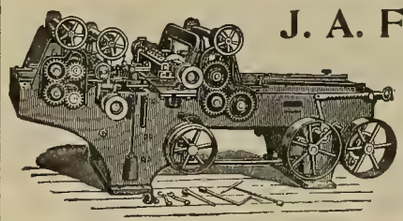
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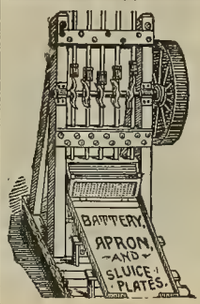
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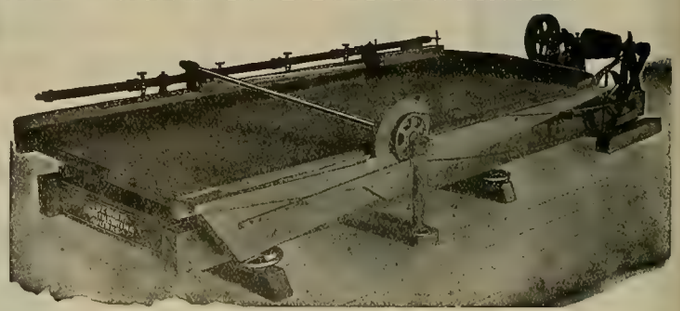
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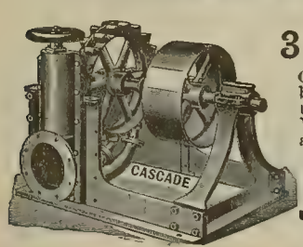
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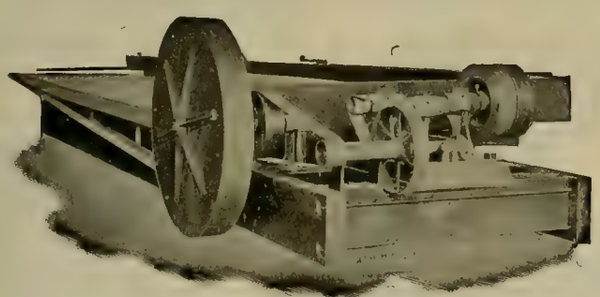
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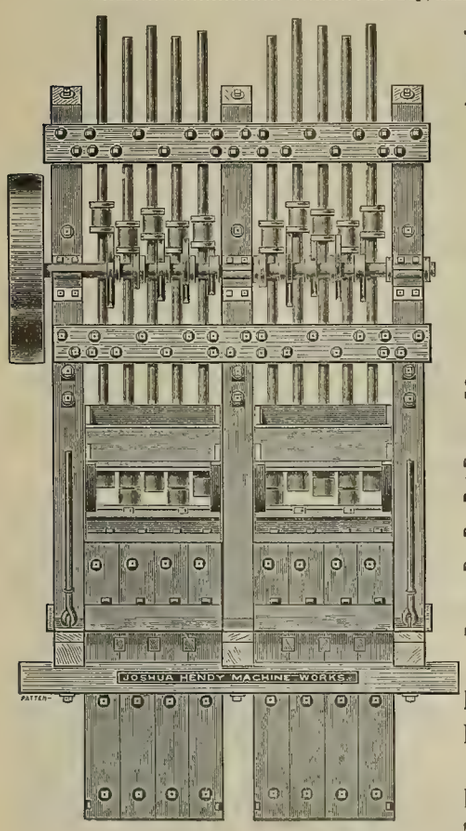
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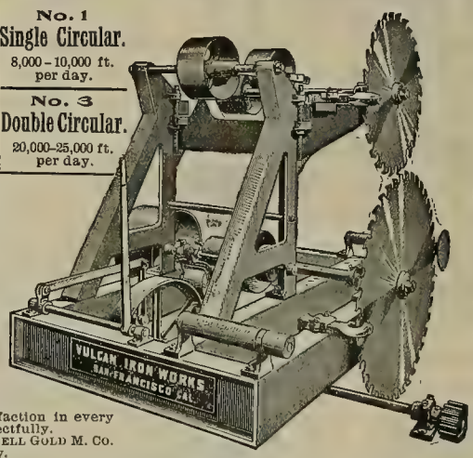
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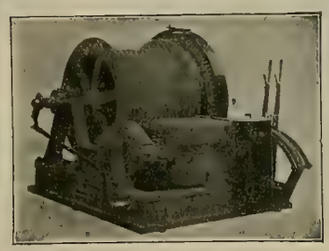
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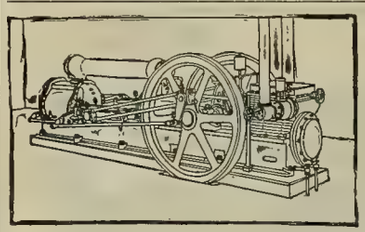
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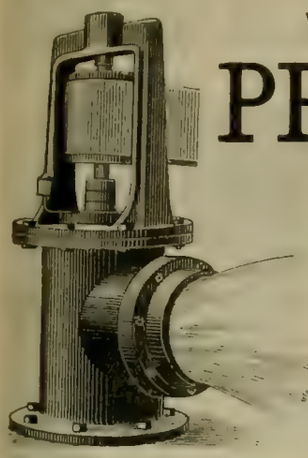
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For Deep or Shallow Lifts.

CAPACITY 100 TO 15,000 GALLONS PER MINUTE.

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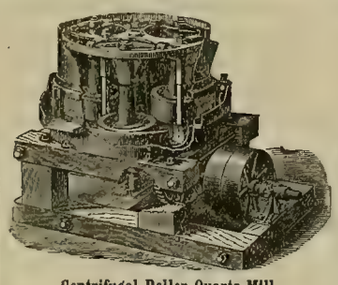


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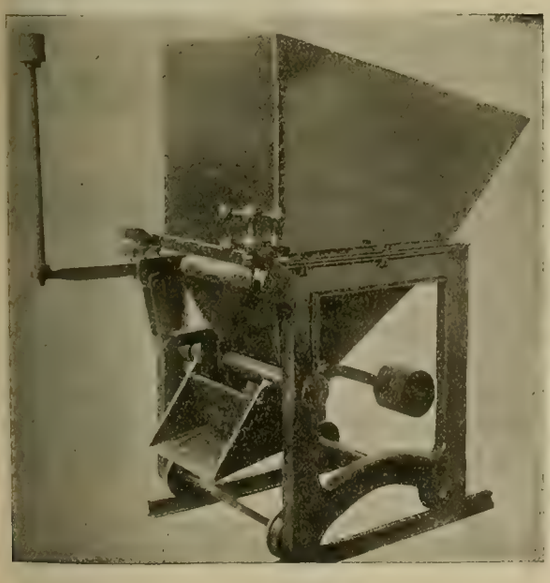
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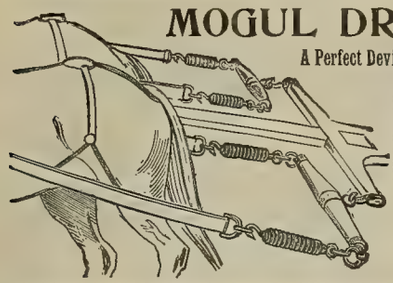
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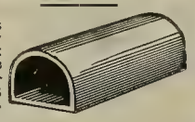
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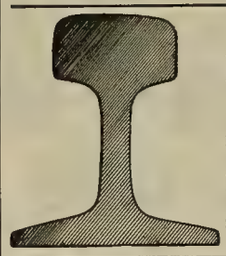


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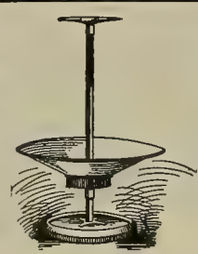


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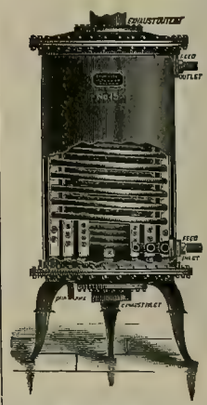
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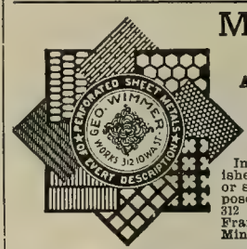
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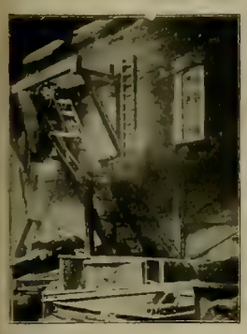
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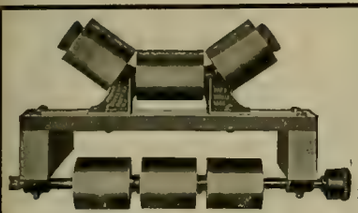
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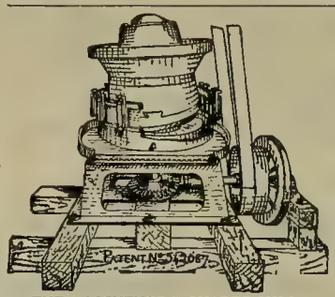
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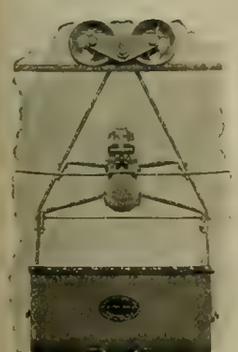
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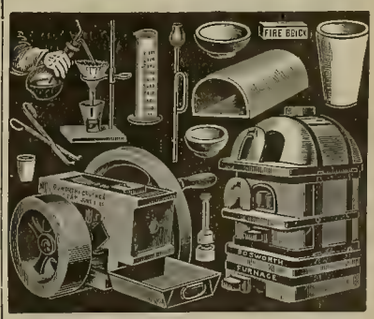
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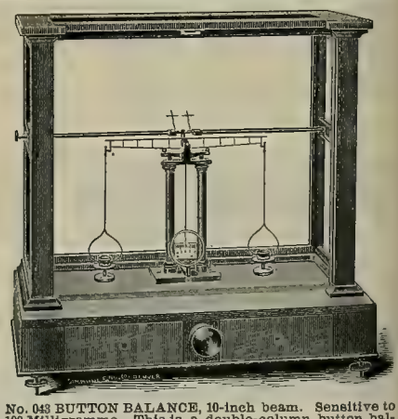
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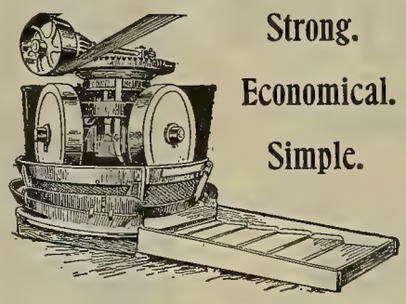
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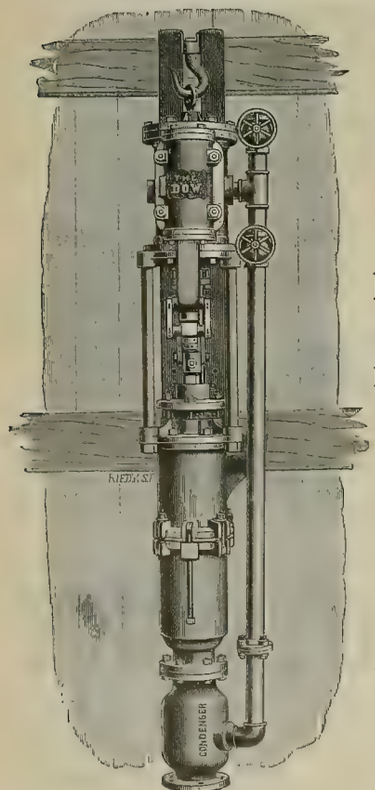
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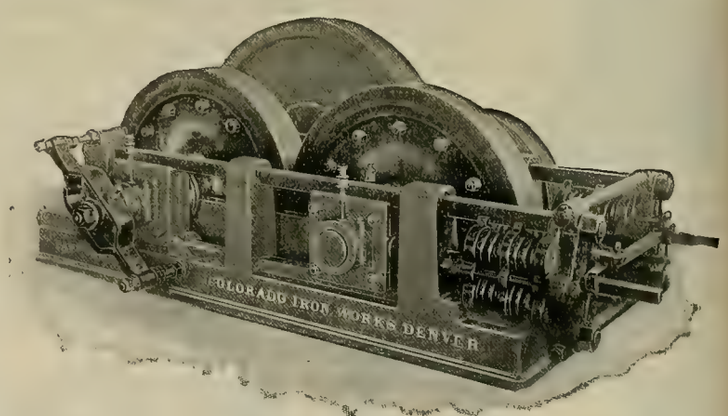
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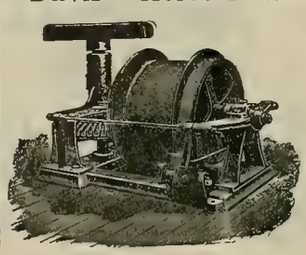
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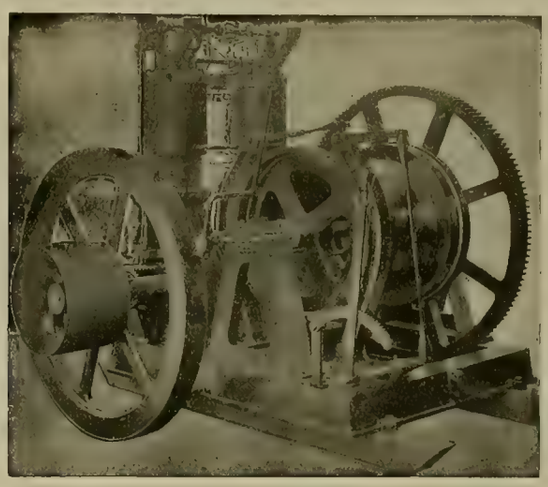
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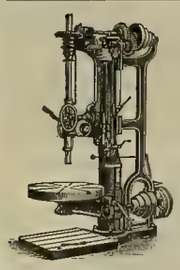
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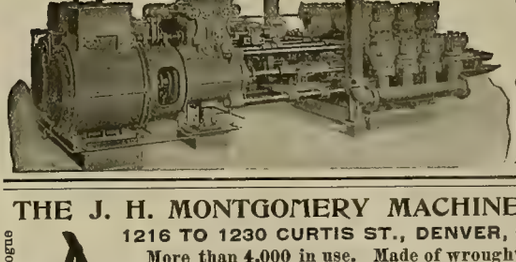
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SAN FRANCISCO, Sept. 21, 1899.

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Silver shows a further decline since last week, though only a small fraction; but it is in this manner that the price has steadily declined for several weeks past.

A Washington special says:

It may be an astonishing statement to say the United States Government refuses to accept gold of its own coinage in exchange for silver dollars, but that is what at least one sub-treasurer is actually doing. A complaint comes from St. Louis, where the sub-treasurer declines to exchange silver dollars except for silver certificates. Neither gold nor banknotes will tempt the white coin from his vaults. It is possible for the United States Treasury to reach a point where a general order will be issued to all sub-treasurers forbidding them to exchange silver dollars for gold, national banknotes or any other form of currency except silver certificates.

Uncle Sam presents the remarkable spectacle of trying to get rid of gold and of hoarding silver, all of which is an interesting phase of the wave of prosperity.

While the Treasury has in its vaults gold to the enormous total of $342,691,648, of which $255,022,899 is not covered by gold certificates, and while this dazzling hoard is steadily growing larger, there is a famine of silver dollars. The country is doing such a tremendous business that the people are ravenously hungry for money of small denominations. In the East there is a special demand for $1 and $2 bills. In the West silver dollars have been drawn from the sub-treasuries until their stocks are about exhausted. In all sections there is such a demand for fractional silver that the Government supply will soon be eaten up if the present rate of call keeps up.

The Treasury has on hand $406,576,436 in silver dollars, but most of these must be retained in the vaults for the redemption of silver certificates, which aggregate $406,187,504. This leaves $388,932 in silver dollars in the Treasury and its branches that are not covered by notes.

The Treasury stock of fractional silver is down to $3,456,899, and there is no law for buying any more bullion for this coinage. The Government officials fear the entire stock of small silver will be called into circulation before Congress can take action to meet the great demand.

LEAD.—New York reports quiet, $4.57½ bid, $4.62½ asked; brokers' price, $4.40.

Local, pipe, 7¼@7¾c; sheet, 7¾@8¾c; pig, 6¾c; bar, 6¼c.

COPPER.—New York reports Lake very quiet at $18.50; brokers' price, $18.50. Local —Mill copper plates, 23¾c.

Exports of copper from Japan during the first six months of 1899 amounted to 10,601 tons, against 6268 tons for the same period in 1898. Of the above amounts, 10,270 tons went to Europe in 1899 and 4602 tons to the same continent in 1898. In New York there is a quieter market for copper at 18¾c for the Lake brands, with sellers more numerous at these figures. The market is dull, but prices hold their own. It is not yet known whether the Calumet & Hecla intends to drop its price to 18c on the next sale, but there are some suggestive movements which may or may not be regarded as a forerunner of coming events. There is information to the effect that the stock of Chili bar copper at Liverpool, amounting to between 9000 and 10,000 tons, is to be shipped to this country for treatment in one of the refineries here.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Weak, $31.75 bid, $32.15 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $46; export, $40.50 @41; carload lots, special rates.

The local price of quicksilver has advanced within the past week. The market has shown an upward tendency for some time past.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 68⅔s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ℔ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¼ @6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¾c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¾c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.10 per gal.; bbl., $1.05; pure No. 2, cs., 85c; bbl., 80c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.15; less than 200 gals., $1.10; in bbls., 4c per gal. less than case; Baker's Crystal, $1.40; China Nut, 50c; Linseed, strictly pure, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 44c; cs., 49c; raw, bbl., 42c; cs., 52c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 16½c; Astral, 16½c; Star, 16½c; Eocene, 18¾c; Extra Star, 20½c; Elaine, 21½c; Water White, bulk, in tanks, 11¾c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¾c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86 deg. Gasoline, bulk, 21c; do., cs., 26c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 20½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 47c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

San Francisco Stock Board Sales.

SAN FRANCISCO, Sept. 20, 1899.

9:30 A. M. SESSION.

200 Andes	13c	400 Gould & Curry	26c
300 Best & Belcher	48c	50 Mexican	46c
100	49c	600 Potosi	52c
500 Bullion	07c	100 Union Con	43c
100 Chollar	44c	200 Utah	13c
300 Con. Cal. & Va.	$1 70	100 Yellow Jacket	29c
100 Crown Point	21c		

2:30 P. M. SESSION.

100 Belcher	35c	400 Potosi	52c
600	34c	300 Savage	31c
50 Caledonia	63c	350 Sierra Nevada	77c
300 Con. Cal. & Va.	$1 75	50 Standard	$3 00
700 Ophir	$1 10	100 Union Con	43c

Mining Stocks and Securities for sale. Purchaser guaranteed against loss. Correspondence solicited from people wishing to buy Stocks and Securities, and also from brokers and others who are able to dispose of Stocks and Securities.

Address **E. N. BREITUNG,**
Marquette, Mich., U. S A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

S. O. Graham, J. H. Garrett, J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

FROM $3 TO $5
WHILE YOU WERE WAITING.

July 20 our stock was placed upon the market at $3 per share. It has advanced steadily since then until it is selling now at $5. Par value of each share is $10, which it will sell for by January. There are but 1000 shares offered at $5 per share. If you want to double your money in four months, with the possibility of making 1000 per cent when oil is struck, now is the opportunity.

PROSPECTUS FREE GIVING
"Inside Information."
UNION-CONSOLIDATED OIL & TRANSPORTATION CO.,
332 PARROTT BLDG., SAN FRANCISCO.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

—INVEST IN—
SUMPTER,
OREGON.
We can make you money on SUMPTER REAL ESTATE AND MINES.
Write for information as to prices of LOTS, BUSINESS INVESTMENTS and MINING PROPERTIES.
ERWIN & CO.,
Real Estate and Mining Investors,
SUMPTER,.....OREGON.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. B. Jacks, in the Badger Hill mine, near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek and Woods Ravine, and from John O. Smith et ale., in the Smith's Blue Gravel Mine, near Ono, Shasta Co., to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 9, 1899, at 1:30 P. M.

WANTED.—POSITION BY EXPERIENCED cyanide man and mining engineer, preferably in charge of a cyanide plant. Am a thorough chemist and assayer. Technical graduate. Salary moderate. Best of references. Address K. C. N., care this paper.

WANTED.—Situation by young technical graduate of practical experience as assayer, chemist, etc., also experience in cyaniding, chlorinating and stamp milling. One year's experience in Mexico. Speaks English, German and Spanish. Location immaterial. Member of Am. Inst. of M. E. Address "Technical Graduate," this office

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

AN EXPERIENCED MILLMAN DESIRES position in a mill: understands concentrators and assaying; thoroughly competent. Address
Care of Mining and Scientific Press.

WANTED—To purchase working gold mine with mill and machinery; give full particulars. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

SECRETARY,
Accountant and Buyer
Open for engagement with large company after October 1st. Or will take charge of books for several small companies. A1 references.
Address S. A., this office.

LOST. 500 SHARES SANTA ROSALIA Mining Company's stock, Certificate No. 210, in name of H. M. LARUE. All persons are cautioned against negotiating the same, as transfer has been stopped.

FRED C. MILES,
CISCO, PLACER CO., CAL.
Gold and Copper Mines for Sale
AT VERY REASONABLE PRICES.

FOR SALE,
200 Acres Dredging Ground Averaging 25c. per yard. Privilege of Prospecting. Cheap Power, Etc.
Address W., care of Mining and Scientific Press.

Mines for Sale.
A specialty made of properties in Mexico and the Southwest. I have orders for *large, developed* and *producing* gold and copper mines. Must have good reports, maps, etc.
H. E RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
California Gold and Copper Properties in Shasta and Trinity Counties.
Working bonds on undeveloped claims. Contract work superintended for absentee purchasers.
PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

F. B. COOK & CO., MINES AND MINING,
Atlas Block, Salt Lake City, Utah.
Properties reported on and development work superintended for investors.

WEST COAST OF MEXICO.
WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

S. M. SMITH. **E. LUNDQUIST, Mgr.**
Gold Melted, Assayed and Purchased. Cyanide, Chlorination and Amalgamation Tests.
National Assay Office,
ASSAYING AND ANALYTICAL WORK.
Office and Laboratory, 217-219 S. West Temple St.,
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Controls AND Check Assays
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MARINER & HOSKINS,
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Mining Engineers and Metallurgists.
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CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

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The Vancouver Assay Office and Ore Testing Works.
MINING ENGINEER, METALLURGIST AND ASSAYER.
Working Tests by Amalgamation and Cyanidation. Ores Purchased. Assays and Analyses.
Representative for:
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OFFICES: VANCOUVER AND VICTORIA, B. C.

MACHINERY For Sale Cheap for Cash.
Hoisting Engines, Air Compressors, Rock Drills, Rock Crushers, Dump Cars, Channeling Machines, Steam Shovels, Light Locomotives, etc., all in good condition. New or Second-hand.
WILLIS SHAW, 627 N. Y. Life Building, CHICAGO.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Powell's Patent Swing Check Valve.



SIMPLE, EFFECTIVE AND TIGHT.

Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

THE WM. POWELL CO.,
CINCINNATI, O.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California. Location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1899, an assessment (No. 1) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of October, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 28th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY. — Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of September, 1899, an assessment (No. 20) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

KATE HAYES MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, North San Juan, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment (No. 7) of One Dollar per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary

Office—320 Sansome street, room 24, San Francisco, California.

BADGER HILL AND CHEROKEE GRAVEL MINing Company.—Location of principal place of business, San Francisco, California; location of works, Cherokee, Nevada County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 24th day of August, 1899, an assessment of Three Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of September, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 19th day of October, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

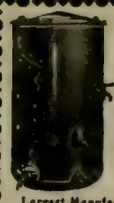
Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of September, 1899, an assessment (No. 14) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.



REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO.
AKRON, OHIO.

Largest Manufacturers of Oil Filters in the World.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 14) levied on the 19th day of July, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Chas. Peach	23	2,000	$200 00
F. Brey	28	1,250	125 00
M. Raschen	66	250	25 00
Fred Britten	147	150	15 00
George Britten	148	50	5 00
Henry Voll	159	150	15 00
H. Gumbel	160	1,250	125 00
H. Gumbel	161	500	50 00
Chas. Gumbel	162	380	38 00
H. Helfrich	166	250	25 00
N. Frost	186	100	10 00
N. Frost	199	100	10 00
N. Frost	203	50	5 00
F. M. Freund	270	200	20 00
F. M. Freund	271	200	20 00
F. M. Freund	272	200	20 00
H. Goldsmith	278	42	4 20
Chas. Peach	299	388	38 80
N. Frost	308	100	10 00
H. Gumbel	345	500	50 00
H. Gumbel	346	500	50 00
H. Goldsmith	353	148	14 80
Wm. G. Loewe	365	200	20 00

And in accordance with law, and an order from the Board of Directors, made on the 19th day of July, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the company's office 237 Twelfth St., San Francisco, California, on MONDAY, the 25th day of September, 1899, at the hour of 5:30 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

AUG. BERBER, Secretary.

Office—237 Twelfth St., San Francisco, California.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMpany.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Guy C. Earl	73	800	$4 00
Guy C. Earl	161	320	1 60
D. M. Kent, Trustee	273	1,867	9 33½
Mrs. Elizabeth Weaver	315	500	2 50

And in accordance with law, and an order from the Board of Directors, made on the 12th day of September, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California, on SATURDAY, the 7th day of October 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 8) levied on the 9th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
W. G. Loewe	122	500	$50 00
E. Hartmann	136	500	50 00
G. F. Schwarz	209	50	5 00
M. Ile-Baird	158	1000	100 00
J. H. Pelz	200	500	50 00

And in accordance with law, and an order from the Board of Directors, made on the 9th day of August, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on WEDNESDAY, the 11th day of October, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each. JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

HEALD'S

BUSINESS COLLEGE.

24 Post Street, - - - San Francisco.

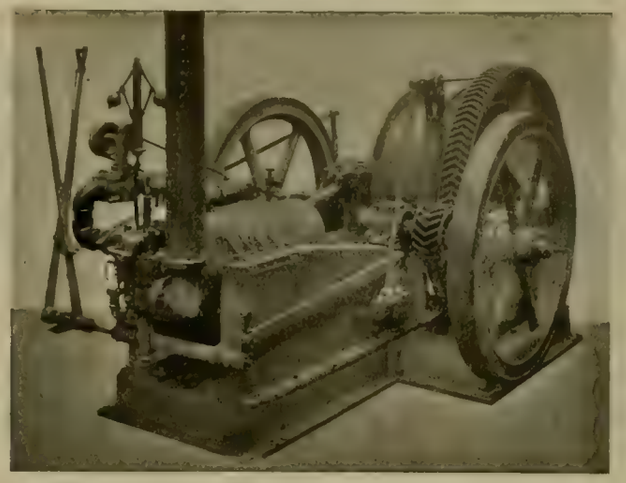
MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction.

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

HERCULES HOISTS Are Sold the World Over..



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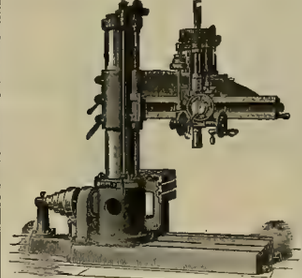
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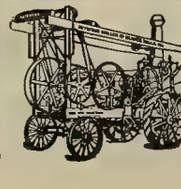


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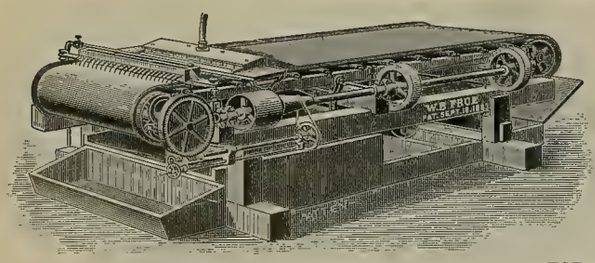
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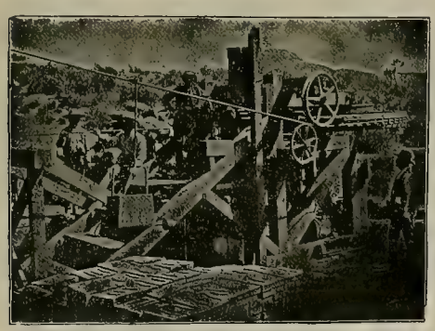
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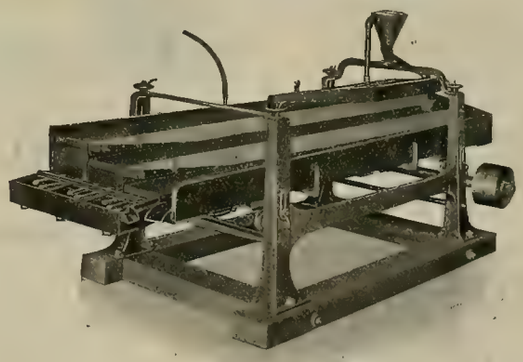
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Gives THREE CONCENTRATES on the one Machine at the same operation.
The Machine is especially adapted to the separation of Zinc and Lead.

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MINING AND SCIENTIFIC PRESS.
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No. 2047.—VOLUME LXXIX. Number 14. SAN FRANCISCO, SATURDAY, SEPTEMBER 30, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Vagaries of Geology.

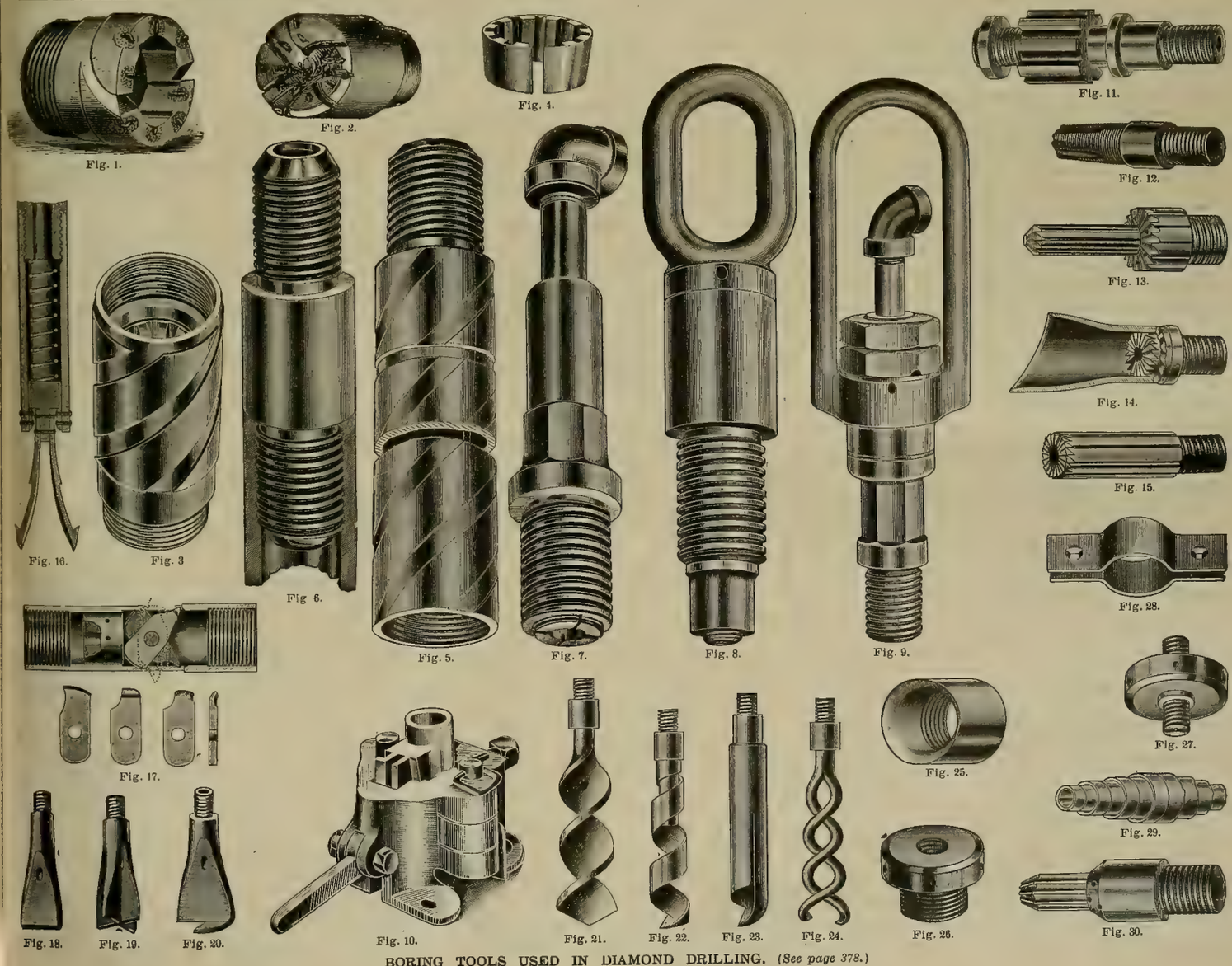
It is not strange that geologists do not always agree upon the origin of geological occurences which are not absolutely plain to all. No geologist, having seen it, will dispute that the Grand Canyon of the Colorado river, in Arizona, has been formed by the erosive effect of the river and its sediment, scouring throughout a long period while the land was slowly rising. There are, however, other geological features less profound but far more difficult of interpretation. The correlation of geological formations far removed from each other is one of the most difficult problems with which the geologist has to deal, particularly in the case of azoic rocks which, containing no fossils, leaves their determination to lithological features only, and consequently geologists do not always agree as to the age of this formation or that.

An overturned fold often results in a perplexing problem where the exposures are poor, occurring only in patches, and when the result is observed—that of an older formation lying upon a younger—there appears room for discussion as to the existing conditions. The age of certain uplifts has been the cause of much discussion, and in the determination of the facts geologists are not always of one mind. To one the evidence may indicate that the occurrence took place during cretaceous time, and another will find what he considers sufficient evidence to justify the belief that it did not occur until the tertiary period.

Often when a mining geologist goes to examine a mine for the first time he forms impressions which seem well founded, but a subsequent observation and more careful study satisfies him that his first impression was incorrect. Had he not gone back and taken a more careful look he would have left the place satisfied as to the character of the occurrences, and another coming later, discovering the true conditions, a disagreement would arise. All are liable to error, and one should not condemn too hastily the opinion of another without first investigating from the standpoint of view of the other.

It is an uncommon thing to find carboniferous limestones and schists lying upon quarternary gravels, yet such an occurrence exists in California, in the Black Hawk mountains of San Bernardino county. It is the result of a thrust fault, but it should be seen to be understood. Faults are important factors in the earth sculpture in some regions, and the fact that the puzzling conditions observed are not readily understood suggests the necessity for study in that direction.

The practical miner gives most of his thought and attention to the conditions he finds from day to day in his shaft or in the face of his drift, giving little thought to the broader questions involving the origin of his vein and its relation to its surroundings. He exposes the evidence of nature's work foot by foot and has the best opportunity for observation, but destroys the evidence as he goes, and too often pays little heed to it.



BORING TOOLS USED IN DIAMOND DRILLING. (See page 378.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Largest Circulation of any Mining Journal on the American Continent.

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San Francisco, September 30, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Boring Tools Used in Diamond Drilling, 369. Diamond Drill for General Underground Work; Diamond Drill for Boring Deep Vertical Holes, 378. Overland Mill, Sunshine, Mercur District, Utah, 380. Latest Mining and Metallurgical Patents, 381.
EDITORIAL.—The Vagaries of Geology, 369. Let There Be Light; Rights of Property Holders Along a Stream, 370.
MINING SUMMARY.—382-383-384.
THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 398.
MISCELLANEOUS.—Concentrates, 371. American Institute Mining Engineers, 372-373-374-375. Increasing Mill Capacity; The Creede Mines, South Dakota; The International Congresses of the Exposition of 1900; Gold-Bearing Sands of Vermillion River, 376. The Forest Problem in the West, 377. Mine Exploration by Diamond Drill, 378. The Frozen Deposits of the North; Improvements in Railroading; Concentration of Auriferous Sulphides in California, 379. Cheap Mining and Milling at the Overland, Mercur, Utah; The Electrolytic Refining of Auriferous Silver; Tides for Generating Power; Horse Power Supplied at Niagara; The Furnace Controversy, 380. Latest Mining and Metallurgical Patents, 381. Industrial Notes; Personal; Recently Declared Mining Dividends; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Books Received, 384.

SINCE the smelters have resumed operations in Colorado the works are surfeited with ore. One of them has nearly 20,000 tons stacked up, and the supply continues unabated.

AN Eastern financial journal, describing a gold property in Tuolumne county, California, says: "The Harvard has a quarry nearly 500 feet high, 4000 feet long and between 600 and 700 feet wide, which runs about $4 per ton in free milling gold." This constitutes a mass of ore containing 100,000,000 tons, worth nominally $400,000,000. A very good property to own, as with a mill of 1000 stamps crushing 4000 tons daily it would last seventy years, and then only be worked down to the bed of the river. But this magnificent mine is eclipsed by the statement coming from Santa Fe, New Mexico, where it is claimed there are $800,000,000 of gold in sight in the magnetic iron mines. Fortunately these statements are so grossly exaggerated that no one believes them, and consequently they do comparatively little harm. If either of these stories be discounted to the one hundred thousandth part it would still leave a greatly exaggerated statement which facts could not sustain. What useful purpose such reports are supposed to subserve is not apparent.

Rights of Property Holders Along a Stream.

The rights of property holders along the bank of a river has recently come into question again near Oroville, in Butte county, Cal., by a number of persons taking up land on Feather river between the lines of the owners' lots and the stream itself, it has been stated, for the purpose of dredging for gold. It has been formerly maintained that the rights of property holders located along streams extended to the center of the stream, but recently it has been asserted that the rights only extend to the meander lines as indicated by the United States Geological Survey.

The proper solution of this question will depend somewhat on the nature of the original grant and the intent of the grantor in making the conveyance. As a rule the meander lines are run on lakes and streams, not for the purpose of establishing a boundary for the land, but in order to determine the quantity of upland to be paid for by the purchaser.

Ordinarily, a meander line is not a boundary, but water whose body is meandered is the true boundary, whether it in fact coincides with the meander line or not. The owner of the lands so bounded has a right to follow the water as it recedes, and he is entitled to all lands which may be added by recession or accretion. On navigable streams the boundary is low water mark; on non-navigable, the center or thread of the stream.

As a general rule, we do not think land lying between a government meander line and the actual water boundary can be located under the mining laws after the government has issued its patent for the land bounded by the meander line.

Let There Be Light.

In his official address at the opening of the session of the American Institute of Mining Engineers in San Francisco on the 25th inst., President James Douglas among other practical points brought out clearly the good sense in every way of mining men, letting each other and the world in general know what they were doing. His remarks on that occasion will be found on page 373 of this issue. They deserve the favorable consideration of miners everywhere. They supplement and endorse what this paper has so long maintained, viz: the desirability from every point of view of publishing to the mining world the result of practical mining work. The time has gone by when there were great trade "secrets" in mining or anything else. There is a general consciousness of this, an increase of fraternity, a willingness to profit by others' experience, and to share in the dissemination of knowledge that is in happy contrast to the old hide-bound style of suppressing technical information, and it is with pleasure this paper notes so powerful an ally as the president of the greatest technical society in the world.

Some time ago in these columns this subject was given considerable space. Some of what was there said is here reproduced, it being necessary to quote what could not at present be improved:

In its many years of continuous and successful existence this paper has made the interchange of ideas and personal experience one of its strongest features, thus constituting it a medium of communication between progressive men, mutually aiding each other. Such contributions are always welcome, and those who feel so disposed are hereby requested to note the value to themselves of such articles and in their own case to make such contribution as they feel their knowledge or experience justifies. No one is asked to send all he knows, but many of our readers know a good deal about some one thing connected with progressive mining and on that particular thing each is here individually asked to send a few practical points that will doubtless be of considerable value to others elsewhere who are in doubt on the very matter that he has successfully solved. Everybody is wiser than anybody, and in a technical paper like this much of its practical value is due to articles written by men who have in their own experience proved that what they are writing about is an accomplished fact.

The suggested description or discussion can be as long or as short as its writer may deem necessary. Sometimes 100 words will tell all that is needful; in other cases 2000 may he needed to properly explain the matter under discussion. Sketches, photographs, and, in fact, all manner of illustrations can be used (except "blue prints"), the engravings made therefrom embellishing and adding to the value of the communication.

Quite often the impulse exists, but a man is too busy or too tired. Yet nearly every intelligent miner has some time in his life done something in his line that he is proud of, or that he thinks or feels is about as good as any one else could have done under the circumstances; something hard, or unusual, that took all his wits to make a success, or at least not a failure. There are a thousand things in mining that deserve the notice and world-wide publicity accorded by publication in this paper, and any one, anywhere, who reads this will please consider it a special invitation to him to write down some past or present experience of his and send it to us. Here are over a hundred suggestive topics that occur to the mind of the writer during the time devoted to the writing of this article:

How to best save the fine gold when milling cemented gravel in drift mines; an example of successful co-operative mining; profitable working of a custom stamp mill; the building and operation of a wing dam; best arrangement for drop of stamps and why; experience with hydraulic elevators; improvement in arrangement of pipe lines and delivery of water through monitors; daily work of a small cyanide plant; leaching carbonate copper ore with sulphuric acid; results of this season's river mining; cost of mining and milling gold ore; practical method of mine examination; economical work in running a tunnel in hard ground; treatment of low-grade copper ore; relative value of electric and compressed air power, by one who has tried both; how a fire in a shaft was successfully handled; sampling lead ores; retorting amalgam; main requisites in a mining report; improvements in gold milling; use of liquid chlorine in chlorination process; proper contour of silver-lead furnaces; example of profitable treatment of mine tailings; how a leaser made his lease profitable; new points in mine timbering; successfully resisting a "claim jumper"; best location and arrangement for a good mill; experiences of a prospector; overcoming of machinery transportation difficulties; system of fire protection in a mining camp; building a pipe line; satisfactory instance of profit sharing"; wear and tear of shoes and dies; best disposition of smelter slag; record of unwatering a mine; building and maintaining reservoir dams; successful record of a California debris storage dam; timbering in drift mines; utilization of waste water; admission of visitors into a mine; relative value of zinc dust and zinc shavings in cyanide process; amalgamation tests; relief in case of mine accident resulting in personal injury; best arrangement of 10 stamp mill; successful securing of gold from black sands; to obviate loss in scorification assays; use of chuck-block in mortar; working with an arrastra; assaying concentrated sulphurets; slow vs. rapid-drop stamps, prospectors' drill; cam improvements; belting on concentrators, incline vs. vertical shafts; river dredging; mining low-grade cinnabar ore; ditch and flume building; wooden vs. iron battery frames; lead dust accumulator; rawhiding ore; flashlight photography; practical working of miners' unions; battery sizing boxes; sharpening drills; effective form of rolls; making valuable an abandoned mine; what a dry washer can do; proper duties of a mine foreman; removal of amalgam from copper plates; economic matting of sulphide ores; ore sampling in mill; organizing a joint stock mining company; one day in a mine manager's active duties; development of a "prospect" into a paying mine; successful drainage of a deep shaft; ventilating a drift mine; best weight for stamps; suitable arrangement of mill building on site; putting off large quantity of blasting powder; vertical vs. horizontal engine for stationary work; how "assessment work" is done; experience with iron riffles as a gold saver; timbering an incline shaft; changes in stamp practice; developing a prospect; selling a mine; operation of an amalgamator; details of cost of 6x8 tunnel; some ultimately successful mistakes; transmission of power; oil as fuel; spontaneous combustion; ore sorting; mine inspection; application of belts and pulleys; utilization of water power; cleaning up after a cave; good method of bank blasting; concentrator work; improvements in sluice building; ore amalgamation in the mortar; chlorination tailings as flux in smelting galena; best ore crushing for cyanide process; errors in mill construction, etc.

The above proposed topics are merely suggestive; as many more, probably better and equally practical, will readily occur to many of our readers, the idea being to illustrate the manner of mining work that could with common profit to the mining world be presented in this open forum. "My light is none the less for having lighted that of my neighbor," and in all ages the passing on of a light has symbolized the increase of knowledge in all the useful arts and sciences. Science is organized knowledge; art, its application; and in all the wide domain of arts and sciences none is more generally useful than the art and science of mining; no men are better fitted to give instruction therein than those who have successfully solved so many of its problems and worked them out in practical detail. It is from this class of men, scattered throughout this west half of America, that this journal cordially invites such communications, that their work may receive permanent record herein and be of value to so many others also at work in the development of this nation's great basic industry.

Concentrates.

TOUGH ROCK requires wider holes than brittle rock.

MURIATE (chloride) of copper is green—darker than malachite.

FOR fuel purposes three barrels California oil are considered equivalent to one ton of ordinary coal.

THERE are 3000 shareholders in the Calumet & Hecla Copper Co., very few of them hold over 1000 shares.

THERE are no zinc reduction works on the Pacific Coast. The Chapman Co., 422 Battery St., San Francisco, buy antimony ore.

IN the last fifty years the State of California has yielded an aggregate value of eighteen hundred million dollars in mineral products.

IN a placer location of 160 acres by an association but one discovery is sufficient. Such association must consist of at least eight individuals.

ALTHOUGH liquid air is reported to have been successfully used in blasting operations, it has not as yet come into extended use, nor is it likely to.

IT is stated that on a clear day the summit of the mountain Fernando Po, off the west coast of Africa, can be seen at sea from a distance of 250 miles.

THE original gold nugget found by Marshall at Coloma, Cal., Jan. 19th, '48, is now in the possession of W. W. Allen, 323 Phelan building, San Francisco.

A DESIDERATUM is a blasting powder, safe to handle and equal to the various grades of nitro powder, which, upon exploding, shall make no noxious gases.

THE new Tamarack shaft, near Houghton, Mich., will be completed in two years more. It has five compartments and connects with levels two miles in length.

NATIVE TELLURIUM is rare, but is found in Boulder county and in other parts of Colorado. It is most commonly granular, massive, but sometimes occurs in six-sided prisms.

AT one period in its history the Robert E. Lee mine on Fryer Hill, Leadville, Colo., produced about $117,000 in seventeen hours. The ore was very rich in chloride of silver.

COLORADO mine owners have now to advertise for working miners, and the usual line in the morning papers, warning miners looking for work, to "keep away," is absent.

MINERS who have been making new locations for Uncle Sam are returning from the extreme east or west, where they have aided in perfecting title and doing location work.

Most of the ore deposits of Cripple Creek, Colo., occur in andesite breccia, but the veins also extend downward into the underlying granite. The Independence mine is in granite.

QUICKSILVER MINES, like those of copper, gold and other metals, can be made profitable on a very low percentage of metal if the deposit be large and other conditions are favorable.

THE ridiculous statements about molybdenite are not to be believed. Molybdenite is not used on this coast. Concentrated to a product of high percentage, it is worth about $200 per ton.

A GASOLINE engine uses about .12 gallon of gasoline per brake H. P. hour. Gasoline is rated according to its specific gravity, 74° Baume gasoline is ordinarily used, 72° and 76° being also employed.

FLUORITE, or fluor spar, treated with sulphuric acid, evolves an acid which will etch glass. Hydro-fluoric acid cannot be kept in glass bottles for this reason. It is put in leaden or rubber bottles.

THE treatment of ore in every mine is at first largely a matter of experiment, and it would be true economy at the start to employ a competent man to give the necessary information connected therewith.

MACHINE drills are simple in construction and are self operating with either steam or air, but there are many things concerning machine drills and their operation which can not be learned in a day as some suppose.

THE eucalyptus (red and blue gum) of Australia makes superior mine timbers when round, but are not as good as pine when squared, owing to variations in the grain. This timber is used extensively in Australian mines.

IN some ores the gold occurs in association with other minerals which render amalgamation difficult or impossible. The gold may in some cases be obtained by concentration, where amalgamation or other methods fail.

To determine the h. p. of a water supply, multiply number of gallons flow per minute by pressure in pounds per sq. in.; divide product by 1500. To find "pressure in pounds per sq. in." multiply number of feet fall by 0.433.

THE two samples of mica from Independence, Cal., and Shasta, Cal., are not large sheets enough to be of commercial value. The value of mica is in direct proportion to the size of the sheet and the ability to cleave it economically. Good sheets 10x12 inches ought to bring $10 per pound.

AN "original locator" can locate as many more claims as he wants to, and by doing the required amount of assessment work, can hold them. A woman or a minor can locate, and, by complying with legal requirements, can hold a mining claim.

SOME big "dumps" in California, containing many thousand tons of tailings suitable for cyaniding, are at the Utica mine, Angels; Zeila and Kennedy mines, Jackson; Voorhies & Barney, Sutter Creek and Drytown; Golden Gate Mining Co., Sonora; Alvinza Hayward, Plymouth. There are countless other lots of smaller quantity.

THE so-called "clay" often found as an accompaniment of mineral veins in some instances is not clay at all, and contains merely a trace of aluminum, being, in fact, silica in an extremely fine state of division, yet possessing some of the physical properties of clay.

A MINE MANAGER recently testified that a property which had been under his management for four years never paid more than expenses. On being questioned more closely he said the mine paid no profits, but the dividends came from the boarding house and store.

SPOKANE, WASH., wants to build a smelter, and wisely debates its site, whether to erect it where the prevailing winds will blow the fumes through the town, or build outside and with a view to subsequent sanitary requirements.

SCHEELITE, containing 67% of tungstic acid, has been worked at Macraes, Otago, New Zealand. It is found associated with the ore—an auriferous lode—and is obtained by crushing the quartz, the scheelite being recovered by concentration.

"CHEAP" ASSAYING is like "cheap" advertising. In both cases it is not what you pay, but what you get for what you pay that determines the value. "Cheapness" is only a relative term, and "cheap" work is very often the costliest kind to those who pay for it.

WHERE several holes, heavily charged with nitro powder, are to be fired in a shaft, in which it has been necessary to carry the timbers near to the bottom, it is not advisable to discharge them simultaneously by means of the electric spark, as great damage to the timbers may thus result.

SOFT GROUND may be blasted with black powder to better advantage than with nitro powder. Hard ground requires high-grade (No. 1) powder; medium ground, No. 2. When breaking short ground deep holes are not advisable, except where the previous blasts have left a particularly favorable condition.

NITRO POWDER freezes at about 42° F. There is great danger in thawing powder when once frozen. It should be handled as little as possible. It may be safely thawed by placing in a tin can or bucket, surrounded by warm water, which is very gradually heated. Nitro powder must not be subjected to sudden changes of temperature.

THERE are numerous shafts in California drift gravel mines more than 500 feet in depth, in most instances the upper portions of these holes being in the volcanic or lava cap covering the gravel. There are also gravel deposits through which no shafts have been sunk, exposed in old hydraulic workings, 600 feet below the original surface.

NEAR Stockton Hill, Arizona, is found a vein carrying a complex ore, in which iron, lead, zinc and copper sulphides are prominent, with usually good values in silver and low values in gold. Crossing this vein at a right angle is another vein composed almost wholly of quartz, but carrying a small amount of iron and copper sulphides and rich in gold.

WHERE there is a soft streak in a vein or where the vein itself is soft, it is usually good practice to pick out the soft material before blasting, as better headway may be made by so doing. It is not advisable to attempt to pick out the soft material further than can be conveniently done, as the loss of time would soon overbalance any gain otherwise obtained.

WHERE the low grade of the ore does not permit an extensive system of timbering and filling, the vein is worked in a series of large-sized rooms or stopes, timbered sufficiently to keep up the ground temporarily, and the pillars removed later, the ground being allowed to cave. This system is employed extensively in the Lake Superior region and the mines are worked very cheaply.

WHERE a shaft passes through the loose, soft earth or decomposed rock near the surface, which when dry stands well enough, close lagging should be done, for ground of this character when wet often runs badly and may later cause much trouble. As depth is attained and the ground becomes more firm the lagging may be spaced, and still deeper, where it is hard, lagging may often be dispensed with.

MOLYBDENITE and molybdate of lead are not the same mineral. The former is a soft, metallic, scaly, foliated mineral of glossy lead color, and is the sulphide of molybdenum. Molybdate of lead is a soft, brittle mineral, of light yellow to red color, having no metallic luster. It sometimes occurs with other lead ores and is not a desirable mineral in any large quantity, either in the mill or smelter.

"I am often too busy to read your paper through," writes a Sacramento, Cal., subscriber, "but I always read the advertisements. Without derogating from the value of the reading articles and items, I think the advertisements are very interesting. Recently I wanted to buy about $400 worth of machinery and upon looking through your paper found advertised just what I wanted."

THE American Consul at Pretoria calls the attention of the State Department to the fact that under the laws of the Transvaal Republic all residents may be impressed into military service, regardless of nationality, and urges that strong representations be made to the Boer Government before the outbreak of hostilities, in order to prevent the impressment of 1000 Americans in that country liable to military duty.

A SAW OUT may be made at the center of the inner side of wall plates used in shafts, for the purpose of lining up the sets, but it is unsafe to depend upon this center cut alone, for while the center lines may coincide exactly the ends may swing either in or out of a true line and result in a very bad job. The only safe way is to hang a plumb line at each corner, and line up three, four or even more sets at one time, then if they are "true" at the corners the centers must be in line.

APATITE is calcium phosphate. It occurs in crystalline rocks and granular limestone. In size the crystals range from extremely small, microscopic, needle-like objects found in various feldspars and other minerals as inclusions to large masses. In Ottawa, Canada, the Archæan formation contains large amounts of calcium phosphate. Some of the crystals are 1 to 2 feet in diameter and weigh hundreds of pounds. Large green apatites are also found in the granites of the Harney peak range, South Dakota.

TUNGSTITE is a yellow powder or incrustation occurring with wolfram, and is a result of its decomposition. Besides wolfram, the tungstate of iron and manganese, there are manganese tungstate (hubnerite), an iron tungstate (ferberite), lead tungstate (stolzite), which occurs in square octahedrons or prisms, and in color is green, gray, blue or red and has a resinous luster. Calcium tungstate is scheelite. It is usually found massive; in color, white, pale yellowish, brownish, greenish or reddish. It is transparent to translucent.

THE drying of ores by calcining previous to dry crushing often does more harm than good, particularly where the ores contain much sulphide mineral, as the partial oxidation of the sulphides interferes with the perfect operation of the cyanide process. The ores should either be dried by a long-continued low heat, or be thoroughly roasted, burning or volatilizing all of the sulphur present. Complete roasting can not be accomplished by the continuous kiln process, which requires the ore to be treated in large lumps, for the reason that the heat is insufficient to thoroughly oxidize the interior of these lumps of ore.

REPLYING to Kingman, Arizona: The territorial law of Arizona requires that all locations and registrations of mines and mineral deposits made in any of the mining districts of the Territory shall be filed with the County Recorder for record within sixty days after the same shall have been located. The law has been interpreted to exclude the first day—the day of location—and include the last day. Thus a claim located at any hour on January 1st after midnight December 31st would count January 2nd as the first day, January 3rd as the second day, etc. The sixty days would therefore expire March 2nd at midnight, in any year excepting leap year.

THE recent statement herein that in California all corporation stock of a Cal. corporation is assessable was correct and unassailable. The latest decision to that effect was in the Los Angeles, Cal. Superior Court, in July, '98, where in a contested case the judge closed his decision thus: "No power existed in the corporation to waive the legal right as to assessment on account of debts, or that the contract that no assessment would be made applied only to the unpaid subscription price. Accepting either theory, the stock issued to defendant remained assessable for the purposes for which this assessment was levied, notwithstanding the endorsement upon the certificates."

IN sinking a shaft on a small vein in granite, the vein dipped out of the shaft; but, it being desirable to continue the shaft vertically, this was done; as the vein in its dip got several feet from the shaft the granite became extremely hard. A crosscut was run, showing the vein to be about 5 feet from the shaft and approximately parallel with it, standing vertically. It was then determined to enlarge the shaft by cutting out to the vein. The result was a saving of 30% on the cost per foot in sinking during the first week and more than 50% during the succeeding weeks. The vein eventually dipped back into the shaft. This shows that it is often less expensive to remove all of the ground to a good breaking crevice, as a gouge, vein or fissure, as it facilitates breaking the ground.

A TUNNEL driven at the Red Point mine, on the Forest Hill divide, in Placer Co., Cal., was run several hundred feet before striking the channel. When the channel was worked it was eventually learned that the channel might have been reached within a few feet of the mouth of the tunnel; but the fact was not previously apparent, owing to the surface debris. At the Gray Eagle mine, on the same ridge, a shaft was sunk several hundred feet to prospect for a channel, and gravel was found, apparently in the channel. A tunnel was run several thousand feet to tap the bottom of the shaft, when, upon reaching it, the discovery was made that the shaft had struck a depression on the rim, and the tunnel had to be turned up-stream and run several thousand feet before bedrock was reached, on the main channel; which illustrates how difficult it is to see into the ground.

In the issue of the 9th inst. appeared the following: "'49, California; '59, Pike's Peak; '69, White Pine; '79, Leadville; '89, Cripple Creek; '99,——?" During the three weeks since it appeared have been received numerous letters, each filling in the blank with the name of locality from which the letter came; in several papers have also appeared notices of the same nature. The unanimity with which mining men and mining journals deem their respective localities fitted to fill the suggested requirements speaks well for the activity and promise of all, and is further suggestive of the fact that in many localities now exist conditions relatively justifying attention. In '99, so much is being done in mining that it would be an extraordinary development that would occasion a "rush" or such consequent excitement as occurred in the years of the notable "9s."

Smelters everywhere do business with a view to mutual profit; as do shippers. Whether it be a San Francisco or Utah or Colorado smelting company the ore will find its way to the one where, freight rates considered, the best returns can be had. Thus are found Utah ores going to California and California ores going to Utah. Smelters must have certain ores, and such ore is worth more to them—and consequently more to the shipper—than another kind of ore would be to that particular smelter. For instance, the ore cited from Inyo Co., Cal., sent to the Selby Smelting & Lead Co. of San Francisco may have contained flux, of which they had an excess, and, therefore, they could not work it for less than the stated charge, while a Colorado smelter might be urgently in need of such ore, and consequently make a very low rate of treatment. It must be plain, however, to all that no smelter can work ore for nothing and make a profit; and when this is done it is because their need of certain kinds of ore compels them to do so.

THE fissure veins of California are usually, though not always, accompanied by dyke rocks. The most prominent mines in the black slates have dykes as an accompaniment. Among the mines of this type are the Princeton, Hite's Cove, Marble Spring, Red Cloud and Martin & Walling in Mariposa county, where the dykes are fine-grained light-colored rocks resembling felsite. The Sheep Ranch mine, in Calaveras county, is in black slate and has as an accompaniment a granite dyke. The large ore bodies of the Golden Cross mines, at Hedges, in San Diego county, are intruded by irregular masses of pegmatite granite. The Stonewall vein in San Diego county has a granite dyke. The mines of Salt Spring valley all are accompanied by diabase dykes. In the central gold belt most of the mines are at the contact of altered diabase and black slate, but the Eureka at Sutter Creek and the Plymouth Consolidated mines at Plymouth were associated with dykes. The Bonanza pocket mine occurs within a dyke of diabase. A dyke as an accompaniment to a vein cannot be considered as indicative of value but is evidence of the deep-seated origin of the fissure.

American Institute Mining Engineers.

The twenty-ninth year of existence of the American Institute of Mining Engineers was signalized by the holding of its meeting in San Francisco, California, during the past week. In the early months of the year every detail was arranged by correspondence and wire, so that the local committees in charge were able to carry out the extensive programme. The Institute is world-wide in its membership and influence. There are about 2600 men who constitute this great technical society, and they are found in every part of the earth.

Following is a corrected list to date of their names and residences :

ALABAMA.

Aldrich, Aldrich, W. F. *Anniston*, Noble, A. E. *Birmingham*, Aldrich, T. H., Aldrich, T. H., Jr., Bowron, C. E., Boron, J., Hillman, McCormack, Montgomery, J. A., Ramsay, E. *Brookside*, Toulmin. *Ensley*, Fackenthal, J. S. *Helena*, Squire, J. *Huntsville*, Moss. *Rock Run*, Christianson, Garvin. *Stone Hill*, Herzig. *Talladega*, Lucas. *University*, McCalley.

ALASKA.

Douglas Island, Corbus, Mackay, A., Robeson, Weck. *Juneau*, Denby, Garside.

ARIZONA.

Bisbee, Danforth, Ricketts, L. D., Williams, B., Williams, Lewis. *Clifton*, Colquhoun, Plater, Smith, J. D. A. *Congress*, Fairbank, Goodloe, Noon, Staunton. *Curtiss*, Mills, O. E. *Globe*, Cook, E. H., Farnall, Waters, A. L. *Harqua Hala*, Fitzsimmons. *Jerome*, Mitchell, G. *Mammoth*, Andersen. *Morenci*, Douglas, W. *Nogales*, Banks, N. W., McLean. *Prescott*, Blandy, Blauvelt, H., Gage, Treadwell. *Riverside*, Innes. *Shultz*, Armstrong, T. *Tucson*, Blake, W. P., Riordan.

ARKANSAS.

Cushman, Denison. *Fayetteville*, Purdue. *Pinebluff*, Fordyce.

CALIFORNIA.

Alameda, Arents, Merrill, C. W. *Amador City*, Pritchard. *Angels Camp*, Allen, T., Ellis J., Loring. *Auburn*, Fisher, W. B. *Berkeley*, Blood, Christy, LeConte, Murphy, Simonds, E. H. *Big Oak Flat*, Dron. *Bodie*, Bosqui, Brown, R. G. *Colfax*, Neff. *Coulterville*, Mills, F. P. *Dimond*, Kornberg. *East Oakland*, Jacobs, G. B. *Foresthill*, Waterhouse. *Fourth Crossing*, Honnold. *Galt*, Harvey, F. H. *Gwin Mine*, Thomas, F. F. *Havilah*, Shaw, R. C. *Haywards*, Kimball, E. B. *Jackson*, Detert. *Keswick*, Neilson, T., Wright, L. T. *La Porte*, Turner, R. C. *Los Angeles*, Booth, F., Comstock, T. B., Pope, J. D. *Mare Island*, Stanford. *Michigan Bluff*, Power, H. T. *New Almaden*, Derby. *Newcastle*, Goodwin. *Oakland*, Howard, C. W., Lang, H., Merrell, J. M. *Orroville*, Evans, G. H., Scrutton. *Palo Alto*, Mitchell, D. P. *Petaluma*, Preston. *Quincy*, Mills, J. E. *Riverside*, Pedley. *San Ardo*, Lathtop, M. A. *San Diego*, Jenks, A. W., Robbins, F. C. *San Francisco*, Barbour, Bradley, F. W., Browne, R. E., Cheyney, Clark, F., Code, Crawford, J. J., Cross, Doble, Ellis, H. R., Eveleth, Gilson, Hanks, Heller, Holman, Janin, L., Jost, Kerr, M. B., Keyes, Lindley, Means, J. H., Miller, W. P., Jr., Myrick, Parker, R. A., Price, Radford, Ralston, W. C., Reddy, Spiers, Stevenson, R., Thomas, G. W., Wagoner, Wartenweiler, Watts, Willson, F. E., Wiltsie. *Santa Barbara*, Wood, T. D. *Sierra Valley*, Wilkinson, J. F. *Sonora*, Hopper, McClintock, Storms. *Soulsbyville*, Scott, W. G. *Standford University*, Branner, Newsome. *Sutter Creek*, Ross, J., Jr. *Tesla*, Norton, R. H. *Victor*, Del Mar. *Visalia*, Small. *Washington*, Cohoe.

COLORADO.

Altman, Henderson, J. McC. *Arrastra*, Whitaker, O. R. *Argo*, Pearce, R. *Aspen*, Bardwell, Bulkley, F., Cox, W. J., Devereux, J. H., Edwards, J. W., Freeland, Guinn, Hare, Little, Richards, J. F., Rogers, R. M., Woodward, H. E. *Boulder*, Easton, Heikes, Nickels. *Breckenridge*, Revett. *Buenavista*, Morley, B. F. *Central City*, Collins, A. L., Dickey, Fry, Rickard, F., Rickard, H. *Colorado Springs*, Bolles, J. H., Bolles, R. J., Dickerman, Gilpin, Leacey, MacNeill, Palmer, C. E., Strieby, Weston, W. *Cripple Creek*, Arthur, Babbitt, Countryman, Hills, Luckraft, Malins, Millikin, Moore, C. J., Rickard, E., Rigney, Starkweather, Warne, Willis, F. G. *Cyanide*, Tindall, Weed, F. *Denver*, Argall, P., Atkins, H. H. Jr., Austin, L. S., Austin, W. L., Bancroft, Barnhart, Brunton, Bulkley, F. G., Burger, Burlingame, Cazin, Curtis, Darby, Davis, W. C., Dewey, C. E., Emanuel, Farish, Foster, C., LeNeve, Furman, Gorham, Gouyard, Grant, J. B., Griffin, H. M., Hale, Hartung, Hawkins, J. D., Howard, W. C., Hughes, C. J., Jr. Johnson, W. E., Keebler, J. A., Kirby, Lakes, Lawrence, B. B., Livingston, Lowe, McClurg, J. A., Milnard, Nesmith, Noble, L. S., Page, W. B., Palmer, E. V., Paul, H., Pearce, S. H., Porter, J. A., Rickard, T. A., Roberts, J. C., Sayr, Schwarz, T. E., Shepard, F. E., Stearns, T. B., Storrow, Swart, Trimble, Turner, R. B., Valle, Vezin, Walter, R. J. *Dunton*, Litchfield. *Durango*, Amy, Jakway. *Eldora*, Englehardt. *Elkton*, Dwelle, Wilson, W. B. *Empire*, Woodrow. *Eureka*, Hanson. *Fort Collins*, Headden. *Georgetown*, Martine. *Gillett*, Hawkins, E. N *Golden*, Mye, R. *Goldfield*, Wood, L. S. *Grand Junction*, Nichols, J. C. *Idaho Springs*, Brown, A. H., Dumont, Underhill, Vivian, G. G., Wiley, W. H. *Lake City*, Abbott, J. W. *Laplata*, Pret. *Leadville*, Boehmer, Bohn, C. A., Cameron, D., Cameron, W. McC. Carnahan, C. T., Henley, Johnson, E. M., MacNutt, Morse, P. S., Mudd, Parrish, Weddle, Wood, T. S. *Ouray*, Carr, Hurlburt. *Pueblo*, Bayles, Eilers, K., Harnden, Howard, W. H., Johnson, E. W., Mitchell, H. W., Mosman, Rhodes, R. D., Robinson, C. S., Robinson, T. W., Wierum. *Rico*, Barnett, L. H. *Salina*, Sauer. *San Luis*, Van Diest, E. C. *Silverton*, Hollis, R. W., Holt, M. B., Kane, McCartney, Miller, C. W., Stoiber, E. G., Stoiber, L. A., Walter, E. W. *Telluride*, Carhart, Dikeman, Doolittle, Herron, Lay, Mansfield, Mercer, J. W., Polter, W. C. *Victor*, Amsden, O. B., Kurie, Stevens, E. A., Woodbridge, Woods, F. C.

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MONTANA.

Anaconda, Bellam, Sargeant, Wilkinson, T. K. *Basin*, Emlaw. *Belt*, Thomas, W. S. *Butte*, Abbott, A. A., Akers, Baker, T. F., Carkeek, J., Carkeek, W., Carson, A. C., Christian, Clark, E. M., Clark, J. K., Clark, W. A., Dunshee, Gillie, Hammer, J. G., Harper, Heinze, Leggat, McCormick, E., Mason, R. T., Moore, C. H., Putnam, Scallon, Schumacher, Siderfin, Thornton, W. D., Wethey, Williams, H., Wilson, E. H., Winchell, Wiseman, Wilson. *Coloma*, Browne, A. B. *Columbia Falls*, Langford. *Deerlodge*, Reed, H. S. *Dillon*, Poindexter. *Elkhorn*, Kelley, Zimmerman. *East Helena*, Cole, H. M., Dean, A. L., Heywood. *Gebo*, Welsh, H. F. *Gilt Edge*, King, E. W. *Great Falls*, Goodale, Klepetko, Shaw, W. T., Stockett. Woodbury, L. S. *Helena*, Braden, Freeman, H. C., Haskell, E. K., Sanders, W. E., Seligman, Wickes. *Laurin*, Dickerson. *Marysville*, Bowlby, Burrell, Herron, D. A., Holloway, F. F., Holloway, H., Philipote, Widdicombe. *Philipsburg*, Eye, Moffat, A. S. *Prize Mine*, Byrnes. *Red Bluff*, Turner, G. D. B. *Smelter*, Mannheim, P. A. L., Smith, F. M. *Whitehall*, Wilkinson, C. D.

NEBRASKA.

Omaha, Jones, L. J. W., Page, W. T.

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Candelaria, Sutherland, W. J. *De Lamar*, Oxnam. *Glenbrook*, Short, F. R. *Gold Creek*, Hamilton, F. C. *Hawthorne*, Knapp, S. A., Jr. *Midas*, Fleming. *Montgomery*, Godbe. *Palisade*, Pinder. *Virginia City*, Fielding.

NEW HAMPSHIRE.

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ARGENTINE REPUBLIC, Buenos Ayres—Hoskold. Chilicito Reoja—Williams, H. J. C. BRAZIL, Mariana—Cragoe. Santa Barbara—Miller, Jas. Villa Nova de Lima—Chalmers, G. BOLIVIA, La Paz—Armas. BRITISH GUIANA, Georgetown—Winter. CHILE, Santiago—San Roman. COLOMBIA, Cana—Robertson, J. R. H. Colon—Williams, E. G. Honda—Green, J. G., Russell, A. J. Medellin—Escobar. Palmira—Eder. Panama—Lefevre, H. F. Puerto Berrio—Halse, Scott, C. C. A. Quibdo—Granger, H. G. Santa Ana—Carleton. DUTCH GUIANA, Paramaribo—Edwards, W. S., Mayo. ECUADOR, Guayaquil—Finlay, von Isschot. HONDURAS, Yuscaran—Haskell, P. H. PERU, Lima—Figari, Gildemeister, Johnston, J. H.

ENGLAND.

Acton—Daw. Addlestone—Hatch. Borunemouth—Waugh. Brighton—Ashmore. Chatteris—Esson. Chesterfield—Pilkington. Chingford—Loram. Dudley—Hughes, R. W. Ellesmere Port—Addie, Robert. Ewhurst—Frecheville, W. Kingston on Thames—Johnston, R. B. Liverpool—Pearson, J. E. London—Attwood, Austin-Roberts, Bayliss, Bennet, Benson, Bird, R. M., Bratnober, Bromly, Butters, Calderwood, Carr, Carroll, Chalmers, J. A., Charleton, Chester, E. D., Claudet, Clunes, Davis, L. M., Dawson, Dorsey, Farrar, Fawcett, Francis, G. G., Frecheville, R. J., Gilchrist, P. C., Godley, Hammond, J. H., Harris, H. J., Henderson, J. A. L., Hinman, Hughes, A. D., Hunsiker, Irvine, James A., James, J. H. C., Janin, H., Jennings, H., Kennedy, J., Kenyon, Lawrence, H. L., Lloyd, Louis, D. A., McDermott, Mercer, W. A., Merricks, Murray, F. W., Owen, Payne, H. G., Pearsall, Pearse, A. L., Rickard, T., Rogers, C. E., Rolker, Sandberg, Sanders, A. D., Scott, F. B., Stoddart, Taylor, P., Thomas, Thomas, W. R., Thompson, W., Tilden, Touzeau, Varden, Western, C. R., Western, F., Whittall, Woakes, Wood, R. A., Wright, W., Yorke, C. A. Manchester—Wilbraham. Middlesborough—Bell, C. L., Bell, L., Evans, D., Stead. Millom—Sahlin. Moresby—Peile. New Barnet—Jessop, H. J. Newcastle on Tyne—Louis, H., McGowan. Newquay—Clemes. Nottingham—Goddard. Plymouth—Seccombe. Reigate—Browne, A. B. St. Austell—Hodge, A. St. Ives—Stevens, W. F. St. Leonards on Sea—McCarthy, E. T. Scorries—Eustice, Richards, J. T. Sheffield - Hadfield, Hardwick, Stubbs, F. Southsea—Mainwaring. Stoke on Trent—Paul, F. W. Stokesley—Finch. Sunbury—Lamb. Totnes—Chenhall. West Hartlepool—Thomlinson.

IRELAND.

Dublin—Pollok.

SCOTLAND.

Glasgow—Brown, W. S., Crookston, MacArthur, Miller, John, Riley, J. Kirkintillock—Sawers. Sterlingshire, Polmont Park—McKillop.

WALES.

Aberdare—Lewis, W. T. Aberystweyth—Cosens. Cardiff—Brown, T. F., Evans, H. A. Dolgelly—Edwards, H. W. Fredunnock—Richards, E. W. Glamorgan—Martin, E. P. Llandudno—Foster, C. Le Neve.

AUSTRIA.

Leoben—Hoefer, H.

BELGIUM.

Antwerp—Zintgraff. Forest - les - Brussels—Thiry. Louvain—Deken, A. de.

FRANCE.

Montavet—Bonard. Orthez—Frossard. Paris—Arnaud, Batz, Bel, le Bret, Cardozo, Collin, Daleas, Delrez, Dorion, Duchanoy, Haton de la Goupilliere, Hebert, Knoertzer, Ledoux, F., Levat, du Marias, Osmond, Pelatan, Robellaz, Thuillier, Wurgler. Seine et Oise—Valton.

GERMANY.

Altenessen—Krabler. Baden—Jabs. Berlin—Kerl, Wedding, Wolff. Bochum—Timm. Brandenburg am Havel—Recknagel. Dusseldorf—Daelen, Schroedter. Essen am Ruhr—Engel. Frankfurt—Netto. Neumuhl—Grillo. Opladen—Ulenberg. Siegen—Macco. Volklingen—Roechling. Wiesbaden—Massenez. Zellerfeld im Harz—Schmeisser.

NORWAY.

Lokling—Bluett. Roros—Larsson.

RUSSIA.

Kotchkar—Chaplin. Vladivostok—Davidson, W. S.

SPAIN.

Provincia de Cordova—Maurice. Provincia de Huelva—Rich, W. Provincia de Jaen—Power, I. M., Tonkin.

SWEDEN.

Fagersta — Brinnell. Karrgrufven — Granstrom. Motala—Angstrom. Sala—Wenstrom. Stockholm—Akerman, Lundbohm. Upsala—Sjogren.

SWITZERLAND.

Zurich—Huber.

CHINA.

Shanghai—Kow, Shockley, W. H. Tientsin—Drake, N. F., Jameson, Kwang.

INDIA.

Balaghat Mines—Ahlers. Burmah, Rangoon—Maud. Calcutta—Doyle, P., Wood, E. S. Mysore, Oogaum—Jolly, Leslie, Llewellyn, Richards, T., Smith, P. B.

JAPAN.

Chikuzen — Adachi. Hagi Yamaguchiken—Tsuno. Hokkaido—Kanda, Kawai, Oshima. Iwaki — Kada, Kasahara. Rikuchu—Takeda. Tokio—Dan, Kondo.

JAVA.

Batavia—Atherton, T. W. T., Reynolds.

NETHERLAND INDIA.

Totok—Weigall.

SOUTH AFRICA.

Capetown—Burnham, M. H. Kimberly—Labram, Lawn, Williams, A. F., Williams, G. F. RHODESIA, Buluwayo—Currie, Macandrew, Pringle, Van Ness, Woodford. SOUTH AFRICAN REPUBLIC, Barberton—Blow. Boksburg—Hellmann, Morris J. Eureka City—Metcalf, A. T. Germiston—Manheim, H. C., Webb, L. Johannesburg—Austin, H. K., Berry, J. F., Britten, Button, Carter, B. P., Coben, E. H. A., Conner, S. B., Deny, Drake, F. M., Gordon, W. D., Grey, Halder, Hancock, Harvey, R. J., Ingram, Inman, Jennings, S. J. Jessop, W. H., Johns, J. H., Leggett, Miller, H. W., Murray, C., Park, W. E., Pettit, Phillips, A. G., Seymour, Stacpoole, A. R., Stark, Stockett, A. W., Stonestreet, Thomson, S. P., Thurston, E. C., Watson, F. M., Watson, W., Webb, H. H., Whitmore, Wilkinson, W. F., Williams, J. R., Wilson, N., Wulff, Yeatman. Klerksdorp—Webster, H. L. Lydenburg—Neale, A. L. Nigel—Garthwaite. Pilgrim's Rest—Hughes. Roodepoort—Skinner, H. R. Zoutpansberg—Andrew.

AUSTRALIA.

NEW SOUTH WALES, Broken Hill—Armstrong, J. O., Courtney, Delprat, Horwood, Koehler, MacLaren, Moulden, Pearson, J. F., Stewart, A., Wilson, Harry. Captain's Flat—Trewenack. Clyde—Mingaye. Dapto—Blakemore. Drake—Dudley, U., Weinberg. Lucknow—Winsler. Newcastle—Savage. Nundle—Crichton. Reefton—Mosley. Sydney, Benausan, Boucher, Dunstan, Eissler, Godfrey, J. R., Helms, Howell, J., Middleton, W. B., Piper, Power, F. D., Scheidel, Taylor, J. Tenterfield—Hall, E., Reid, J. H. Woolwich—Mackenzie, G. S. QUEENSLAND, Aldershot—Dyson. Charters Towers—Macfarlane, Geo. Calicfer—Smith, G. Mount Morgan—Richard, G. A. SOUTH AUSTRALIA, Adelaide—Greenway, Hawker, Higgins. Gawler—Martin, J. F. North Adelaide—Ayers, F. G. Palmer—Cuilingworth. Port Darwin—Hunt, B., Rosewarne. Port Pirie—Jobson, Poage. VICTORIA, Ballarat—McCulloch, Chas. Cumberland—Williamson. Melbourne, Allan, T. A., Brown, A. T., Chapman, C. W., Collins, W. J., Daly, Dickenson, Hartrick, Kitchener, Lidgey, Lyon, Odling, Saddler, Schlapp, Walcott, R. H., Wharton. Moyston—Williams, F. J. WESTERN AUSTRALIA, Boulder City—Earp, Nichols, R. Bulong—Hollow. Busselton—Backhouse. Coolgardie—Atwater, Black, R. S., Cleland, Hoover, Kingston, Leahy, McKinnon, Pridham, Provis, R., Sharp, W. G. P., Stanley, J., Thomas, A. E., Thomas, T. E., Winmill. Kalgoorlie—Allen, R., Banon, Blakeslee, Edols, Fitzgerald, Forbes, D. G., Gibson, R., Grace, Hamilton, R., Judd, Linck, Macgeorge, McKay, Raymond, R. M., Shallcross, Skewes, Smith, R. N., Sutherland, J. W., Ward, O. B. Kanowna—Gipps, Hooker, B. Menzies—Rayfield. Mount Sir Samuel—Taylor, A. Murchison—Roberts, G. M. Perth—Feldtmann, Hooper, E., Kaufman, Simpson, E. S. Yalgoo—Clark, G., Downey. Yerilla—Humphrey, C.

NEW ZEALAND.

Auckland—Campbell, J., Davey, G., Fulton, W. M., Gordon, H. A., Griffiths, A. P., Griffiths, H. D., Montgomery, A., Park, J., Rhodes, C., Rich, F. A., Woolmer. Dunedin—Allen, Jas., Beal, Larnach, Smith, J. P., Ulrich. Helensville—Hosking. Oamaru—Don. Otago—Jackson, J. H. Paeroa—Wingate. Reefton—Foster, P. L. Thames—Thornton, D. E. Wellington—Seddon, R. J. West Auckland, Coromandel—Argall, W. H. Greymouth—Bishop.

TASMANIA.

Launceston—Brown, R. M., King, E. M., Simpson, Smith, J. H. Mount Lyell—Beardsley. Mount Read—Williams, L. Penghana—Sticht, R. Rosebery—Wilson, H. Waratah—Kayser. Zeehan—Heathcote, Levings, Provos, J., Waller, G. A.

It will be noticed that the above list constitutes a roll-call of the most prominent mining engineers and metallurgists, etc., and that it is a Cosmos or World's club. Were half of them to be assembled in one place at one time they would make a large gathering. But it is rarely possible to get more than one-tenth of the members together, for they are largely captains of great industries, or traveling in the employ of themselves or some others on business, so that it was not expected that the delegation coming eastward to join in the session at San Francisco would be a large one.

The local committee in charge left San Francisco on the 23rd inst, twenty-one in number, and met the visiting delegates who had been journeying westward by easy stages from New York City in a special train of private cars since the 15th inst. On the 16th they were 1000 miles on their journey, and left Chicago for St. Paul, Minn.; on the 18th they were at Great Falls, Montana, on the 19th at Butte, Montana; the 20th was spent at Anaconda; in the latter three places the smelters, etc., being visited. On the 21st, the train left Spokane, Wash.; on the 22nd, Portland, Ore., and on the evening of the 23rd the travellers were met by the Californians and welcomed in the shadow of Mt. Shasta. On the 24th the mines and smelters of the Mountain Copper Co., at Keswick, Shasta Co., Cal., were visited; on the morning of the 25th the visitors and their attendant escort reached San Francisco, and prompt on schedule time, after a trip of over 4000 miles, the session of the Institute began at 1:30 P. M., Sept. 25th, by an address of welcome by W. C. Ralston, on behalf of California, responded to by Jas. Douglas, president of the Institute, who said, in part, that Mr. Ralston's remarks regarding the mining appliances that had been introduced in California recalled the fact that California set the example of automaticity in metallurgy. Continuing, he said:

There is no more perfect piece of automaticity than a gold mill. And I cannot help thinking that it was the example of the gold mill that more or less influenced our iron and steel people to introduce that same principle into their mills, until to-day, from first to last, machinery and not hand power affects all our great metallurgical operations.

This leads me to the subject which I have chosen to address the Institute upon. This is the closing meeting of the Nineteenth century, and it would be inappropriate not to make some reference to the progress that has been made in our special branches during this momentous period of the world's history. I am not competent, nor would time allow, to go into the details of the progress in every branch of mining metallurgy which we ourselves, during our short span of life, have witnessed; but I have chosen to draw attention to some phases of the social bearing of the Nineteenth century on our particular arts, because, as you all know, sociology touches mining metallurgy at a hundred different points. One of the most important phases of Nineteenth century progress has been the liberality with which men, not only of science, but of technical skill, as well, are willing to lend their experience and transfer their thoughts to others. This has been an age of great growth of democracy, and the spirit of democracy has likewise imbued the great population of scientific and technical men until there has grown up to be an actual brotherhood in the secrets of nature and a desire to communicate without stint what we know to our brother men.

Ten years ago I believe that we would not have been admitted to the works of the Boston-Montana Co. or the great works of the Anaconda Co. or the Keswick works; but this noble feeling of brotherhood in the resources of nature has grown and is growing every day. We have already sent that spirit abroad in the world, and that spirit will continue to pervade the world until it absolutely absorbs it, and there shall be no secret which one man knows which he will not be willing to communicate to another. I believe the true progress will not be made until this comes. When we look back upon the last half century, I think we will find that those arts which have progressed the most rapidly have been those which that spirit has most thoroughly permeated.

That man stands highest in his profession who he is willing to communicate to his brethren the largest amount of scientific knowledge and the greatest amount of what were originally technical secrets. The reason that there was a difference in the progress to-day, just as in the days of trade secrets, was because the real element of success was a personal equivalent, not depending upon the number of facts that a man knew. One man progressed and another receded because one brought business tact, imagination and marvelous foresight to bear upon his business, while the other brought nothing. Upon the great principle of reciprocity depended all recent progress. Only generous givers were thoroughly receptive.

Looking beyond this, which, after all, is more or less a moral influence, we cannot help recognizing that the great force at work during the latter half of this century has been the use of machinery instead of hand power, and that we, as an industrial group of the world's nations, have been the one to have used most this new principle in human affairs. If we look back to the beginning of this century, we can hardly conceive what an insignificant factor we were, economically, in the world's history.

In 1840 we had something over 2000 miles of railroad, and 801 little blast furnaces all over the country, each making one ton of pig iron a day. Now, if we multiply the number of tons of pig iron that those little blast furnaces made in 1840 by forty, and multiply the number of miles of railroad that were then in existence by the same number, we get almost exactly the number of tons of pig iron that are made to-day and the number of miles of railroad by which we are hurried here and there over the country. It may seem odd, but it is the fact that this extraordinary progress of the iron industry and the progress of railroad building have run on absolutely parallel lines, with but few deviations. Owing to cheap transportation the iron ores are now transported a thousand miles or more to the coal. All the little centers of industry

have slowly died, and instead of them great central establishments have been located, where, by dint of machinery, iron and steel are made at figures that we ourselves, less than a generation ago, could not conceive to have been possible.

The natural resources of no one country are going to avail her to win the race of industrial progress. If in the future we are to stand on the topmost pinnacle it must be by bringing scientific research, technical skill and mother wit to bear upon our great industries, just as we have done in the past. We are free in a great measure from Old World prejudices. When we are free, likewise, from Old World sympathies, which have had a tremendous retarding influence upon Old World institutions, the end will have been attained.

In all these respects, gentlemen, I think we have had notable advantages over the Old World. But we are teaching them, just as they have taught us, and in the future we may rest assured that they will, sooner or later, learn the lesson and hoist us with our own petards. The twentieth century will see a race again between the Old World and the New World for, I will not say supremacy, but for prominence in all the industrial arts. We will hold our own, not by the possession of natural resources, but by the possession of that marvelous mother wit which we have already brought to bear on what we have done in the nineteenth century.

Prof. W. P. Blake read a technical article on "The Origin of the Yosemite, Cal., Valley, and the Erosive Effect of Glaciers." In the course of his remarks he said:

The gorge of the Yosemite, so grand and impressive, is only a minor feature of the glacial workings above it, through hundreds of square miles of the Sierra. The ice has left its record in the Yosemite, even to the floor. The ice must have filled the gorge, and much above it, to a thickness of 5000 feet, and with a pressure upon the floor of the valley of 120,000 pounds to the square foot. Imagine the tremendous force of such a weight, on the under surface of which was a broken mass of rock, like diamonds in a drill, grinding, planing and cutting. For untold ages this mighty force was at work, polishing the face of the country through which it passed. The character of the rock of the Yosemite is granite, close-grained and vertical in structure, with points of easy fracture. As the great mass of ice bore down upon this vertical rock, it was broken and knocked over by the moving ice, flaking off at the places of easy cleavage. Thus was formed the precipice and thus is explained the dome-shaped summits of the mountains there. The ice has left its track unmistakably.

It has been argued against the glacial theory of the formation of Yosemite that no glacial moraine is found in the valley. We have the testimony of many scholars that glacial moraines are not found where a glacier debouches into a lake or the sea. We know that the ocean once beat against the foothills of the Sierra, and it is by no means impossible that the sea once reached as far as the outlet of the Yosemite. The polishing effect of great masses of ice, seen beyond question of doubt in many high places in the Sierra, is removed in many other places by the storms and frosts of ages. Yet no one can visit Yosemite valley without perceiving evidences of glacial action. The theory advanced by Professor Whitney to the effect that there was a tremendous convulsion of nature in which the floor of the valley sunk below the level of the surrounding hills, thus accounting for the precipitous cliffs, is entitled to fair consideration, but it does not account for the glacial action seen on every hand.

In crossing the Sierra from the Yosemite to Lake Mono the evidences of glacial action are shown on every hand. There, on the Tuolumne meadows, are the rounded tops of hills over which swept in bygone ages vast masses of ice, which must have covered the Yosemite valley hundreds of feet. As this mass pressed forward, grinding, crushing, smoothing and shaping, evidences were left behind by which the geologist may read the record as plainly as in an open book. The rocks are there in places exactly as left by the disappearing ice. In one place the ground has been smoothed—sandpapered, so to speak—by the gigantic force, so as to be dangerous to animals and has earned the name of Bloody canyon.

"Notes on Mining Cable Tests and Physical Tests of California Timbers," was the next paper, by Prof. Frank Soule of the University of California, followed by one on the "Construction of the La Grange Dam," by E. H. Barton of Sonora, Cal., both in abstract. Other papers, presented in print, were: "Stoping With Machine Drills," Bert. Thane, Sumdum Chief mine, Alaska; "Deep Mining at the Utica," J. H. Collier, Tesla, Cal.; "Note on Plate Amalgamation," Allan J. Clark, Lead, South Dakota; "The Mines and Mill of the Atacama Mineral Co., Ltd., Taltal, Chile," Sydney H. Loram, Chingford, Essex, England; "Investigation of Magnetic Ores from Eastern Ontario," Frederick J. Pope, New York City; "The Relative Desulphurizing Effect of Lime and Magnesia in the Iron Blast Furnace," O. R Foster, Brooklyn, New York, which closed the first day's session. Mr. Clark's paper on plate amalgamation is herewith presented in full:

In his paper on "The Accumulation of Amalgam on Copper Plates," R. T. Bayliss records the fact that at the Drumlummon mill, at Marysville, Mont., a series of tests proved that silver, instead of showing a strong affinity with the amalgamatad surface of the copper plates, gave evidence of a persistent tendency to escape amalgamation; the fineness of the amalgam, as measured in gold, being highest nearest to the battery, and giving place to a constantly increasing proportion of silver as the amalgam was deposited upon the copper plates at greater distances from the battery discharge.

On reading this paper during the summer of 1897, it occurred to my mind that the extremely large plate surface presented in the mills of the Homestake Company would offer almost ideal conditions for the observation of this phenomenon. With this object in view, the experiments recorded in Table I were conducted.

In view of Prof. Hofman's exhaustive description of the Homestake milling practice, only a brief summary of the conditions of the test will be necessary.

All the samples were taken from the Golden Star mill—a full series on the same day. In several cases more than one sample was taken, but the results always coincided very closely with those given in the table.

The pulp from the battery was in contact with the following amalgamating surfaces:

1. The inside plate of copper.
2. The "first row" plate of copper, 12 feet by 4 feet 6 inches in size.
3. The "second row" plate of copper, plated with one ounce of silver to the square foot, and 12 feet by 4 feet 6 inches in size.
4. The "third row" plate of copper, same as the second row.
5. The "fourth row" plate of copper, same as the second row.

At the period of the experiments the plates of the last three rows had been in service for about one year.

The results of these experiments apparently confirmed Mr. Bayliss' experience in every detail. At least, that was the writer's conclusion; and he thought no more of the matter until, during the first months of 1899, another series of analyses, undertaken with another object in view, brought the subject again to mind.

During the interval—to be more exact, in July and August, 1899—the plates of the second, third and fourth rows were taken up, thoroughly cleaned, and replated at the works with two ounces of silver to the square foot. They had, therefore, been in use about six months at the period of the new tests, and were in perfect condition. These assays were not made from small samples, but from the entire product of the plates of four batteries during a period of three months, assays being made after each semi-monthly retorting during this period.

The results are recorded in Table II. As will be noticed, these figures are an absolute contradiction of those previously obtained.

It is with the hope of eliciting discussion from the members of the Institute, and perhaps learning of similar experiences, that this note is written.

To the writer it would appear that the following is a probable explanation, though he must admit that it is pure theorizing on his part, and that he can bring forward no authorities to support his view.

In the first tests the silvered plates, carrying but a light deposit of silver when put down, and having been in service for a considerable time, must have lost a considerable amount of their silver, and must have been approaching the condition of the plain copper plates; while, in the second series, the heavier silver deposit and the shorter service make it certain that the silvered surface was intact. It would seem, therefore, that the explanation must rest upon the amalgamated surface—copper in the one case, and silver in the other; and that the tendency of the silver in the pulp to resist amalgamation decreases, if it does not entirely disappear, when thoroughly silver-plated surfaces are used in amalgamating.

TABLE I.—TESTS MADE IN 1897.

Sample From	Fineness. Gold.	Fineness. Silver.	Ratio of Gold to Silver.	Remarks.
Inside plate	.818	168	4 87 to 1	
Copper plate, 1st row	.812	175	4.65	
Silvered plate, 2nd row	.654	331	1.97	
Silvered plate, 3rd row	.618	376	1.64	
Silvered plate, 4th row	.512	465	1.10	
Copper plate, head of 1st row	.809	180	4.49	These are somewhat below the average values for 1st row amalgam.
Copper plate, foot of 1st row	.784	185	4.14	

Difference in average gold-fineness between 2nd and 4th rows, 141.

TABLE II.—TESTS MADE IN 1899.

Sample From	Highest Gold. Fineness.	Highest Silver.	Lowest Gold.	Lowest Silver.	Aver'e Gold.	Aver'e Silver.	Aver'e Ratio.
Silvered plate, 2d row	.573	429	558	408	564	421	1.34
Silvered plate, 3rd row	.570	433	555	410	569	422	1 35
Silvered plate, 4th row	.566	452	542	425	558	433	1.29

Difference in average gold-fineness between 2nd and 4th rows, 6.

"Stoping With Machine Drills," by Bert Thane of the Sumdum Chief, Alaska, mine, was treated as follows:

The mining industry has, within the past few years, taken a new impetus in all its branches. New mines are being opened every day, while old ones, which have been either working at a loss or have been compelled to shut down, are now gradually being reopened and placed on a paying basis.

This growth and new life are due, in a measure, to the discovery of new mining districts, but the most important cause of the progress is the wonderful advance that has been made in all branches of engineering.

By means of the important inventions and discoveries that have been made in mechanics, chemistry and electricity, we are now able to work ores which, only a short time ago, would have been regarded as worthless. We find, for instance, the electrician eliminating two of our greatest difficulties—those of distance and superior elevation—while the mechanic has brought to the highest degree of perfection not only ore crushing and hoisting machinery, but all such devices as pertain to the mechanical handling of ores. At the same time the metallurgist, with his combined chemical and mechanical skill, has helped us to extract the precious metals from the most refractory of ores.

But, when we turn to examine methods in actual use for actually mining or breaking ore, we are surprised at the small amount of progress that has been made in this direction. In the handling of the ore after it is broken, almost everything has been done to reduce the operation to its simplest and cheapest mechanical form, and every form of engineering skill has been brought to bear upon the problem. But the work of the engineer usually ends with the erection and installation of the machinery that he has designed. His interest rarely reaches to the details of breaking ore; this is supposed to be the peculiar province of hand labor. This branch of the business is usually under the immediate supervision of men risen directly from the ranks, who have learned to do exactly what was done before them, and, accepting without question that this is the only method, have bent their energies to bringing that method to the highest degree of perfection.

There is no intention of denying the value of such work, for it is done well, and the energy, the system and the skill with which it is carried on are all of the highest order. But this does not prevent one who has marked the revolution which mechanical devices have wrought in other branches of mining from wishing to see the proper appliances brought to bear upon the problem of breaking ore.

The use of power drills in stoping is one of the methods that have been proposed to meet the problem. Although their use for this purpose is not new, the method has not, in my opinion, received the consideration that it merits. We find the big machine in the shafts, tunnels and drifts a decided success and in use almost everywhere; but when we look for "the little one" in the stopes and on the vein, we find instead the miner and his hammer pounding away, just as his fathers did before him. Perhaps I should make some exceptions here and mention what has already been done in this line, but it has been so little, especially in this country, that it is hardly worth mentioning.

Attempts have been made to use machine drills in stoping from time to time by enterprising men. Most of these, from one reason or another, have resulted in failures; and a failure once made is sure to be heralded far and wide, only to be lived down by the slow growth of success.

It was through the failure, or rather the repeated failure and final success of one of these attempts that I personally witnessed, that caused me to become personally interested in this subject; and, as it bears directly upon the question before us, I will endeavor to give a short outline of my experiences and their results.

While working underground in the Chief mine at Sumdum, Alaska, I had the good fortune of being placed as helper, or "chuck man," on one of these small machines, known as a "Baby Ingersoll." It was used for stoping and raising on the vein. It was, therefore, an excellent example of the problem before us, as the vein varied from 1 to 3 feet in width, the most unfavorable for machine work; besides, the place of working was one of great difficulty, as it lay along the shaft, making any mistakes dangerous and costly. Thanks to my partner, who was a machine man par excellence, no such mistakes were made.

This was the fourth attempt to use the little drill at the mine and the first to register a success. My partner, who was a late arrival from the Cœur d'Alenes, found the little drill thrown aside in disgrace, and covered with rubbish. But he knew what it could do, and begged to be allowed to give it one more trial.

Of course, it is out of the question to use the big machine, on account of its size and weight, for stoping in such narrow veins, even though in its own sphere it is already a success.

The cause of failure, in the use of the small drills, was due, in this mine at least, to the fact that the men who had attempted to work them were used to the big machines, where the strength of stroke and large size of the hole overcame many of the difficulties met with by the smaller ones. The latter naturally requires more care and skill, but this care and skill is not so great but that any man of ordinary ability can master it.

The drill used by us weighed 170 pounds when mounted on a tripod. We found the latter to be much better than a bar, as it allows greater freedom of motion—something absolutely necessary in following a hole—and takes much less time in moving from one place and setting up in another. With the machine that we used the bolts are so arranged that a drill may be driven in any direction by a simple manipulation of the legs of the machine, which is easily acquired by practice.

The chief cause of trouble in machine drilling arises from the many "slips" and layers of alternately hard and soft rock, which are found running in every conceivable direction in vein formation. A drill once started, for instance, will run freely till it strikes one of these slips, which it will, naturally, have a tendency to follow; or, again, if driven through soft seams, it comes in contact with harder material and it will immediately begin to slip along the new surface. This tendency, if allowed to continue, will cause the drill to bind against the bend in the hole, and will not only prevent the drill from entering the hole, but will hold it fast and prevent its withdrawal. This not only causes much annoyance and loss of time, but it frequently causes the total loss of a hole.

With a big machine, where the power is sufficiently great, the drill is driven ahead and pulled out regardless of the slips and bends, and this difficulty is more easily surmounted; but with the smaller one, constant watch must be kept, and the instant the drill starts to slip or bind the machine must be readjusted to follow the hole and the stroke shortened, as in starting. To do this it is seldom necessary to stop, for a perfect understanding of the drill, and between the men working it, allows the chuck tender to loosen the proper bolts while the machine is still in motion; and as soon as its position is changed enough to allow it to run smoothly, it is fastened again. From personal experience, I think it is not only unnecessary, but unwise, to attempt to drill holes too deep. This practice is usually the cause of much trouble and loss of time. From 3 to 6 feet is plenty deep enough for such work, generally speaking. This is all the more the case, as the time required to move the machine from one place to another is very small indeed.

A tripod necessitates the use of a platform to work on; but as it is very easy to build one out of lagging, this is a matter of very small consideration, especially as the planks may be used over and over again, and a platform once built saves time in the end, as one can move about freely and rapidly, and with less danger of accident.

So far the economical side of the question has not been mentioned, but simply the practicability of the small machine. With regard to this new side of the question, and a most vital one, it is almost impossible to collect data of any general application, because of the small amount of work that has been done with the small drills up to within the last few years.

However, I am informed by Capt. Thos. Mein, recently superintendent of the Robinson mine, in the South African gold fields, that in this great district the use of small machines on narrow veins is an established fact, and is carried on with great success.

In our own State I find that within the last six months some three plants, of five small machines each, have been put in; that in the North Star at Grass Valley is perhaps the best known.

My own experience with this work is about as follows: With the "baby drill," two men—my partner and myself—were able to drill about 40 feet a day in hard quartz, full of slips and seams. This work was done between the hours of nine and half past four. The rest of the shift was sufficient for us to do all our own timbering, to build our chutes and ladder-ways, to shovel away our broken rock and to keep the place in ship-shape order.

Circumstances favored me in the following way, with an opportunity to compare the machine and hand labor to advantage. During the holidays the compressor was shut down for a week or so, preventing the use of the machines. During this time we worked in the same stope, using now the hammer to drive our holes. The comparison is an excellent one for the following reasons: All the conditions were the same in both methods; the rock was the same throughout, the size of the vein and the nature of the working places were the same for both methods, and, as we were situated away from the other workmen, the quantity of rock broken daily was accurately measured.

The results of the comparison were all in favor of the drill, for we found that for an average of the week's work we were able to break down just half the ground that we did before, in the same time; or, in short, that two men are able, under similar circumstances, to do twice as much work with the machine as they can do by hand. There is also another incidental advantage—that of ventilation. One of the greatest difficulties of the superintendence is to see that the men are properly supplied with fresh air, particularly in making uprises. This difficulty is entirely eliminated when machine drills are used. It must be evident from these considerations that the small machine drill is practical and economical, as far as labor is concerned, when it is properly used.

There still remains the cost of drills, compressors, power and pipe line, etc. It is unnecessary to go into these questions in detail, because each case must be settled by itself, with a full knowledge of the situation, source of power, size of plant, etc. But with an abundance of water power, and the elimination of distance and position made possible through electricity, the running expense for power is very slight, and the first cost of plant is within the reach of any stable company capable of either opening or running a mine. While, therefore, a certain increase of expense for power and plant is necessitated, the reduction in the expense for labor is just one-half as much more than offsets this outlay.

The reduction in the number of hands needed for breaking ore is one of the chief causes of the prejudice that many miners have against the machines. But this prejudice is entirely unwarranted, for every cause that increases the output of the miner and decreases the expense of mining only tends to open new mines, and enables old ones to increase their force, thus giving plenty of work to the supposed surplus of miners.

On my return to the mine I hope to secure further and fuller data on this subject, in order to convince others of what I firmly believe myself, for I think it is only a question of time before we will have the little machine everywhere high up in the stopes, pounding its way into prominence and success.

On the 26th the first paper was one in abstract, on "The Electromotive Force of Metals in Cyanide Solutions," by Prof. S. B. Christy of the University of California, with diagrams illustrated on a screen, followed

y a paper on "Some Features of the Economic eology of Russia," by Prof. A. C. Lawson of the niversity of California. "The New Alaska-Treadell Gold Mills," by Robt. Mein, was the subject of ne next paper, followed by one on "The Peculiar re Deposit of the East Murchison United Gold line, Western Australia," by D. P. Mitchell, Palo lto, Cal., herewith appearing in full:

Western Australia is the home of much that is ew and interesting in the gold-mining industry. ome of the gold deposits are outranked for size and alue by nothing yet discovered, while the value of ne ores is, in many cases, rivaled only by their comlex character. As in all parts of the world, many f the ore bodies occur in ways which tax the skill of he miner in following them; and among these the riter considers the case of the East Murchison nited more interesting than the average. This is ne of the leading gold mines of the colony in point f production, and is situated near the town of Lawrs, in the East Murchison district. The country r several miles around the mine is mainly granite, nd the line of outcrop on which this mine is located an be traced for a long distance. There are, at the ater level, two nearly parallel veins running ightly north of west.

Structural Features.—The most striking peculiarity these veins, and the hardest to understand, is heir tendency to send out horizontal stringers or de veins. These vary in size from a veinlet an inch hick to a vein several feet in width, and they exnd with great persistence into the wall rock on ther side of the vein.

The usual signs of a movement of the wall rocks, ch as a ribbon structure of the quartz and a wellefined gouge or seam of clay along the walls, are in any places lacking, while in other places they ppear strongly marked. They seem more in evience below water level than above.

It is a commonly accepted idea that when a goldearing vein loses in width, it often gains in value. this instance, however, the direct opposite is the se; for in many stopes it has been possible to ave the narrow portions of the vein to act as illars, and to extract only the wide portions, which re of high grade. This reduces the cost of stoping, nd is of advantage in many ways. Although the arrow portions of the vein proper are of low grade, is a strange fact that the stringers, of whatever ze, are usually of high grade, some of the smallest es containing much coarse gold. Their connection ith a narrow portion of the vein seems to make no fference with their capacity for carrying value. The great number of small stringers which branch t from the main ore bodies, in places, were numerus enough to make valuable ore out of what would ve been, except for their presence, worthless wall ck. In other words, they increased the available idth of the stopes by several feet.

Mineralization.—Portions of the veins are heavily harged with iron pyrites, both cubical and massive, nd other portions with galena, usually in a finely sseminated condition. It is a matter worthy of otice that wherever an ore chute is heavily charged ith galena the fineness of the bullion saved by malgamation drops from 5% to 10% below its noral grade. The whitish color of the bullion indicates ainly its decrease in value. The concentrates btained from the ore, after removing the free gold y amalgamation, are of a very high grade, running om $700 to $900 per ton.

In those portions of the vein extending from the rface nearly down to water level, a curious phenomenon is to be observed. This consists of the condary mineralization of the veins, taking the rm of arborescent and massive occurrences of iron nd manganese oxides. These are found along the eavage planes and in cavities throughout the veins, nd are probably derived from the decomposition nd solution of various minerals from the veins and all rocks, and their deposition in these forms. hese secondary deposits, which are almost invariply very rich in gold, mark the superficial enrichent which has taken place in so many of the quartz eins of this colony.* The fact that they do not xtend below water level, or into the zone of sulphide inerals is evidence of their secondary nature.

Influence of Structure on Development.—From delopments on the surface and at water level the eposit seemed to consist of two slightly converging eins having approximately the same dip; but as reater depth was attained an intricate system of oss and horizontal fissuring was revealed. The endency of the veins to become horizontal at times nd to send out horizontal stringers was not at first garded as of much importance, and, consequently, evelopment work was planned on the supposition hat the dip of the veins at water level would conue in depth. When the full significance of the orizontal occurrences was realized, the plan was dopted of sinking winzes to find where the vein ecame flat, and thus indicate where to locate the vels.

The large size and high value of these horizontal portions of the veins render them very valuable additions to the ore reserves. In extracting ore from them, the roof is supported by cribs, locally termed "pig sties," until the whole space can be solidly filled in with waste rock.

* H. C. Hoover has treated this subject at considerable length his paper on "The Superficial Alteration of Western Australian re Deposits:" *Transactions A. I. M. E.*, October, 1898.

"The Occurrence of Tin Ore at Sain Alto, Zacatecas, With Reference to Similar Deposits in San Luis Potosi and Durango, Mexico," was the subject of the next paper, by Edward Halse of Colombia, S. A., followed by one on "The Copper Deposits of Vancouver Island," by Wm. N. Brewer, Victoria, B. C., condensed as follows:

Until within the past two years but little attention has been given to the outcrops of the west coast of Vancouver island and their copper contents. During the past few months the writer has been engaged in examining and developing some of these prospects.

In many respects he has found characteristics associated with these prospects which, in his experience, are unique. Nearly all the outcroppings which overlie chalcopyrite ore along the west coast of the island are composed of a high-grade magnetite. The magnetic qualities of some of these outcrops are so pronounced that the magnetite possesses polarity. Although the writer himself had no analyses of this magnetite made, yet from its appearance he can readily believe that analyses made for other parties, which show a yield of 62% or 63% of metallic iron, with only traces of phosphorus and silica, are correct.

At a very shallow depth masses of chalcopyrite, yielding in some instances as high as 32.6% of copper, occur associated with the magnetite; and in once instance, which recently came under the writer's observation, a solid body of high-grade chalcopyrite fully 4 feet in thickness occurs within 6 feet of the surface.

Usually this solid sulphide ore carries low values in gold. Probably an average of $2 per ton would be fairly representative. But in some instances development has determined the occurrence of narrow stringers of pyritous quartz, associated with the sulphide ores, which yield by assay more than $20 per ton in gold.

In the districts examined by the writer the country rock is usually crystalline limestone, with dykes of igneous rocks as intrusions. Sometimes the outcrops of magnetic iron ore are found in the limestone itself; but they usually occur at the contact between the limestone and igneous rock, or in fissures cutting through the igneous dykes. Most of these dykes are apparently quartz diorite.

The trend of the country rock is conformable with that of the island, *i. e.*, northwesterly; but the line of strike of most of the ore bodies is usually northerly or northeasterly.

As lode mining on Vancouver island is in its infancy, it is impossible to present many facts with regard to these extraordinarily rich outcrops. In fact, 175 feet is the greatest depth which has yet been attained on any of the ore bodies. At another location, recently visited by the writer, he found that high-grade chalcopyrite occurred at a depth of about 120 feet.

Although the outcrops of magnetite are usually persistent in length, especially when they occur in fissures in the igneous dykes, yet the writer has failed to find any instance where the lodes can be traced for any very considerable distance without a break.

On Bear river, at the head of Bodwell sound, some of the outcrops can be traced a distance of 500 to 700 feet. Another instance where the outcrop can be traced for about the same distance occurs on Anderson lake, which empties into Uchucklesit harbor. Still another instance occurs near Goldstream, ten miles northwesterly from Victoria. This last outcrop, however, is composed of gossan instead of solid magnetite.

Usually when the outcrops are found on the contact between the crystalline limestone and igneous rocks they cannot be traced as readily along the line of strike as when they occur in fissures in the igneous dykes. The contact outcrops occur in masses or pockets, sometimes covering a considerable area of ground, and often disposed in a tolerably regular line, but with no indications on the surface that there is any connection between the different pockets.

It is not safe to form an unqualified opinion as to the non-maintenance of continuity along the line of strike, because the ground is often covered with moss or debris from slides. At no location known to the writer, where masses of outcrops occur along the contact, has sufficient underground work been performed to determine the continuity of the ore bodies between the masses of outcrop.

The writer has observed several places where the outcrop of magnetic iron ore occurs in the crystalline limestone. Such occurrences are apparently limited in extent, but impress one that their structure has the same pockety and irregular characteristics as belong to the limonite ore deposits in the Southern States.

So far as the grade of the various outcrops is concerned, the writer has oberved that there is but little, if any, difference between those occurring in the igneous rocks, on the contact, or in the limestone.

Besides the outcrops of chalcopyrite, bornite occurs in some localities, with heavy spar as the gangue. There is such an occurrence on Deer creek, where a fairly high-grade bornite is plentiful at and near the surface; but the writer is informed that as depth has been attained the bornite has given place to chalcopyrite of good grade. Except the deposit on Deer creek, the writer knows of no other discovery where bornite has been found in any quantity to the southeast of Sidney inlet, which is thirty miles up the coast from Clayoquot.

The portions of the island to which the writer has given most attention are in the neighborhood of Goldstream, ten miles from Victoria; the Alberni canal, which connects with Barclay sound 110 miles northwest from Victoria; and the country adjacent to the inlets which connect with Clayoquot sound, about 160 miles northwest from Victoria.

The geology in the sections mentioned is complicated. The rocks around Victoria are chiefly eruptives. To the northwest, near Goldstream, there occurs a wide belt of semi-crystalline slate, slightly graphitic, in places highly metamorphosed, as on Skirt mountain, in which the copper deposits referred to earlier in this paper occur. This belt of slate has a general trend N. 60° W. On the northeast of this belt occur crystalline limestone, granites, diorites and other igneous rocks, which comprise the formations, until the sandstones and conglomerates of the coal measures are encountered near and along the eastern coast of the island.

The mountains on the island vary in altitude from 1000 to 7000 feet. They are covered with a heavy growth of timber and underbrush. Consequently prospecting operations up to the present time have been confined to the immediate vicinity of the shores of the inland waters and streams emptying into them.

Mineral occurs in three zones, each of which has a northwesterly trend, while each mineral deposit has its individual line of strike. The most southerly of these zones is the belt of semi-crystalline slate, which traverses the extreme southern portion of the island from Goldstream to near the headwaters of the San Juan river. This zone furnished, thirty years ago, a considerable amount of placer gold, which was found in the Leach and Sooke rivers and their tributaries. Northeasterly from this belt of slate occurs the main belt of igneous rocks, which, in places, is several miles in width.

On some of the numerous islands in the sounds which connect with the Pacific ocean deposits of magnetite, with some associated copper pyrites, have been discovered; but on none of them, to the writer's knowledge, has there been any extensive development work performed.

The other papers of the session of the 26th were: "Rock Salt in Louisiana," by A. F. Lucas, Lafayette, La.; "The Lee Long-Wall Mining Machine," by H. Foster Bain, Des Moines, Iowa; "Natural Coke of the Santa Clara Coal Field, Sonora, Mexico," by E. T. Dumble, Houston, Texas. and "Transcontinental Railway Lines," by James Douglas of New York City.

The first paper of the morning session of the 27th was one on "Electricity as Applied in California Mining Practice," by Prof. C. L. Cory, University of California; "The Geology of Arizona," was the title of the paper by Prof. Theo. B. Comstock, Los Angeles, Cal.; "Tangential Water Wheels" was read by W. A. Doble of San Francisco, Cal., who was followed by Mr. Sam'l Thomas, who read the last paper of the session regarding "Early History of Anthracite Coal in Connection with the Manufacture of Pig Iron." The following named papers were read by title: "Notes on the Independence Mine at Cripple Creek, Colo.," by T. A. Rickard, Denver; "Gold Mining at Minas Prietas," by E. R. Abadie, Torres, Sonora, Mexico; "Treatment of Oxidized Ores of the Lake View Consols Mine," by J. W. Southerland, Boulder, Western Australia; "The Effect of Heat Treatment Upon the Physical Properties and the Microstructure of Medium-Carbon Steel," by R. G. Morae, Jamaica Plain, Mass.; "Peculiar Forms of Native Gold," by G. F. Kunz, New York City; "The Cement Rocks of Illinois," by J. A. Ede, Spring Valley, Ill.; "The Temperature at Which Ferrous and Calcic Silicates are Formed and the Effect Upon These Temperatures of the Presence of Certain Metallic Oxides," by H. O. Hoffman, Boston, Mass.; "Wolframite Deposits in South Dakota," by A. Forsythe, Rapid City, South Dakota; and "Nickel Steel, a Synopsis of Experiment and Opinion," by D. H. Browne, Cleveland, Ohio. After the usual remarks the meeting adjourned.

Immediately thereafter a party of visitors went to the University of California, thence to the Selby plant of the Selby Smelting & Lead Co. In the evening the San Francisco merchants and the California State Mining Association banqueted the visitors in characteristic style. On the morning of the 28th inst. the party left San Francisco on an itinerary through the interior of California.

Increasing Mill Capacity.

Written for the MINING AND SCIENTIFIC PRESS.

When large capacity is deemed an essential feature in the economy of milling gold ores, and at the same time fine crushing is required to free the gold from its matrix, an auxiliary plant in the form of grinding machinery of some kind, as supplemental to stamps, has been found to give satisfactory results. The ore first introduced to stamps may be crushed through a coarse screen to ½ or ¾ or even ½-inch size, and then sent to grinding mills to be reduced to the necessary fineness. Where stamps are crushing two to four tons daily, the capacity may in this manner be increased to six or twelve tons per stamp and the ore reduced to the necessary fineness without further expense than the necessary additional power to run the grinding mills. As the ore passes from the stamp batteries directly to the grinding mills, no additional men need be employed, and the increase of power required is but a small fraction of the benefit derived from increased capacity of the mill. This grinding of ore, following crushing by stamps, often brightens gold in some ores which are not readily susceptible to amalgamation with quicksilver, rendering them much more free in milling. Where this method of increasing capacity may be adopted, it may be found inadvisable to attempt to amalgamate inside the grinding mills, as the quicksilver may be floured thereby. A grinding mill having a screen through which a continuous discharge takes place is essentially different from a pan such as is employed in silver mills, where the pan is charged with a given quantity of material, which is ground for a certain length of time, when the mullers are raised and the quicksilver added; amalgamation proceeds until completed, when the pan may be discharged and another charge introduced, to be treated in the same manner as the former one. This method cannot be applied to grinding mills having screens.

With reference to the likelihood of the quicksilver to flour in the grinding mill, all ores do not act alike in this respect. Where the grinding mill is fitted with plows, as most of them are, and amalgamation is practiced in the mill, these plows should not be set so close to the bottom as to constantly scrape up the hard amalgam which may form on the bottom of the mill, thereby increasing the likelihood of loss of gold. They should be set sufficiently high, at least, to admit the fingers of the hand between the lower edge of the plow and the bottom of the pan. Where amalgamation is practiced inside the grinding mill, the quantity of water employed is important, and the amount cannot be determined without experiment. A large quantity facilitates discharge, thereby increasing capacity; but it may also discharge gold before it has had a chance to amalgamate; while too small a quantity will retard the discharge of the pulp to such an extent as to cause it to accumulate and overflow. In adjusting these matters the mill man must use good judgment, and the result of his work will tell him the proper amount of water to employ and also the speed at which the grinding mill may safely be run to accomplish the best results. By the adoption of this method, large capacity and high extraction may be attained at minimum cost.

The Creede Mines, South Dakota.

Written for the MINING AND SCIENTIFIC PRESS.

This group of mines, five in number, is situated on Lightning creek, about one mile below the May mine, and nine miles southwest from Custer City, South Dakota. These mines, for the most part, are located in the Potsdam sandstone, which forms a bench or strip of mesa covering about forty acres on the west side of the creek. The north end of these claims runs up on the mountain, where a number of good vertical veins have been opened, disclosing quartz carrying gold and copper of fair grade. These veins, situated on the high ground, are found with walls of slate, with here and there short stretches of hornblende, with a dyke of granite running north and south in near proximity on the west. These veins of quartz, which penetrate the slate formation, are from 4 to 6 feet in width and have not been developed to any great depth. The ore is a good concentrating proposition, and yields by assay from average samples near the surface about $8 per ton in gold, while the percentage of copper has not been ascertained, probably not more than 3%. But it is of the Potsdam formation I would speak more particularly. It will be observed from the foregoing description that there is something peculiar about the situation of this isolated body of Potsdam, resting, apparently, conformably upon the slate beneath, which is its proper position geologically, but butting up against the steep side of a slate mountain, which rises high above the Potsdam and forms its western and northern boundary.

What the experience of others may have been I know not, but being an old miner myself and having prospected in the different mining camps of the West since the early days of 1860, and never having seen an occurrence of this kind before, it struck me as being peculiar. I remark that the situation of the Potsdam below the old micaceous slate, locally, is new to me, and yet, when I come to view the lay of the land just as it is, I find no difficulty in accounting for the situation, or at least forming an opinion (whether it be orthodox or not), which is satisfactory to myself. I judge from the indications that the upheaval of the igneous granite dyke has created the mountain ridge of slate and that this occurred prior to the sedimentary deposit which forms the different strata of the Cambrian. The flow of water down Lightning creek has been immense at some previous age; the canyon is deep and it has been cut through the solid slate, bringing the silts and sands derived from eroded quartz veins and deposited those sands at this spot where the conformation of the mountain compelled a whirling eddy and here the heavier sediments found a resting place.

I am aware that some geologists whose knowledge of the earth's crust is more profound than mine have expressed an opinion that all of the igneous upheaval has occurred since the laying down of the Potsdam; that all of the different strata of the Cambrian, clear up to the Carboniferous, was formed before the upheaval of the igneous flow. But with all due difference to them, I can not, while gazing on this scene, accept that theory; at least I must insist that this little spot of earth (if no other) forms an exception to the rule, in the Black Hills of Dakota.

Do you ask if this Potsdam formation is metal bearing? I answer yes, to a very encouraging degree. There are vertical cores coming up through the different flat strata, and in some of the layers which are more open to receive or absorb mineral in solution, there have been formed wide shoots of ore. From some of these shoots which have been tested, returns have been received showing as high as $50 in gold and 16% lead. In this I note another peculiarity, for it is unusual (according to my experience) for lead and gold to combine to this extent, where there is practically no silver, and the lead is not in the form of galena or carbonate, but has been pronounced a telluride of lead carrying gold.

C. W. ROBBINS.

Custer City, S. D., Sept. 19th, '99.

The International Congresses of the Exposition of 1900.

Congress of Mines and Metallurgy.—An international congress on questions concerning mines and metallurgy will be held from the 18th to the 23rd of June, 1900, in connection with the Paris Universal Exposition. Like similar reunions at the Paris Expositions of 1878 and 1889, the congress has been organized at the initiative and under the direct patronage of the French Government. In 1878 there were 200 members; in 1889 more than 600, from all the leading countries in the mining industry. For 1900 a great effort is being made to secure a representative assembly of the world's engineers and manufacturers who are interested in the progress of mines and metallurgy.

The members of the congress who will receive all its publications are to be the delegates of the French state departments and of foreign governments, donors of at least 50 francs, and the active members, whose subscription has been fixed at 20 francs.

The public sessions will be held in the afternoon, alternating between questions of mines and metallurgy. Reports on the questions presented for discussion will be prepared beforehand by engineers of the different countries and distributed to the members of the congress.

Each morning the members in groups, under the guidance of engineers and manufacturers specially chosen for the purpose, will study in detail the most notable mining and metallurgical exhibits of the different countries in the Exposition. This common study of improvements realized up to date is to aid the work of the congress in preparing the way for further progress.

The organizing committee is particularly anxious to know, at as early a date as possible, the probable number of active members.

The following questions are provisionally indicated as the basis of the final programme, which will be published when the international organization of the congress is completed:

1. *Mines.*—First, use of explosives in mines; second, use of electricity; third, working conditions at great depths; fourth, means of reducing manual labor in the mining industry.

2. *Metallurgy.*—First, progress of iron and steel metallurgy since 1889; second, applications of electricity to metallurgy: (*a*) chemical applications, (*b*) mechanical applications; third, progress of gold metallurgy; fourth, recent improvements in the mechanical improvement of ores.

The president of the committee of organization is M. Haton de la Groupillierre, director of the Higher National School of Mines. On the committee are represented all the mining and engineering schools and the principal mining and metallurgical companies of France. The secretary general of the congress is the secretary of the Central Committee of the Coal Works of France, M. Gruner, 55 Rue de Chateaudun, Paris.

Gold-Bearing Sands of Vermillion River.*

By J. W. EVANS, M. E., Sudbury, Ont.

The alluvial deposits of gold-bearing sand found along the banks of the Vermillion river, in the district of Nipissing, created considerable excitement last spring and summer, but owing to the character of the gold the results obtained from a few primitive tests were far from satisfactory. In this paper I wish to draw attention to a few points which came under my observation.

In the majority of the deposits the gold is found in the first 10 or 12 inches of soil, a reddish sand composed of quartz, granite and greenstone, containing garnet and magnetic iron, with a quantity of coarse gravel, covered in patches with hardened clay. Samples of this sand from the east bank of the river, in Hanmer township, within twenty miles of Sudbury, averaged from six samples 60 cents per ton gold, and yielded, with very careful panning, from 100 to 200 colors to a ten-pound pan.

The colors vary greatly in size. The larger ones, being flat and much indented, are very liable to float off in panning or washing, owing to minute air bubbles adhering to the indentations. I have frequently lost these larger colors when panning from one pan into another, even when exercising the greatest care.

A few panning results from samples taken to the depth of 2 to 3 feet I have mounted upon slides for the microscope in order to show the variations in size and character of the colors. The average fire assay result on this lot was about 15 cents per ton, the number of colors varying from forty to eighty per ten-pound pan. As an example of the loss in treating the sand with a rocker, I found on selected material assaying $1.15 per ton that the washed coarse gravel which had been thrown out of the screen yielded, upon panning and breaking up the hardened clay sticking to it, twenty colors, which had remained attached to the clay, and assayed 45 cents per ton of gravel, or 25 cents per ton of sand taken. The tailings which were being washed into the river assayed 40 cents per ton of tailings, or about 15 cents per ton of sand taken, and the concentrates from the rocker 80 cents per ton of concentrates, or about 10 cents per ton of sand. The sand taken was from 10 inches from the surface. The fire assay being $1.15 per ton leaves 65 cents unaccounted for, but as the sand contains galena, copper pyrites and some gold-bearing quartz, a higher result in the fire assay is to be expected.

The fire assay results, without previous concentration, however, I find very variable on this work. For instance, taking 100 colors to a ten-pound pan, there will be only three colors, on an average, in a five A. T. charge, assuming the sampling perfect, and as there is a great difference in the size of the colors the results are bound to vary greatly. In a five A. T. charge an error in weight of gold will be multiplied 6400 times in calculating to a ton, while in a ten-pound lot will be multiplied only 200 times. This will in a great measure offset the loss in panning.

The loss in ordinary panning on this sand I put down as about 50%, but with proper care about 75% of the gold can be saved.

I found in every case where I passed the gravel through the crusher and assayed the pulp the results were higher than when the coarse gravel was screened out, proper allowance, of course, being made for the percentage of gravel. In one shaft which had been sunk to a depth of 60 feet, about 200 feet from the river bank, no gold was found after leaving the surface layer until within about 10 feet from the bottom, but from trouble with water the shaft was not sunk any farther, and in no instance, to my knowledge, has bedrock been reached. Owing to the slight fall and thickly wooded nature of the country, sluicing on a large scale would be difficult if not impossible.

Gold has been discovered in many places farther up the river, and in almost every case the gold gets coarser as one goes north.

On one slide I have mounted a facsimile of the largest color yet found on the river. It comes from some distance to the north. The gold found so far is not much worn and the microscope shows pieces of quartz attached to many of the colors.

The sand on the hillside several hundred feet from the river bank gives almost the same result as that nearer the river, and as the course of the present stream is very sinuous it suggests the existence there of a much larger river at some time in the past. I think it very probable that some valuable deposits containing coarse gold will be found upon this river in the near future, and that many of those already found could be worked at a profit on a large scale, in some manner similar to the dredge work done on low-grade placer deposits in California.

*Transactions of Canadian Mining Institute.

The Forest Problem in the West.

By ABBOT KINNEY, of La Manda Park, at the recent meeting of the American Forestry Association at Los Angeles, Cal.

The economic interest of the American people in their forests everywhere, and especially in the West, is to preserve the integrity and water-holding power of the mountain watersheds of the country. This is clearly the public interest, whether these mountain watersheds could or could not support by their products and wise use a system of management guaranteeing the integrity of the water-holding power. The public interest is both economic and humanitarian in preserving the mountain forest covering. Without forest preservation most of our remaining wild public land districts cannot be settled, and districts already settled are likely to lose in man-sustaining power. This has occurred already over wide areas of the world from undue forest denudation, on the one side by the irregular or exhausted water supply and on the other by the destructive action of flood and torrent through sudden rainfall delivery from bared areas. The proper preservation of forest balance does not require that ripe timber should not be cut, or that other uses, such as mining, should not be enjoyed.

Local Considerations.—The interest and requirements of districts vary in what treatment of forested areas is most advantageous. In most of the West and in all of the Southwest the conditions of topography, rainfall and climate exact the highest care and treatment of the comparatively small forested area, all of which in the Southwest is on mountains or high plateaus only.

In this district it were better, for the country and for its people, that no use should be made of forest lands or forest products than to have the forests wasted and burned as at present is generally being done.

However, no such drastic remedy as the isolation of the forests from human use is necessary. Under a proper and intelligent forest system the integrity of the watersheds can be safely maintained, and yet plenty of use can be found for both land and products, uses that can go on without fatal results to the forested area.

It is only in the extreme southwestern mountains that the conditions are such as to counter-indicate the cutting of any timber or even firewood in the mountains. But even here mining, resorts, power companies and irrigation works can be established with no disadvantage to the trees or chaparral, but rather to their increased safety. The nation can gain by preserving its forests in safe proportion, and can in no way consent to see this proportion of safety to its people diminished. The nation will gain by forest preservation even though the system be without any resources or power of self-sustenance.

Special Issue in the Southwest.—While forestry has become a living issue in the Atlantic States, through the depletion of perennial flow of springs and streams and increased flood action, and probably by greater and increasingly injurious extremes of frost and heat arising from forest destruction, in the West and Southwest effective forestry is a question of life or death.

With irrigated districts, present or prospective, the conservation of the forest natural reservoirs is at least as important as the conservation of any part of the rainfall by artificial storage diversion or distributing systems.

The lands on the mountains and watersheds in this part of the United States are in large part Federal public lands. By the extensive reservation of forested mountain lands from sale or settlement, the Federal Government has committed itself to a rational forest system. What the situation demands and what the people desire is a forest management of these important mountain waterseds that will serve the highest interests of the entire community. Interests built up under the neglect and waste and abuses of the Government's forestal mistakes and laches should be treated with all the consideration that the safety of the communities affected and the welfare of the great majority of the people will permit.

All foresters, and especially all foresters in the Southwest, endorse, and must endorse a Federal forest policy, whether the forest management pays its way or not.

The Government forestry systems of European nations, of Canada, Algiers, India and Australia, are self-sustaining, and for the most part bring in considerable revenues. Curiously enough, it is in the countries like Spain, Arabia, Persia and Turkey in which forestry is neglected, where national productive power has most diminished, and in which both nation and people individually are poorest. The success of other countries in maintaining national forest systems invites our attention to this subject.

The principal revenue from all forest systems is from the sale of forest products. These are mainly merchantable timber and fuel. The Western districts in which the principal areas of public lands exist, are situated so that one part or another of California would resemble their conditions closely enough for preliminary plans and outlines of forest management appropriate for the entire Western public land areas.

California's Forest Area —California contains mountains and plains, valleys, farm lands and deserts. In the northwest its climate is one of if not the moistest in the United States; in the southeast it is one of the most arid. In the redwood belt there is a very large rainfall, and almost continuous fog and mist between the rainy seasons. In the Cocopah desert years pass without a drop of rain, or even a cloudy day. California conditions, carefully considered, can do much to outline a forest and public land policy. What is the public land situation here?

California contains 99,361,083 acres of land, of which

The area appropriated is	40,392,418	acres
The area unappropriated is	43,841,944	"
The area reserved is	15,127,621	"
	99,361,083	"

This gives a substantially accurate picture of our land situation. In the other Western States the public lands are in much larger proportion.

The above figures, however, do not give the exact facts. Of the appropriated area some has gone to the State for taxes. In some of the mountain counties this tax area is quite considerable. The State Comptroller and the county officers thus far have found no general record of this tax land, therefore no one can tell to what it amounts.

Of the area reserved, a considerable part is patented and in private hands. In some reserved districts the proportion of private holdings is large, in others very small.

The National Yosemite Park, of about one million acres area, is a little more than half in private hands. The San Gabriel reserve, from the Cajon west, has a very small proportionate area in private hands, while the San Bernardino part of the forest reserves of the south has a considerable area in private hands.

The reserve system suggests the policy of Switzerland. In that republic experience has demonstrated the immediate and often awful results of forest denudation on steep, high mountains to lower agricultural lands.

From this experience has been evolved a forest system which lays out, as a part of its functions, forest reserve districts. The lands within these, whether public or private, are under public control, and not a tree can be cut without public authority. We may come to this system some day.

Public and Private Lands.—There are in this State about 83,000 square miles of public lands in the hands of the Federal Government. An examination made by expert civil engineers on section lines, and mapped by the old State Board of Forestry, shows in its report that the mountain land with merchantable timber is substantially all in private hands. There is, speaking generally, no timber of merchantable quality and accessibility in California not in private hands.

Fuel and small wood costs more to bring out of the high Sierras at present than it will bring. There are restricted districts where the waste and fallen wood or small standing timber could pay its way for use as ties, posts, fuel or mining, but no large revenue is in sight from this source at present. Consequently, the source of revenue and support of foreign systems is absent in California.

We may assume that the known conditions in California in this respect in one or another of its districts apply to those of the entire West.

There is, however, a source of revenue to the Government from a rational management of its mountain forest lands, when handled in conjunction with the development of public irrigation works of the vast area of arid public land.

The reason why there is such a large amount of public land in California and in the West generally is that the land is all in an arid climate, and that it is therefore incapable of supporting a farmer or settler, without a secure supply of water for irrigation, and often for domestic use.

Forests and Irrigation. — The mountain forested areas are all incapable of agriculture in the Southwest. There is consequently no gain of productive area, as in the settlement of Ohio, for instance, by denuding them. On the other hand, these forests are the natural reservoirs of the Southwest.

The forests in this section are of the highest importance both to the irrigation districts already developed, and also to the enormous areas that may by future irrigation works be made fertile.

Storage reservoirs, diversion works, ditches, etc., are all safer and more permanent when under a forested watershed than under a bare one. In the first case, with forest covering, there is a minimum of flood action, and practically no torrential detritus to fill up the works. From a denuded watershed the water delivery is irregular, torrential and detritus-laden.

The public land now at its limits, or near its limits of support of population, can, by judicious irrigation works, be made capable of supporting a population of between fifty and one hundred millions. Irrigated land has always been as capable as that for supporting the densest population from agricultural returns. We see this in the history of the Euphrates and the Nile. In both of these cases, and in the more modern developments in India, we see that the important works were carried out by the community or Government, were managed by the community, are thus managed, and that new work for further development in the application of water to land in genial and dry climates, such as those of India and Egypt, is planned or being executed solely as Government undertakings.

Why the Government Should do it.—There are three good reasons with us for this policy. The first is that the lands susceptible of improvement are largely public lands. The second is that the undertakings are too large for most private initiative, and the third is that a public administration of irrigated lands is the only one in which the land occupants can feel safe in not becoming serfs of the water company, as is now practically the case in the rich, irrigated valley of the Po, where the returns are large, but the people in misery.

Governments in the past and governments now recognize the advantage and propriety of making their lands productive by public irrigation works. The peoples who have done this in the past have been among the greatest. One of the most powerful governments of the present day, that of Great Britain, is now, as it long has been, engaged in such irrigation development. The dam on the River Nile, near Assouan, will be the greatest land reclamation work in the world. The values created by the application of water to land in Egypt will far exceed the values created by the exclusion of water from land in Holland. Both are Government undertakings.

Other Government Work.—In this country the Government has undertaken land reclamation by exclud ing water, as by the Mississippi dykes. It has also added to the land values and product values by the construction of harbors and canals, thus reducing or removing freight tariffs or lighterage and landing tariffs. The States on or having rivers have been benefited by this policy. So also the coast States or those on the lakes or served by the great Sault Ste. Marie canal have been benefited; so has the country generally been benefited.

It is eminently proper that the people's Government should apply this policy to the development of the rich and sunny Western lands that cannot produce and serve mankind without water. In this case the benefit is direct to the public. It is homes for the people that will be created. It is, of course, markets and a high productive-power population in our own bounds that we thus create. It is the conservative agriculturist that we thus introduce and encourage to balance the more radical bodies of employes in the great manufacturing districts. Fifty million such Americans will consume more American products and support more American trade than all our present foreign trade combined.

Taking the public land area as a whole we find some that is inherently worthless, some that can be made good and productive, some where forests and their products can be safely used under reasonable regulations, some where the forests can only be safeguarded but not used, as in the chaparral mountains of the South, and a wide district that is at present used for pasturage, excessive and premature. The pastures thus deteriorate and carry less stock.

Forest Lands Should be Leased with Proper Regulations.—The public land pastures have deteriorated and are deteriorating in stock and sheep-carrying power. Fighting and disorder is everywhere present among the pasture users. Sometimes they have wars. These stock and sheep men, as far as seen, welcomed a proposed system of leasing the public lands appropriate to pasture, under judicious restriction as to the number of stock permitted on each section and the time of year when the stock should go on. The public lands in California have a present value for pasturage that varies with seasons. It is estimated to have an annual rental value of not less than $250,000 and may exceed half a million dollars. Its rental value varies with the seasonal rainfall. The stockmen would be glad to pay rent and thus know upon what feed they could rely, without the present accompaniments of murder and arson.

These districts where pasturage injures the watersheds could have the stock reduced to a safe number by reasonable regulation or entirely removed.

When we consider the vital importance of the entire forest question, and past and present precedent in the matter of forestry and irrigation; when we consider the effect of forest denudation in filling up navigable rivers and harbors, the importance of water to miners, to cities and to irrigators; when we further reflect on the empire at our hand and in our borders to be created by irrigation works, we can agree that forests, reservoirs and public land management all go hand in hand.

The land system as a unit can be self-supporting and revenue-producing. All interests can be fairly dealt with and the country brought to its highest productive power.

Those who engage in promoting this great work have strenuous efforts before them; they deserve the garlands of reward as civic patriots as much or more than those who foment distant foreign wars. The conquest of this empire within our bounds for our own children is more useful, more profitable, more secure and more glorious than any foreign conquests can ever be.

Mine Exploration by Diamond Drill.

The M. C. Bullock Manufacturing Co., 1170 West Lake street, Chicago, Ill., have issued a treatise on the diamond drill, which is of sufficiently practical a nature to deserve extended extract therefrom. As stated, the development of a mineral property depends largely upon its having been prospected carefully and intelligently, and the later operations planned and executed with a knowledge of the extent, character and trend of the ore bodies. Prospecting with the diamond drill, equipped not only for extracting cores, giving a sample for assay, but also for indicating the character and extent of loose and caving material, is often the quickest and cheapest method of determining the value of a mine.

The boring tools used in diamond drill work are shown on page 369, as illustrated in the pamphlet to which reference is made.

Bit blanks (Fig. 1) are made from a solid bar of homogeneous steel. The bit blanks are made with an outside shoulder and a counterbore, giving ample waterway to the face of the bit.

The solid bit (Fig. 2) is used in drilling through a large body of barren rock which is underlaid with a mineral deposit. It is often the cheaper plan to use a solid bit and cut away all of the rock overlying the mineral, than to use the core bit and lose the time required in withdrawing the rods and taking the core from the core barrel. The core bit is set with diamonds in the ordinary manner, then the "plug" center, also set with diamonds, is inserted, and this combination makes an effective solid bit. After the barren rock has been penetrated the "plug" center is removed and the drilling proceeded with in the ordinary manner, extracting a core from the ore-bearing formations.

Core lifters (Fig. 3) consist of three parts—shell, ring and coupling. The shell is bored with an inside taper, into which fits the split ring or spring (Fig. 4). As shown in the illustration, this ring is wedge-shaped with inwardly projecting lugs, which grip the core when under compression. The coupling is screwed into the top of the shell and acts as an upper stop to the ring. The shell and ring being tapered, when the ring is in the upper end of the shell, it is loose and under no compression, but when it is pressed down to the bottom of the shell, the effect of the double wedge is secured and the ring is brought under heavy compression and contracted so that it grips the core tightly. In operation the ring does not rotate with the shell, but rides lightly on the core, sliding down—not under compression—as the bit advances into the rock. When the "run" has been made and the rods are hoisted, the first lift of ⅛" draws the core lifter shell upward, so that the ring is compressed and grips the core, breaking it off close to the bottom and bringing it to the surface. For boring in very soft ground, the ring is made smooth inside and of extra length.

Core barrels (Fig. 5) are made of cold-drawn seamless steel tubing, with the spiral water tubing grooves cut on the outside. This permits of making the core barrel of almost the exact diameter of the hole, so that it acts as a guide and keeps the hole straight. In drilling at an angle across formations which alternate hard and soft, this core barrel prevents the bit from deflecting and following the softer stratum. In crosscutting the formations squarely, the plain core barrel can be used, but as it is made of a slightly smaller diameter than the bore hole, to give a sufficient water space, it does not act so effectively as a guide to the bit as the spiraled core barrel.

Drill rods are made of lap-weld steel tubing, fitted with a coupling, which gives uniform strength to the line of rods (Fig. 6). The rods are cut to exact length, 5 feet for underground and 10 feet for surface work, and accurately threaded, so that the complete line shall be true, straight and of uniform diameter.

The water joint (Fig. 7) is the fitting which is screwed into the top of the line of rods and makes the water connection to the pump. It is a packing gland, the lower end finished with a drill rod thread, the upper end fitted with a nipple for the hose connection. A brass nut at the bottom affords means of adjustment to take up the wear of the packing.

The plain hoist plug (Fig. 8) is ordinarily used in hoisting and lowering the rods. The lower end is threaded to fit the upper end of the drill rod, and revolves freely upon the stem of the eye bolt, so that the hoisting rope is not untwisted when the plug is screwed into the rod.

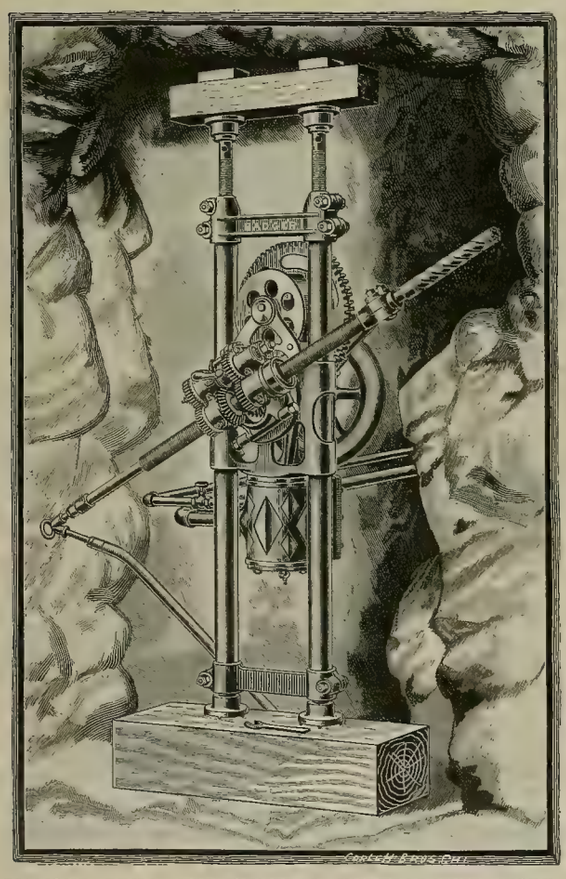
In case of loose rock falling into the hole after the rods have been pulled to take out the core, and when "spudding" or driving pipe, it is necessary to keep a flow of water passing down the inside of the rods, while at the same time they are alternately raised and lowered or dropped quickly. To avoid delays and accidents, the combination water joint and hoist plug (Fig. 9) is used. From its name and the illustration, its use and construction will be understood.

The improved safety clamp (Fig. 10) is used for holding the rods while the operators are coupling or uncoupling the rods in hoisting or lowering.

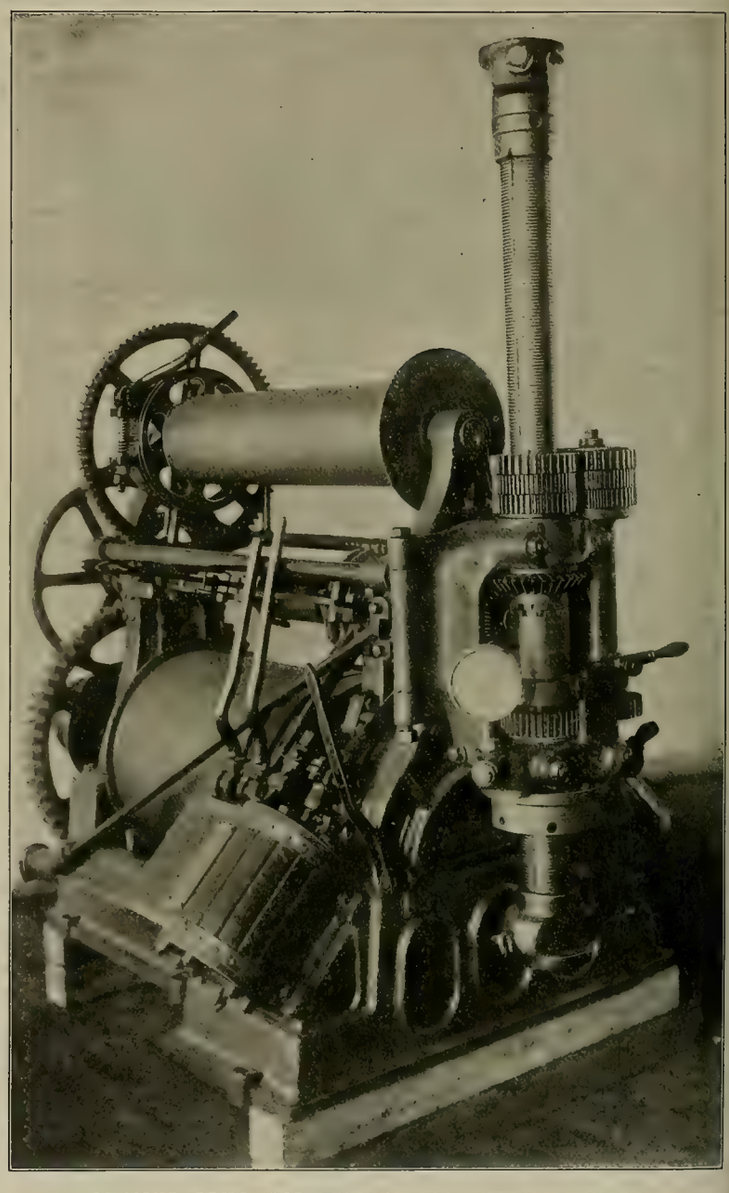
When reaming out a hole preparatory to inserting a line of casing, the reaming bit being driven with a line of small rods, or when using a large core barrel and bit with small rods, there is frequently so much vibration that a high speed cannot be maintained. To overcome this, special guide couplings (Fig. 11) are used. The threaded part fits the drill rod thread and the body collar is made just large enough to fill the hole. These guide couplings are placed at intervals of 20 to 50 feet along the line of rods and are irregularly spaced, so that all of the distances between them can not correspond to the nodes of vibration.

Taps for recovering a line of rods lost in a hole are made in a great variety of forms. One shown in Fig. 12 is used when the upper end of the rods is not damaged, and is attached to the lower end of a line of rods, lowered, and tapped into the top of the lost rods. If the rods are broken and the upper end of those left in the hole are split, an "outside" tap is sometimes used. Frequently the top of the damaged rod must be cut off before the tap can be inserted. For this is used rose bits, either with an inside guide (Fig. 13), or with an "outside" or hog-nose guide (Fig. 14). The former is used when the top end of the rod is splintered but holds together, and the latter when the split end is spread apart. If the break is in the rod coupling and an outside tap or rose bit with an outside guide can not be used, a straight reamer (Fig. 15) is used for cutting away the part of the coupling remaining, so that the inside tap can be inserted. These taps are made in all sizes, and can be used for recovering casing, pipe and core barrels, the same as drill rods. The condition of the rod in the hole can be ascertained in case of breakage by a careful examination of the lower end of the recovered rod and by taking an impression of the rod in the hole by means of an impression cup filled with hard soap, tallow or wax; or if these are not available, very good results can be secured by using a soft wooden plug.

An effective and easily operated casing puller is a harpoon (Fig. 16). If the harpoon jaws encounter an obstruction while being lowered, they will slide up into the recessed chamber and lock in without injury to themselves or the possibility of their being caught



DIAMOND DRILL FOR GENERAL UNDERGROUND WORK.



DIAMOND DRILL FOR BORING DEEP VERTICAL HOLES.

in such a way as to prevent their removal from the hole.

For reaming below a line of casing to permit of driving it deeper, or for cutting off casing at any point when it has become fast in the hole, the hydraulic expanding reamer and cutter (Fig. 17) may be employed. It is fitted either with special tool steel jaws for cutting casing, or with blank jaws, to be set with diamonds. It is attached to a line of rods, lowered to the proper distance and the jaws expanded by water pressure transmitted through the rods. After its work has been accomplished the expanding jaws automatically return to place inside the barrel and the tool is raised to the surface.

Chopping bits used in driving pipe and "spudding" may be the single and double blade bits (Figs. 18 and 19). These are used in chopping through the surface ledges and ordinary wash or soil. The double blade bit works more rapidly than the single blade, but the latter is more easily annealed, dressed and tempered. The lipped bit (Fig. 20) and the auger (Fig. 21) are used in drilling through "hard pan," according to circumstances, and through clay a modified form of the auger (Fig. 22) is effective. The pod bit (Fig. 23) is used in going through loose sand or any heavy material that can not be handled by the clay auger. When a nest of gravel or small boulders is encountered, the double spiraled auger (Fig. 24) can be used to advantage, provided the boulders are not too large. In that case they must be chopped to pieces, or, if too hard, blown out with powder or dynamite.

Drive pipe should be carefully selected. It should be straight and true, free from blisters, and very strong, as great force is required in driving it. A heavy steel shoe (Fig. 25) of extra length should be used to prevent its turning over in the hole in case it becomes unscrewed. The drive head (Fig. 26) is threaded to receive a drill rod, which serves as a guide for the drive weight.

The jar collar (Fig. 27) screws into the top of the rod used as a guide, and is useful when the drive pipe or the drill rods have to be jarred up.

Clamps for holding drive pipe and casing are usually of the strap style (Fig. 28), although the hinged clamps are sometimes used where a large amount of pipe is to be handled. Casing is usually of a size just large enough to admit the passage of the regular boring tools. It is carefully straightened, cut to exact lengths and fitted with special inserted couplings, giving the whole line a uniform outside diameter.

After boring into rock a considerable distance it is sometimes found necessary to insert a line of casing to shut off quicksand or loose, caving ground. This can be done by reaming out the hole to the required size. The reaming bit, with guide, shown in Fig. 30, is generally used, but is subject to many modifications. A length of drill rod is sometimes substituted for the fluted front guide, and a piece of casing can be attached to the upper end of the bit to prevent any tendency to vibration. At best, the process of reaming out a hole for inserting casing is an expensive one, frequently costing as much as drilling the original hole, and where bad ground is known to exist, the wise course is to start the hole of a diameter large enough to allow the intertion of casing and continuing the work with the regular boring tools, after the caving ground has been drilled through and shut off by the casing line.

Prospect holes are located with reference to the extent of the property, what is known of the mineral and the development work which has been done. When possible, the holes should be located near a good supply of water, thus avoiding having to haul it. If water is scarce, provide a large settling tank, or sink barrels in the ground, draining the water from the drill hole, and using it over and over again.

When drilling, if large boulders or loose rock are encountered, a chopping bit is screwed to the lower end of the drill rod and this is raised and dropped, churn fashion, until the boulder or rock has been chopped up and the way is clear for driving the pipe.

As a general rule eight stones should be used for setting a diamond bit. Very large bits are frequently set with more stones, in order to "cover," and sometimes small bits are set with only six stones. It is poor economy to reduce first cost of the bit by cutting down the number of diamonds.

The diamonds should be picked out carefully, with especial attention to their location in the bit and a uniformity of size and weight. The latter point is important, for a small stone set with a number of large ones will become insecure in its setting and necessitate the resetting of the entire bit long before the balance of the stones require it. As a general rule, four of the strongest stones are picked out for the outside stones. These are placed in pairs, on lines at right angles; the lines joining the two pairs of inside stones bisect the angles of these lines. Laid out in this manner and carefully set, the bit will be well balanced and cannot but run smoothly and true.

On the opposite page are cuts of two types of diamond drills. The smaller is the type of machine used underground, and may be readily shifted from place to place. It can be adjusted to bore at any angle. The other is a large and powerful drill of the kind employed in sinking deep vertical holes. This machine is designed for cutting a hole to the depth of 3500 feet, and produces a core from 2 inches to 14 inches in diameter, according to tools employed.

The cost of diamond drill work is affected by various elements—the nature of the rock and overlying wash or soil, whether supplies can be obtained easily, the amount of drive pipe and casing, the necessity for a camp outfit, etc. In hard and badly broken formations the carbon cost will naturally be higher than in the softer strata, and in working in remote localities the items of traveling expense and transportation of machinery and supplies are considerable.

The Frozen Deposits of the North.

Written for the MINING AND SCIENTIFIC PRESS.

The correctness of the theory that the depth of unvarying temperature increases from 1 foot at the equator to 70 odd feet at the poles, has been called into question by a shaft having been sunk over 1500 feet in the sediments of northern Siberia without reaching the limit of frost and by the great depths to which frost extends in the Klondike. But while these facts are indisputable, they do not contradict the theory as much as they appear to at a first glance.

A further investigation of the facts of the case shows that in some localities where frost extends to great depths, there are places where the frost limit is reached in a few feet; that frost only extends to great depths in deposits which are either composed of sediments or the accumulations of a series of slides, while the places in which frost only extends to shallow depths are so situated that they can not be overlaid by surface deposits to any depth. Again, in consideration of the shallow depths to which ground is frozen by months of temperatures ranging from 10° to 60° below zero, the degree of cold necessary to freeze to the depth at which the search for the frost limit was abandoned in Siberia would leave an indelible imprint upon the rest of the earth, but thus far no such evidence has been discovered, as it would be a vastly greater degree than that requisite to produce any glacial epoch whose traces are discoverable at the present day. Furthermore, such a degree of cold would not freeze adjoining places to such varying depths when the rates of conductivity of their formations are practically identical.

The key to the solution lies in the fact that the localities in which the frost reaches depths much greater than those called for by the theory are situated in sections which are or were favorable for the accumulation of slides, sediments, etc., while the places in or near them situated unfavorably for such accumulation are only frozen to comparatively shallow depths. From this it is evident that instead of having been frozen to those immense depths by an intense degree of cold, the deposits were gradually frozen as they were formed. In other words, instead of having been frozen from the top down, they were frozen from the bottom up as they were formed by overlaying. In proof, then, that this process is still at work, and quiet and slow though it be in its operations, it is amply able to do all that has been done in that line of freezing without any unusual degree of cold.

At present the Klondike affords the best facilities for the study of the interesting phenomena attending the process of freezing from the bottom up. This is partly on account of the data furnished by the mining operations and partly because the easily decomposed schists of that section render the process more rapid than among harder formations. Although the process can be traced in all the valleys and low places, it is seen to the best advantage where the effacing hand of Nature is rebuilding, from the bottom up, the portions of the frozen deposits which have been mined out.

The process of freezing from the bottom up is practically as follows: The winter's freezing extends to a certain depth; the spring thaw, rains, etc., bring down the annual contribution of slides, sediments, etc., from the higher ground, before the ground is thawed very deep, and protects it by overlaying so that the summer's thaw fails to reach the limits of the winter's freeze. The cold of the ensuing winter usually freezes down to the old frost, but in cases where the season's accumulations are too great for that, they gradually become frozen by the excess cold surrounding them as the temperature of the frozen deposits is considerably below the freezing point.

On account of the great depths to which the vast alluvial plains and tundras of the north are frozen, they were evidently formed during a period of subsidence, when the sediments kept the surface near the water level while the underlying formation was sinking.

ASA THURSTON HEYDON, M. E.

NEVER in the history of railroading has there been such extensive improvements made by all the roads along their lines and in their equipment. All the Eastern lines are spending millions in improvements between New York and Chicago. The same can be said of the Western roads. It is estimated that the roads having terminals in Chicago contemplate making contracts, or they have already made them, that amount to about $10,000,000.

Concentration of Auriferous Sulphides in California.

NUMBER II —CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS.

Hydraulic separators are a great aid in concentrating auriferous slimes on canvas tables, though few of them are in use in California. There are a number of types of this useful contrivance. They are all built on the same principle, however. The pulp falls into a hopper-shaped box, with or without partitions, the coarse material going to the bottom and the fine slimes passing out at the top through a notch fitted with a launder. The size of the aperture at the bottom of the box is adjustable, so that the discharge of coarse material at that point may be regulated. In one of these hydraulic separators a perforated pipe is inserted to a point near the bottom and jets of clear water are forced into the mass of pulp, creating an upward current, causing the finer material to remain in suspension, thus more thoroughly effecting a complete separation of the slimes. This box is set below the vanners, which have already relieved the pulp coming from the batteries of the greater part of the sulphides contained in the ore, the material passing over the concentrator belts consisting essentially of coarse and fine sand and fine sulphides, a large part of which has been reduced to impalpable powder, and some of it so fine that on coming in contact with the air will float on water.

Passing through the separator, the coarse sand goes out at the bottom and flows away, waste, repeated tests having shown that it does not contain sufficient value to make further treatment profitable.

It would seem that this coarse sand, consisting almost entirely of grains of practically uniform size, might be discharged from the separator into a vat, allowed to drain and then be subjected to treatment by cyanide solutions at nominal expense, as the sands in most instances form an ideal material for treatment by that process. The fine material, passing out from the top of the pointed box, flows to the distributors at the head of the canvas plant.

The placing of a well constructed hydraulic sizer between the battery and the concentrating machines is certainly an idea worthy of consideration, but one not commonly practiced in California. By this means the pulp can be sized and the two grades thus formed can be sent to separate machines. The result is a cleaner product at no increased expense. In some cases carefully arranged hydraulic separators in competent hands may be made to perform such good work, in aiding properly adjusted concentrating machines, as to render further concentration on canvas tables useless. Such an arrangement would comprise two hydraulic separators and three concentrators. The pulp from the battery going to the first sizer effects a separation of the material into two grades, each grade going to a separate machine.

It will be found that the pulp has been relieved of the greater part of its sulphides by this first sizing and concentration. The pulp passing both machines should be collected and passed through the second sizer, so adjusted as to effect as closely as possible a separation of coarse and fine material, the latter going to the third and specially designed machine and the coarse sands to waste. In some ores, no doubt, values may still be found in the coarse material—this will be influenced largely by the method of crushing, whether stamps or rolls, and by the character of the ore, whether largely quartz or soft, talcose or chloritic material.

When an arrangement like that suggested above, or some modification of it, fails to accomplish the desired savings of slimes, the canvas table may be turned to as a last resort, but in many cases the canvas may be dispensed with by giving attention to sizing before concentrating on machines. It is unreasonable to expect a concentrating machine of any kind to save both coarse and fine material in a single operation, as that is contrary to natural laws, yet there are many who expect a clean and complete separation of both coarse and fine particles of heavy sulphides from a gangue of coarse and fine particles of relatively light material. When sizing by means of the separators has been first accomplished the particles are nearly of uniform size in each lot of the material and the difference of specific gravity of the various minerals then renders their separation much easier in the concentrators.

Canvas plants should be constructed, where possible, on a site affording abundant room, not only for the floor but for settling tanks, etc., and for possible extensions of plant which some change in the ore or addition to the mill may render necessary. Dry, seasoned lumber should be used. The posts must be provided with secure footing, as no sag must occur, any unevenness of the inclined surface destroying the usefulness of the plant. The floor should be made of narrow boards—3 or 4-inch material, planed on one side and on the edges. These should be laid with ½-inch space between them, as the swelling of the wood when water is turned on

will cause the boards to meet. If this precaution is not taken the floor will "buckle up" when wet. Pieces of flooring having knotholes should be rejected. The grade given plants is usually ½ to ¾-inch per foot. A small difference in grade does not materially effect the working of the plant, provided it be uniform. A box containing clear water must be placed across the head of the canvas sluices for the purpose of thinning the pulp, if necessary, and for washing down the tables, as explained in a former chapter. At some works the sweepings are conducted to a settling box having a partition 2 inches lower than the sides of the box. The sulphides, with much water, fall into this box. Naturally a large amount of the finer sulphides will remain in suspension in the water for some time and the greater amount of these pass over the partition, where, settling, they constitute a somewhat finer grade than those settling in the first compartment. The material settling in this compartment is removed and passed over a second concentrating machine of fine adjustment having a slight but rapid vibration. The tailings from this machine pass over a small auxiliary canvas floor, a further saving thus effected, the several products being almost wholly free from waste material.

The overflow from the settling box passes to a series of tanks, or rather to a large tank having numerous partitions, the water carrying sulphides in an extremely fine state of division, which, passing backward and forward from one compartment of the tank to the next, gradually settles on the bottom. These tanks do not need frequent cleaning, as it would require months to fill them, but the material is usually high grade — sometimes worth several thousand dollars per ton.

Nearly always a metallic, golden to bronze colored film may be found floating on the surface of the water in the tanks, concentrator boxes and settlers. This material is rich sulphide ore which, owing to its extreme fineness, is floating. Where this occurs it may usually be settled without difficulty by taking up the overflow of such box or tank and carrying it away through a pipe which discharges quietly into another box or vessel, the discharge end being beneath the surface of the water. It must be so arranged as to make as little current as possible, in order that the slimes may not rise again to con tact with the air, when they will again float, as before.

In tanks where the sulphide mineral remains in suspension, refusing to settle, it may usually be thrown down by the addition of lime to the water, which clarifies the liquid.

The sulphides obtained on canvas floors, being very fine, have given some trouble in treatment by the cyanide process, but a high extraction is usually possible by the agitation process, the solution being either drawn off by means of the vaccuum filter or by decantation. These fine sulphides often return a higher extraction than those taken from the concentrators. This fact is due to the difference in the size of the particles of material under treatment, the finer slimes rendering the microscopic particles of gold more easily accessible to the action of the solution of cyanide.

Cheap Mining and Milling at the Overland, Mercur, Utah.

Written for the MINING AND SCIENTIFIC PRESS.

On the Sunshine side of the Mercur district the Overland is the center of activity. The Overland



OVERLAND MILL, SUNSHINE, MERCUR DISTRICT, UTAH.

cyanide plant is treating 240 tons per day. The ore from this mine is favorable to this method of treatment, there being practically no talc or clay to hinder leaching and percolation. As an evidence of the thoroughness of the saving effected, I am informed that the tailings have been found to contain only from 30 to 40 cents per ton. In May the Overland mined and milled 2000 tons of ore at a cost of $1.92 per ton for mining and 81 cents per ton for milling. For the month of August 5500 tons were handled at a cost of $1.14 per ton for mining and 43½ cents per ton for milling, a total cost of mining and milling of $1.57½ per ton. Supt. G. A. Duncan and Metallurgist A. E. Smith have made special efforts to reduce the cost per ton as the tonnage handled increases, and the results are of general interest. Supt. Duncan expressed the belief that it would be mutually helpful if mining companies generally would accord publications like the MINING AND SCIENTIFIC PRESS more ready access to such figures as are here given. The Sunshine mine is under bond and lease to Gill S. Peyton and associates of the Overland, who are doing development work.

WASCOTT.

Mercur, Utah, Sept. 23rd, '99.

The Electrolytic Refining of Auriferous Silver.

Herr Dietzel, in a paper read before the German Electro-chemical Society, states that an instance of the most simple case of the electrolytic decomposition of alloys is as follows:

If the anode consist of silver containing gold, and an acid solution of silver nitrate is used as an electrolyte, silver is traveling to the cathode, and the same quantity is being added to the electrolyte at the anode; the gold remains at the anode and the electrolyte is not altered. Most of the practical cases in the electrolytic refining of metals are, however, much more complicated, as at the anode, besides one part of the anodic material dissolving, the other part is altered chemically, forming combinations with the elements of the electrolyte; in this case the electrolyte is also altered. If the combination formed at the anode is soluble in the electrolyte, the whole metallic concentration of the electrolyte is not altered, but the percentage of each of the metals is. The percentage of the metal deposited at the cathode decreases in the electrolyte and the percentage of the other metal increases, the sum of all the percentages being unchanged. If the anode is silver containing considerable copper, and if silver is intended to be deposited at the cathode, the silver percentage of the electrolyte decreases and the copper percentage increases to such a degree that it would soon be impossible to deposit pure silver at the cathode. If, therefore, a silver salt requiring a lower decomposition pressure is used as the electrolyte, the assistance of some auxiliary chemical process becomes necessary to diminish the increasing copper percentage and to increase the diminishing silver percentage in the electrolyte. Instead of this, it is much more convenient to use the salt requiring the higher decomposition pressure as the electrolyte, to deposit copper at the cathode and to replace the silver which is dissolved at the anode by an equivalent quantity of copper in a special process before the copper is deposited at the cathode. In this case the composition of the electrolyte remains nearly unaltered. This method has been successfully used for more than six years at Pforzheim, Germany, where about 60 kilograms of an alloy is decomposed per day. This alloy, consisting of fused wastes, contains 40% to 65% copper, 22% to 50% silver, 5% to 7% gold and small quantities of other metals. A slightly acid solution of copper nitrate is used as electrolyte. At the anode copper and silver are dissolved; copper is deposited at the cathode, the gold remains undissolved and the silver is recovered in another tank by special process, which is described. The current is about 150 amperes per square meter at 2½ to 3 volts. The cost of the process is covered by the value of the refined copper. He thinks that the same method can be used for decomposing other alloys, as, for instance, refining nickel and copper.—Electricity.

THE tides are now utilized for generating power at Pont l'Abbe, Finisterre, France, during fourteen hours per day. At flood tide the water flows through a canal two and one-half miles inland into a pond in the rear of the power house, and returns to the sea at ebb tide. The total fall is 7½ feet and 80 H. P. is generated by means of turbines. Means for applying this method of generating power to various industries have been considered. It seems rather singular, says an English contemporary, that practical means of harnessing the enormous energy of the tides have not been devised in numerous places where the rise and fall of water is equivalent to a head of from 25 to 30 feet and the volume of water available is, of course, only limited by the size of the reservoir constructed to receive it. Sometime ago there was much comment made in the London papers as to a proposal to utilize the tides at Southend.—Electricity.

THE mechanical uses of quicksilver are increasing and the electrical demand is so large that it is good opinion that the arts alone could consume all the quicksilver produced without any demand from the gold mining companies.

Horse Power Supplied at Niagara.

The amount of power drawn from Niagara Falls by the factories served by the Niagara Falls Co. is figured as follows:

	Horse Power.
International Paper Co.	7200
Pittsburg Reduction Co. (aluminum)	3050
Carborundum Co	1000
Buffalo & Niagara Falls Electric Light Co.	500
Electro-Chemical Co. (peroxide of sodium)	400
Buffalo & Niagara Falls Electric Railway	200
Niagara Falls & Suspension Bridge Railway	250
Buffalo & Lockport Electric Railway	350
Oldbury Electro-Chemical Co.	1000
Matheson Alkali Works	2000
Cataract Power & Conduit Co. (Buffalo)	8000
Tonawanda Power Co.	500
Union Carbide of Calcium Co.	10,000
Surface Coating Co. (enameling)	20
Niagara Development Co. (workingmen's dwellings)	75
Niagara waterworks	45
Total	34,590

Next month, the Atchison Graphite Co. and the Lead Reduction Co. will be supplied, bringing up the total to 45,190 H. P. contracted for. The annual income is said to be $700,000 and the operating expenses $150,000 per annum.

The Furnace Controversy.

Regarding the present discussion concerning the Ropp furnace, the Brown furnace, etc., and Judge Hallett's recent ruling in a Colorado court, a pamphlet issued by the Parke & Lacy Co., San Francisco, says in part:



H. F. BROWN. No. 471,264. 1892.

"This drawing shows a section of the Brown furnace represented in the only Brown patent in controversy. In this patent Brown claims to have invented the improvement in ore furnaces consisting of a chamber at the side of the main roasting chamber, cut off from the main chamber by a wall or partition, in which the running gear of the rabbles is located."

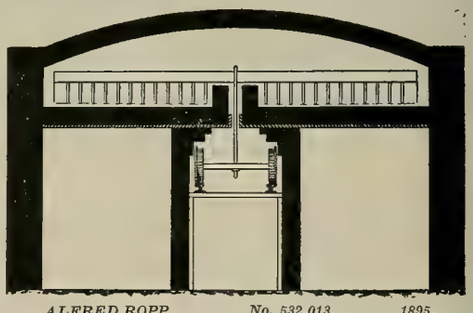
* * * * *



R. GEORGE. No. 80,065. 1868.

"The construction of R. George's furnace is shown in the above drawing, copied from the records of the Patent Office."

* * * * *



ALFRED ROPP. No. 532,013. 1895.

"The utter dissimilarity of the Ropp furnace from that of Brown is seen at once by comparing the drawings of the two furnaces."

* * * * *

"We are building the Ropp furnaces and we will continue to build them. We will stand between our customers, and secure them from any loss or damage from any action brought by Brown or others, based upon Brown's patent or patents."

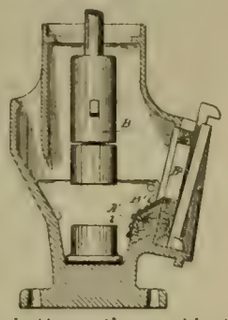
A NOVEL use for the Roentgen rays is reported. It is stated that carbon in all its forms is transparent to these rays, while the incombustible constituents, silica and silicates, are opaque to them. By placing a lump of coal between a Crookes' tube and a fluorescent screen, the slag and ash forming parts of the fuel can be detected. In these tests rough lumps of coal up to 2 inches in thickness may be used with an exposure of five minutes and with a coil giving a 10-inch spark.

Latest Mining and Metallurgical Patents.

Patents Issued Sept. 19, 1899.

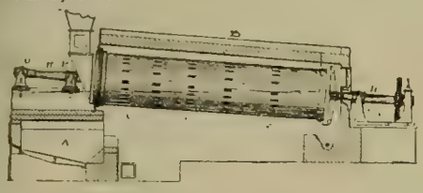
Specially Reported for the MINING AND SCIENTIFIC PRESS.

RIFFLE PLATE FOR ORE STAMP BATTERIES.—No. 632,954; H. Tuttle, Quartz, Cal.



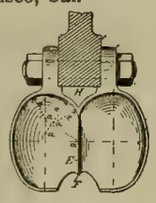
In a stamp battery, the combination with the mortar provided with a pulp outlet opening, of a chuck arranged therein, and of the riffle plate secured to the inner face of the chuck block and extending into the mortar to a point opposite the stamp, plate having its upper face provided with a series of collecting pockets, grooves or channels within which is collected the amalgam; the riffle plate extending from the screen opening downward to a point adjacent to the lower edge of the chuck block, opposite the stamp.

MECHANICAL DRIER.—No. 633,123; F. D. Cummer, Cleveland, Ohio.



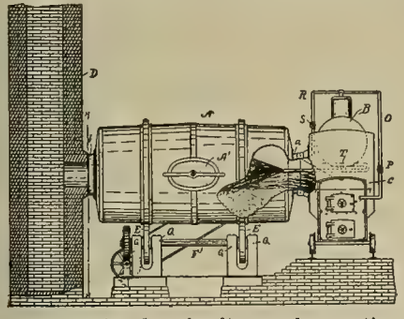
A cylinder having inlet openings between its ends and passages from openings to interior of the cylinder having the shell of the cylinder forming the outer wall thereof and inside coverings substantially parallel to shell, forming the inner walls of passages.

TANGENTIAL WATER WHEEL.—No. 633,184; W. A. Doble, San Francisco, Cal.



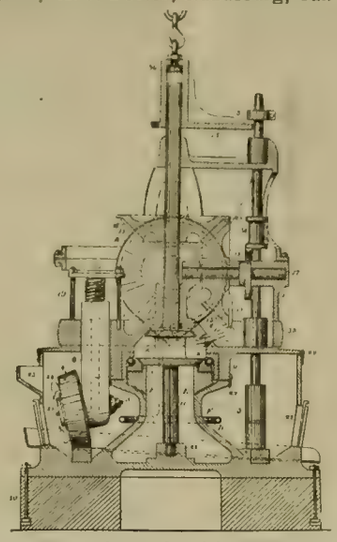
In a tangential water wheel, a series of buckets each consisting of a shell comprising two ellipsoidal cavities in proximity divided by a central wedge-shaped ridge in the plane of the wheel, a clearance passage for the stream at the outer extremity of wedge-shaped ridge, through adjoining margins of the ellipsoidal cavities, whereby the stream is partially surrounded by but not impeded by cavities, the ridge alone encountering the stream and dividing the same, and the cavities serving to deflect the split portions thereof and gradually change the direction of their motion to reversal.

APPARATUS FOR ROASTING REFRACTORY ORES.—No. 633,278; R. A. Stewart, Cerrillos, New Mexico.



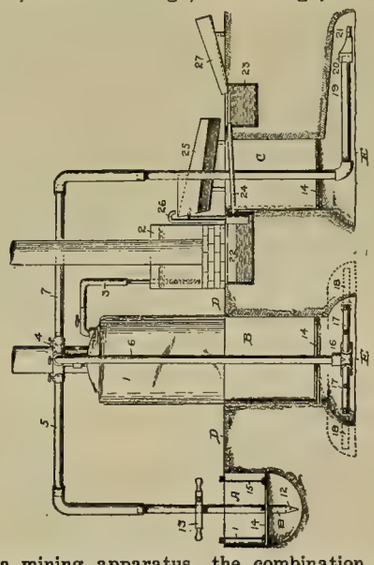
In an apparatus for simultaneously roasting and oxidizing refractory ores, the combination of a rotary ore-retaining cylinder provided with a manhole or holes through which the same is filled and emptied; two pairs of cylinder supporting roller bearings, each pair respectively being located beneath and upon the respective sides of the longitudinal axis of cylinder and connected together by a supporting shaft; a driving gear connected with the shaft of one of pairs of roller bearings; means for communicating motion to driving gear; a draft flue or chimney; a furnace communicating through the interior of cylinder to chimney; a steam generator located above furnace; a steam pipe communicating from the boiler through a steam coil located in the furnace, and from thence into rotary ore cylinder; and a second steam pipe also communicating from boiler to a distributing pipe provided with slots or perforations within the furnace.

STAMP AND BOILER CRUSHER AND PULVERIZER.—No. 633,248; A. J. Petter, Randsburg, Cal.



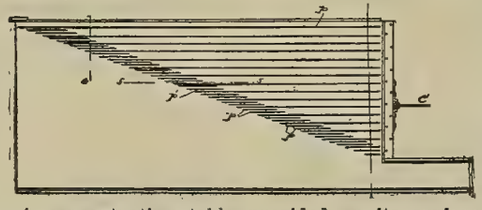
In an apparatus for pulverizing ores, an annular mortar with corresponding die or dies fixed therein, a framework with anti-friction bearings and a vertical central shaft, stamps the stems of which are vertically guided in lines above the die, a mechanism including horizontal shafts and driven gears, and cams on shafts, by which the stems are raised and allowed to drop with an oblique sweeping grinding movement, vertically moving spring-pressed standards carried by the frame intermediate between the stamps, inclined shafts journaled in the lower ends of the standards, and rollers fixed upon shafts, rollers having conical faces converging outwardly, so that the lower faces of rollers travel upon dies and produce a sweeping or grinding action thereon.

APPARATUS FOR MINING PRECIOUS METALS.—No. 633,397; S. R. Stambaugh, Chattanooga, Tenn.



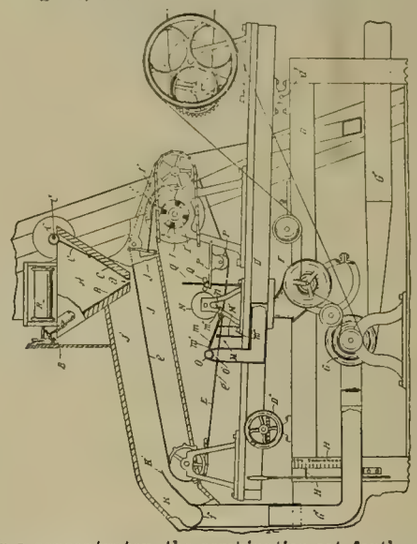
In a mining apparatus, the combination with a steam generator of a shaft sinker, consisting of an open pipe, an excavation closure through which the pipe loosely passes, a flexible pipe connecting the shaft sinker to the steam generator which permits lateral and vertical movement of the shaft sinker when in use, means for manipulating the shaft sinker in relation to the closure, and means for raising and lowering closure independently of the shaft sinker.

CONCENTRATING TABLE.—No. 633,265; U. S. James, Helena, Mont.



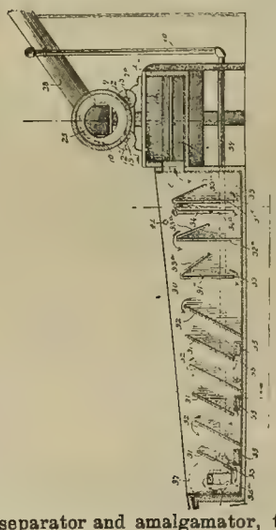
A concentrating table provided on its surface with series of parallel, longitudinal riffles extending from the forward end rearward and terminating short of the rear end of the table, on a substantially diagonal line running downward and rearward, and a series of supplemental riffles interposed between the rear extremities of the riffles. A concentrating table having its feed point at its forward upper corner and provided on its face with a series of parallel riffles tapering rearward and extending from the forward end of the table to a line running diagonally across the table from near the feed point rearward and downward, and a series of supplemental riffles interposed between the rear extremities of the aforesaid riffles, cross pieces binding the strips together, grooves or cuts being formed across the table coincidently with cross pieces, a flexible cover fastened to the table and covering grooves or cuts, and riffles carried by cover and made flexible transversely.

DRY CONCENTRATOR.—No. 633,254; F. W. Wood, Los Angeles, Cal.



In a concentrator, the combination set forth of a pervious traveling belt; means for feeding ore upon the belt; means for forcing air through the belt; a shutter movable toward and from the belt; and an exhaust having its intake above the shutter. A closed chamber arranged above the belt; an exhaust passage leading from the closed chamber; a movable shutter arranged to form the lower wall of the mouth of the exhaust passage and adapted to be adjusted toward and from the traveling belt. A base frame; a movable frame pivoted to the base frame and carrying a pervious concentrating belt; a blower for forcing air through the belt; a valve for regulating the air admitted to the blower; a scale arranged upon the blower frame; a pointer secured to the valve and pointing to the scale; a scale arranged upon the base frame; a pointer secured to the movable frame and pointing to the scale upon the base frame; and means for adjusting the movable frame with relation to the base frame.

ORE SEPARATOR AND AMALGAMATOR.—No. 633,445; H. Fuller, Chicago, Ill.



In an ore separator and amalgamator, the combination of a settling chamber provided with a plurality of amalgamated plates arranged to form a tortuous passage within chamber for tranquilizing the flow of ore washings therethrough, an overflow spout *42* at the discharge end of chamber, a return pipe connected to the settling chamber at its discharge end and near the bottom thereof, an outlet pipe *36* over the end of the return water pipe and having its upper end terminating in the settling chamber on a plane between the overflow spout and the open receiving end of the return water pipe, and a pump.

Mining Summary.

ALASKA.

The Alaska-Treadwell M. Co. estimate that they have blocked out and in sight 4,000,000 tons of ore between their 220 level and 440 level; besides, above the 220 level there is at least an equal amount, or 8,000,000 tons in all.

Captain Richardson, of the United States Army, has been succeeded in command of the Yukon soldiery by Colonel Ray. Captain Walker spent several weeks at Cape Nome before his return. He says "the district is one of great richness, but says 1200 or 1500 people must leave before the close of navigation in order to avoid distress. Should all of the present population attempt to pass the winter at Cape Nome, he believes there will be a shortage of both provisions and fuel. The beach wood supply is already running short. The steamship Alliance brings news that 380 Cape Nome beach miners were arrested in August in a body by United States soldiers stationed there on complaint of the Cape Nome M. & Dev. Co., which claimed the beach. The men were marched from their diggings into Anvil City. The United States steamer Bear was in port and her commander after investigating, told the officials that the United States owns the shore line from 16 feet above high-tide land to three miles out to sea, and I am in control. No man can get title to this and none can prevent another from working the beach. The 380 men who had been marched away from their work marched back again and resumed their labor. At an election held at Anvil City the name of Anvil City was changed to Nome. Two thousand miners cast their votes. A mayor and a full set of municipal officers were elected."

ARIZONA.

COCHISE COUNTY.

Tombstone *Citizen*: It is reported that options have been given on the Tough Nut, Grand Central and other properties which made Tombstone in 1883-4. There are ninety-two claims in Tombstone district, which have made a record of $32,000,000 output in a few years. E. B. Gage of Congress, Mr. Dean of Los Angeles and a Mr. Cheney have large interests in the district. The water problem will be solved first, the mines being flooded. It is thought that gold will be an important product.

GILA COUNTY.

Phœnix *Republican*: The Gun creek district, in the upper Tonto country, seventy-five miles from Globe, has come to the front this season as a promising mining region. The discoveries are on a strip seven miles in length, on which some rich copper ore and gold have been found.

Globe *Silver Belt*: The Ray Copper Co., Ltd., has 300 men employed. The railroad surveys are completed, and construction work on the narrow gauge road from the mines to the Gila river, at the mouth of Mineral creek, is to begin. Pending the construction of the railroad a large traction engine will haul machinery and supplies from the Southern Pacific to the Gila river. The reduction plant to be erected on the Gila, it is reported, will have a capacity of 1240 tons.

MOJAVE COUNTY.

The White Hills Co. is operating in the White Hills. The company owns forty-four patented claims and thirty that are unpatented. From some of these very rich silver ore has been produced and shipped. Some of the properties return good values in gold. The company's payroll is $8000 to $10,000 per month. The company also owns water rights, a 20-stamp mill, telegraph and telephone lines, boarding houses and store.

Kingman *Miner*: In cutting into the foot wall of the De la Fontain mine a few days ago, for the purpose of putting in wall plates, the workmen found a streak of lead ore which developed into a 3-foot streak of solid ore.

PIMA COUNTY.

Tucson *Star*: The copper mines of this county are making a daily output of more than twenty tons of metal, where there was not one pound of copper produced in this county ten months ago.

YAVAPAI COUNTY.

Jerome *Reporter*: On the Agua Fria, south of Bowers' ranch, near Big Bug mining district, the Val Verde Copper Co. is working on the new smelter and town site. The company expects to have its plant completed in sixty days.

YUMA COUNTY.

The Fortuna mine, near Yuma, is reported to be turning out an average of $50,000 per month, at a clear profit of more than $40,000. The quartz of this mine is glassy and unpromising to the eye of the average miner, but it has a redeeming feature in containing gold enough to make it pay handsomely.

CALIFORNIA.

Amador.

Jackson *Republican*: The mills at the old Empire dump are idle owing to lack of water. ——The Ivanhoe mine, near Plymouth, has been closed down, due to a scarcity of water. ——The North California mine at Plymouth, near the Pocahontas, is being worked by El Dorado county people, and the Gowanis mine, in the same district, is in charge of Des Moines, Ia., people.——A rich ledge was encountered in the Bay State mine, four miles north of Plymouth, last week, the extent of which is not known. Sinking and development work are in progress.——The grading for a 60-stamp mill has begun at the Oneida. The machinery will be on the ground within three months.

Record: Sinking at the Lincoln mine is progressing. The shaft is down 1130 feet. A crosscut is being run at the 500 level for the west vein channel, in about 100 feet. The north drift is in a mixture of quartz and slate. It is the intention to install power drills.—— The recent strike in the Keystone on the 800 level was made a little east of the old south shaft. The first day, it is reported, $5000 was taken out and $10,000 more was in sight. The gold was brought up in sacks. A nugget measuring 18 inches in length, 8 inches in width and ¾ inch thick was taken out Friday. It was of pure gold. The pocket is in hard ground and had to be blasted out.

Sutter Creek *Record*: The Emerson shaft of the Wildman has closed down owing to shortage of water.——At the Bunker Hill mine work is to be started.——Ground is being cleared for the foundation of a 60-stamp mill at the Oneida mine.——At the South Eureka the shaft is down 1790 feet. After the 1800 level is reached and a sump sunk, drifts will be run.——The Hepburn G. M. Co., owner of the Bellwether mine, near Jackson, has resumed work. Supt. W. A. Knapp is repairing the shaft, preparatory to sinking.

Calaveras.

Work has been resumed on the Ford mine at San Andreas.

The Republic mine near Kentucky House, south of San Andreas, is to resume work, having been provided with a new pump.

The copper mines at Copperopolis are being unwatered. John Gorham has been appointed foreman.

M. E. Muldoon and J. Plant, of Jackson, have men at work on the Acme and Tiger mines, north of the Gwin.

The St. Lawrence mine, south of Angels, which started up a few months ago, is looking well. The shaft is down 400 feet and levels are being run north. The rock shows a good prospect and it is reported if it continues a 60-stamp mill will be erected. The present operators have a bond on the property from the Brunner estate.

Mokelumne Hill *Chronicle*: Operations on the Kramer mine on Golden Gate mountain are being carried on under the superintendency of J. M. Carpenter. Air pipe has been put in and the old tunnel is open 600 feet. It is expected to strike pay gravel at 1500 feet.

Del Norte.

The citizens of Crescent City are taking preliminary steps looking to the establishment of a copper smelter at that place. They claim a large amount of ore in sight, which will not bear shipment and charges, which it would pay to smelt near the mines.

Kern.

Randsburg *Miner*: This week J. A. Gowan of Long Beach paid Hanson & O'Leary $10,000 for their two-thirds interest in the Defender, Single Standard and Little Bonanza claims, 10% down. A shaft will be sunk to 500 feet.

Kings.

This county has a deposit of terracotta clay, also gypsum, sulphur, fuller's earth and other minerals of economic value, besides an oil belt of promise.

Madera.

The mines of the California Copper Co., at Daulton, are controlled by the owners of the Mother Lode mine, at Greenwood, B. C.

Mariposa.

Jos. F. Josephs of Sonora is reopening the Ferguson mine on the north fork of the Merced river. The mine is reached by way of Big Oak Flat and Bower's cave. There is no road within several miles of the mine, and never has been. Over rough mountain trails in the early days heavy machinery was "packed" to the mine, including a 10-stamp mill, of which the mortars each weighed 4500 pounds. The mine was worked to the water line. There is a small amount of ore still available above the adit level. A shaft will be sunk and a mill built from the material on the site, most of which is in good condition. The Ferguson is a short distance from the Hite mine and presumed to be on the same fissure system.

Mariposa *Gazette*: Not for over a quarter of a century past has the Mariposa Grant had such a promising outlook as at present. At Bear valley, Princeton, and Mariposa, every day teams loaded with lumber, machinery and other implements of mining industry are coming from various quarters.—— Work has commenced on the Mariposa mine by the company. Wm. Dodge is foreman and Thomas Dale night boss. Men are grading and cleaning out the old roads to the mine and grading for a shop and other buildings. The lower tunnel is to be cleaned out, retimbered, and a track put in. The opening of the old Mariposa mine is now under way. During the week a night shift was put on.——Princeton has made the greatest improvement. Miners are working in the old shaft and are down over 100 feet. Joseph Thomas, formerly of Nevada City, Cal., is in charge at Princeton. Back of Princeton the company has completed a warehouse and several large buildings are going up. Headquarters of the company is to be at Princeton and residences for the manager and different officers of the company will be erected there. ——The Pine Tree and Josephine mines are two miles north of Bear valley. Twenty men are employed in these mines, under A. H. Pearce. A number of buildings to accommodate the workmen are being built. The lower tunnel on the Pine Tree has been cleaned out to a distance of 575 feet, and the work will continue to the old shaft, which is in 750 feet. This shaft was sunk 250 feet below the tunnel level. The intention is to continue the shaft to connect with the Benton mill tunnel, which will be driven ahead. At the Josephine two lateral drifts will be run — one south from crosscut No. 2 and one north from crosscut No. 1.——Last week the remnant of the old dam at the Benton mills was burned to clear away the debris.

Mariposa *Gazette*: It is reported that the Mt. Gaines mine, west of Hornitos, will adopt a new scale of wages on Oct. 1st, paying miners $3 a day and muckers $2.50; board 75c a day. With these wages the Mt. Gaines expects to get good men.

Nevada.

The 5-stamp mill at the Orleans mine has been started. Recently a new ledge was struck in the mine, 2 feet wide, but no mill test has been made.

Nevada City *Herald*: J. L. Postlethwaite has struck the ledge in the McKinley mine, Willow Valley district. It is 1 foot thick and looks well. The McKinley is owned by a Tacoma, Wash., syndicate headed by Bowen and St. John, who will erect a 10-stamp mill on it this fall and put in an air compressor.

Placer.

Placer county, during a period of eighteen years, from 1880 to 1898, inclusive, produced $21,598,576, and it is estimated that prior to that not less than $43,000,000 came from the mines of this county, the greater part, over 90%, coming from hydraulic, drift and placer mines.

Auburn *Herald*: I. Meyer has sold his interest in the copper mine at Whisky Hill. The ore carried from $3.75 to $6 in gold and $25 per ton in copper. Mr. Meyer has formed a company for working tailings in Auburn ravine by the hydraulic elevator process. The company has bought the Wall and Sickles farms and is negotiating for the Symmes farm at Gold Hill. Work will be begun near the upper end of the Fagg farm. The water will be taken from Chili hill; 11,000 feet of iron pipe will be required.——Supt. J. E. Walsh expects to start work at the Gold Blossom, near Ophir, October 1st.——The shaft at the Bullion, an extension of the Bellevue, in Ophir district, is nearly pumped out. The company will begin sinking as soon as the ground is drained. A wheel 36 feet in diameter will furnish power for hoisting.—— In the three shafts sunk at the Three Star mine quartz has been struck in each and levels have been run. The company is doing prospect work before putting up reduction works.——C. A. Reed brought from the mountains fine copper ore from the Oro Fino mine at Meadow Lake. But few prospectors are here this summer.——It is reported the pay chute at the Pioneer, near Damascus, has been struck again.

Plumas.

It is reported a rich gold strike has been made in the Beckwith pass.

San Bernardino.

Mrs. Clara Foltz of San Francisco is reported to have taken up 640 acres in Holcomb valley, and proposes to prospect it for gold. The placer mines of both lower and upper Holcomb valley have been worked by various parties, the largest operations being conducted by the Holcomb Valley Co., Ltd., of London, under the direction of J. R. Thame. A steam shovel was employed in this work and a large amount of ground sluiced. A shortage of water and lack of grade limited the operations to the conditions found, and although gold was found the mines did not pay.

A large force is to be put on the Gold Mountain mines, four miles east of Holcomb Valley. The property has recently been bought by J. R. De Lamar from E. J. Baldwin of San Francisco. The ore (quartzite) all contains gold, but little of it is free. Tests have shown that the cyanide process will successfully treat it. It is a blanket vein which was worked years ago by Mr. Baldwin, by the open cut system. A 40-stamp mill was constructed at the foot of the hill, near the mines, but proved a failure as the ore did not contain sufficient gold that would amalgamate, to make it pay. The little village near the mill was known as Blairstown. The mill was burned several years ago, since which time nothing has been done with the Gold Mountain mine, though Hayward & Lane of the Utica mine at Angels, Cal., did some prospecting on other locations in the neighborhood in 1896, put in a test mill and abandoned the enterprise, presumably for the same reason that Baldwin abandoned it.

San Diego.

The first discovery of gold in the Julian district was made on Coleman creek by a woman in 1869, in the bed of the creek.

There are gold prospects southeast of Dulzura, near the Sheckler ranch, that have never been developed, though promising.

Shasta.

(Special Correspondence).—E. P. Conners is developing six claims and putting the old works in repair. There are 100 tons of ore on the dump which will be put through the 5-stamp mill when rains have furnished power. The stamps weigh 850 pounds each.

Ten miles west of Redding, on Clear creek, E. P. Conners is opening claims on which are said to be twenty ledges, 1 to 20 feet in width. The ore is suited to the smelting process. A test made by cyanide averaged $46 a ton. There is no cyanide plant in operation in this county.

Boswell & Johnson, at Harrison gulch, have reached 600 feet in a 6x6 tunnel. According to surveys, they expect to cut the ledge found on the surface in another 100 feet, at which point they will have a vertical depth of 700 feet.

Shasta, Sept. 25th, '99.

The Mountain Copper Co. are making an average output of 2200 tons of ore daily. The ore during 1898 returned about 8⅛% copper. The company buys 1800 tons of ore for fluxing from the neighboring mines, paying therefor 90% of the gold on ore containing over $20 per ton. On ores running under $20 in gold they pay 70% of the assay value. The charges on all grades of fluxing ores are $3.50 per ton. Last year they bought 175,000 tons of ore of this character.

The ore bodies of Copper City occur in feldspar porphyry, which has intruded the slates in large bodies. So broad are these masses that they would not be recognized as dykes. The ore bodies are zones of infiltration, occurring where the porphyry has been fractured and crushed. They could not be called veins. The veins of the district are defined quartz ledges, but are barren. The ore is gray copper, containing gold, silver, antimony and copper. Zincblende and galena are also often found. The ores at and near the surface are oxidized and porous, of dull red color, and the gold mostly free, the other minerals occurring as carbonates and oxides. No quartz is found in the gangue, but in its stead a large amount of heavy spar and calcite, derived from the alteration of the porphyry. At Bully Hill, two miles north of Copper City, the geological conditions are similar to those at the latter place. The red croppings are visible for a long distance. The oxidized surface ores have been mined and milled, and they have also supplied a large amount of gold to the neighboring gulches, which have been worked extensively. The ore bodies have mostly been worked down to unoxidized ore. At the Iron Mountain mines the ore bodies are found in fine-grained quartz porphyry.

Siskiyou.

Yreka *Journal*: Angle & Brown found a rich pocket of quartz on Mount Sterling, fourteen miles west of Cole's, in the Siskiyou foothills, last week. They brought down forty-six pounds of the quartz, full of gold—one solid nugget of gold weighing thirty ounces. At the foot of the mountain there are placer claims, but water is scarce at present to do much development work. These mines are between the head of Main Beaver and the West Fork of Beaver, north of Hungry creek.

Yreka *Journal*: Wetzel, Harmon & Ridenhour, who bought the Greenhorn Blue Gravel mine recently, sold out for $10,000 to Lezsinsky, Page & Heard, who paid $3000 down and the balance in 60 and 120 days. The new owners have commenced operations and will sink another shaft.——Martin & Perkins have sold their ledge on Sucker creek, in Humbug district, for $2500, to M. A. Mitchell of Ashland, Or. The new owner intends, after prospecting, to put up a mill.——The mill of the Commodore mine at Barkhouse, Klamath river, is to be increased in capacity to ten stamps. This is one of the best paying mines in the county, the monthly yield being several thousand dollars per month from an 18-inch vein.

Trinity.

Weaverville *Journal*: J. B. Graves, who is now sole owner of the Blue Jay on Morrison gulch, recently took out a pocket of $2000. It was struck 80 feet from the location of the former large pocket, 140 feet from the mouth of the tunnel and 150 feet below the surface of the ground.

Tuolumne.

A fire recently burned out all the timber in the Beckwith mine at Sonora, from the 100 level to the surface, and also destroyed some buildings and machinery.

From the most authentic sources it is learned that the reports of a rich strike in the Longfellow were not in the least exaggerated. The property lies in a district transfixed by both the east belt and the mother lode, neither the wealth-yielding quartz nor stability of which can be questioned. Nevertheless it was said that the Longfellow and all the other mines in that section, despite proof positive to the contrary, were nothing but pocket formations, the value of which could only be estimated by the amount of ore in sight. In the Longfellow, at Big Oak Flat, rich ore was struck at 130 feet, but after following the pay streak for a considerable distance it apparently gave out. When sinking was resumed the main shaft was driven down to 300 feet, when a station was cut and drifting begun. In this drift the shoot was again found, and it has been exposed for a considerable distance with no sign of an end. The 10-stamp mill is crushing night and day. Sinking in the shaft continues.

COLORADO.

CHAFFEE COUNTY.

M. Leonardy has received from the Arkansas Valley smelter $450 for a seven-ton lot of ore shipped from a recent copper discovery. The discovery is on the Big Chief mine, one mile from Riverside.

EL PASO COUNTY.

A strike is reported on a claim owned by Davis & Goodrich, six miles south of Woodland Park, where a 2-foot vein of ore rich in gold and tellurium has been found. It is on the north side of Pike's Peak.

GILPIN COUNTY.

Central City *Register-Call*: A larger plant of machinery is to be installed by the Colorado Springs parties operating the Modoc mine on Quartz hill.——Mgr. Vivian of the Notaway G. & C. M. Co., operating in Russell mining district, reports the shaft down 200 feet and a contract will be let to sink an additional 100 feet. There is 3 feet of ore in sight. The company is buying additional claims.——Two loads of ore were hauled from the Mechanics lode on Gunnell hill Tuesday to the mills for a test. The property is being being worked by Henry Bolthoff of Hendrie & Bolthoff of Denver.

GUNNISON COUNTY.

Crystal *Lance*: The water has been taken out of the Graham, and before mining work can begin some method of ventilation will have to be put in. The prospect is a good one. ——A number of properties about Gothic and Elko are making arrangements to work through the winter steadily.——H. G. Ingersoll is taking out ore for a test shipment from the Harper property on Galena mountain.—— It is reported the Carbonate is to be equipped with machinery, as it would require a long tunnel to cut the property, and it is deemed wise to explore to a greater depth before driving a tunnel.——Oliver Thomas is hauling 100 tons of ore from Crystal basin for shipment to the valley smelters—the largest single shipment made by any one prospect this season.——The fourth car of ore from the Caledon and Atlantis in Silver Basin has been shipped to Pueblo. The ore is silver-lead. ——Last week J. Magee sold his interest in the Steve Day lease to the Attix company, who have been his partners and have been

carrying forward the work in the properties. The company is calculating to erect a mill for the concentration of their low-grade product. They are also arranging to have ample storage room for ore and concentrates taken out during the winter, when shipments cannot be made.

HINSDALE COUNTY.

Pierce & Kilvert of the Golden Fleece mine have a bond and lease on the Silver Bell group on Henson creek, near Lake City, and have started a tunnel to tap the vein 300 feet from the surface. The ore streak, which is lead and gray copper, is 2 to 4 feet in width.

The Hidden Treasure Co. is putting out thirty tons per day of concentrates. The Ute is putting out ten tons of concentrates per day. The Lillie mine is shipping eight cars per month of crude ore.

The Vermont tunnel is in about 500 feet and in 1700 feet, according to survey, will tap the Vermont vein. This is backed by A. E. Reynolds.

The Czar mine at Capitol City is being operated by a Denver company, and from recent reports a large body of solid lead ore has been found.

LAKE COUNTY.

Leadville *Miner*: The Wolftone shaft is to go down 1500 feet and $150,000 is being expended in enlarging the shaft, unwatering and making the improvements. A battery of seven 100 H. P. boilers of 150 pounds pressure is to be installed. The double hoisting engine will be 125 H. P. Large station pumps are also to be put in, which will raise 1200 gallons 1200 feet per minute. The A. M. W. combination tonnage will be large and large reserves of milling ore are exposed.——The Midas shaft is now down 440 feet and the contractors are making good headway. At 520 feet it will reach the ore chute proven by drifts from the Penrose. The ore is 18-ounce iron and lead carbonate. Within the combination's ground are the Maid of Erin, Wolftone and Adams, which have yielded $13,000,000. The Adams has large bodies of copper sulphides at depth.

MINERAL COUNTY.

Creede *Candle*: The vein has been struck in the Commodore tunnel No. 5 and the ore has been opened up a width of 6½ feet and its limits not reached. The ore averages over 300 ounces in silver and a high per cent in lead. The output from the Commodore since the resumption of work has been about 200 tons per day.

SAN JUAN COUNTY.

In Arrastra basin, the Iowa mine employs 110 men, the Tiger 40, and the Silver Lake 220.

Silverton *Miner*: C. F. Holley of Aztec, who has been prospecting in the Needle mountains for several months, has found ore which assays: gold, 5 12-100 ounces; silver, 1090 ounces. The ore was broken from the face of a 500-foot tunnel on an old property heretofore considered low grade, although at one time a shipper. The mineral is petzite and was taken from a 2-inch streak lying alongside a 4-foot body of mixed quartz and lead. The Ætna, in Needles district, is being operated by J. H. Swarthout of Stanford, Connecticut. The Needle Notch M. Co. have bought six claims in Vallecito basin, among them the Swan and Blum for $25,000. The company contemplates the erection of a power house at Needleton to operate a mill in the basin, a distance of seven miles.

Silverton *Miner*: The Boston & Silverton Exploitation Co., operating the Uncle Sam group, is building a mill of seventy tons capacity, which will probably be running by Oct. 1st. It is said that a 7500-foot tram line, connecting the present workings of the Uncle Sam with the mill, is to be put in. The crosscut tunnel to intersect the Uncle Sam group is 300 feet in, with 3000 feet farther to run. When the mill power is established, power drills will be utilized in the tunnel.——At the Gold King the new addition to the mill building is completed, and the machinery, consisting of crusher, ten stamps, tables, etc., is being put in. The mill has been closed down for a few days. It will now consist of forty stamps. The mining force will be increased by forty men. Average amount of ore going over the tram line daily exceeds 100 tons, which amount will be doubled upon the starting up of the mill.

SUMMIT COUNTY.

Leadville *Chronicle*: The Iron Mask is running full blast. The new bins are full of ore. New machinery was recently put in. It is expected this mine will ship fifty or seventy-five tons a day.——The Col. Sellers is still the largest producer, 100 tons a day being shipped. In a few weeks the output will be larger.——J. C. Gilroy and others have a lease on the Nettie B and are shipping sulphide ore which carries a large percentage of lead. Steady shipments are being made.——The Snow Bank, another property showing large bodies of sulphide ore, will be added to the list of shippers. G. T. McDonald is Supt.——At the Mountain Lion W. C. Tracy has opened up copper sulphide ore which shows good gold and copper values.

TELLER COUNTY.

(Special Correspondence). — The Teutonic Con. G. M. Co. have property on Bull hill, Raven hill and Copper mountain. M. E. O'Bryan is president and Chas. N. Miller secretary and treasurer. Their Bull hill holdings are being worked under lease by the Rex Investment Co. The lessees are sinking a shaft and preparing to put in machinery for further work.

The Specimen lease on Bull hill was sold by the Rex Investment Co. for $5000. The lease runs to 1901.

The Modoc has opened a new vein, heretofore undiscovered, running parallel to the old vein. The new vein has been opened on the fifth, seventh and ninth levels. On the fifth the values run $20 to $80 per ton; on the seventh the vein is about 4½ feet wide and runs from $40 to $70 per ton, rich streaks going as high as 10 to 200 ounces gold; on the ninth the vein is 15 feet wide and contains seams of very high value. A well-known mining engineer claims there are $300,000 in sight in the Modoc.

The six acres of the Gold Sovereign, on Bull hill, is very rich ground, on which there are six sets of lessees, all of whom are shipping ore. The Snyder lease ships thirty tons per day from a vein 18 feet wide, the values from which run $20 to $30 per ton. A new station is being cut 150 feet below the tunnel level. All the lessees are doing well.

The Gold Sovereign Co. has purchased the Rattler, an adjoining property, paying $50,000 in Gold Sovereign stock therefor.

The John A. Logan, whose shaft is 1000 feet deep, has cut several rich leads at this depth, which are supposed to be the same as the Gold Sovereign have opened nearer the surface.

The Copper mountain section of the district is attracting much attention. A number of properties are being developed there, with good results.

On Tenderfoot hill a new hoist is being put up on the property, which has the continuation of the Hoosier vein.

On Lincoln hill the King of Diamonds will soon resume work.

At Rhyolite hill there appears to be a junction of two zones — one from the direction of Copper mountain and the other from Tenderfoot and Carbonate hills. Here is the undeveloped region of the district, where there appears to be a great amount of new work of an exploration nature. A new company has been organized with large working capital, whose base of operations will be in the vicinity of Rhyolite.

During the smelter strike there was a considerable falling off in the production of the district, but since Sept. 1st most of the mines have resumed their normal output, some having increased it, and the district generally is very active. The stock market is active and prices firm.

The Pinnacle mine, on Bull hill, under lease to Whipp & Glenn, recently shipped twelve cars of ore to the smelter which averaged $100 per ton. It is claimed they are producing sixty tons per day.

A careful estimate of production for the month of September of the Cripple Creek district shows that the cyanide and chlorination mills have handled 24,000 tons and the smelters 15,000 tons — 39,000 tons for the month. The mill ores, it is estimated, were distributed about as follows: Colorado-Philadelphia Reduction Co., 8000 tons; Metallic Extraction Co., 9000 tons; El Paso Reduction Works, 3000 tons; National Extraction Co., 2000 tons; Colorado Ore Reduction Co., 2000 tons. A further interesting fact is that the smelting ore now being shipped from the district has an average value of about $100 per ton, and that being milled averages $30 per ton. Just at present the smelters and mills have all they can do on high-grade ores, and as a consequence there is a glut of low-grade ores in the district which were formerly sought with some eagerness. The completion of the Economic Extraction Co.'s cyanide and chlorination plant, soon to be accomplished, will doubtless relieve congested ore channels, as that plant is expected to handle the ores from all the properties in which the Woods Investment Co. are interested, the Gold Coin being the principal one.

The smelters no longer pay the sampler charges, as formerly, hence this expense has to be borne by the producers.

The La Bella Mill, Water & Power Co., at Goldfield, recently made a contract with the Cripple Creek District Railway Co. to furnish electric power for the latter's car lines. The same company is putting in a 300 H. P. motor at the Granite mine, on Battle mountain, for hoisting and other work. Similar motor force will be installed at the Victor, Legal Tender and other mines. This company's compressor plant is furnishing compressed air to operate at least sixty drills in the district. The general management of this company is the same as that of the Florence & Cripple Creek Railroad.

The plant of the Detroit Reduction Co. is about completed, and initiatory tests are being made. The plant cost about $27,000. The method employed is a modification of the panamalgamation process, there being crushers, rolls, cylindrical dryers, pans and settlers, the pulverization reaching from 60 to 200 mesh. They do no roasting. It is said a chemical is to be used to assist amalgamation. F. A. Ryder and O. F. Barnes are actively in charge.

The Moose mine, under the superintendence of Peter Busch, is now operating, but not shipping. Present workings are 800 feet deep and the shaft is being sunk deeper.

At the Elkton a new level is being run at 600 feet depth. This mine is shipping about sixty tons per day. Sol Camp is now Supt., former Supt. W. A. Wilson having gone to Rossland, B. C., to take a similar position on the Le Roi group.

It is claimed the extraordinary flow of water struck in the Standard tunnel, on Beacon hill, has to a large degree drained the mines of Beacon and Raven hills, including several levels on the Elkton.

The Red Umbrella mine, on Raven, under lease to T. Collins & Co., is reported as having made a strike of ore that puts the property in better condition. WASCOTT.

Cripple Creek, Sept. 25th, '99.

(Special Correspondence). — The Economic Extraction works, near Victor, are being built in two sections, one of which is equipped for chlorination and will doubtless be ready to operate within a month. This section will have 300 tons daily capacity. The machinery therein is to be run by nine electric motors; there are seven roasters, with automatic cooling devices; several chlorine barrels, each 17 feet long and 7 feet in diameter; and large tank and settling facilities. Sulphuretted hydrogen will be used in the precipitation process. Refining furnaces are being built to separate the metals from the sulphide materials. Everything will work automatically. The second section, which is to be equipped with cyanide apparatus, probably will not be completed this year.

Victor, Sept. 25th, '99. WASCOTT.

W. A. Otis and C. A. Farnsworth have purchased the entire capitalization and property of the Brigadier G. M. Co., also the property of the Twin Sisters G. M. Co. The latter will be conveyed to the Brigadier. The capitalization will be $1,500,000. The Twin Sisters property is under lease to Vincent & Fitchew, who have opened up good ore at a depth of 45 feet. Returns from the first shipment sent out netted $50 to the ton. In sinking the shaft the lessees are saving ore. The property consists of nine acres east of the Red Umbrella.

The Mitchell claim of the Pinnacle Co. has the continuation of the shoot that has made the Lansing claim of the company famous. The vein encountered in the Mitchell claim was cut at a depth of 20 feet.

The Moon-Anchor mine has struck a flow of 1700 gallons of water a minute in the bottom. The pumps of the mine were equal to 1500 gallons per minute, but, one of the pumps being broken, the water gained. It will not go above the sixth level and the new pumps on the ground will soon lower the water.

The Waldron lease on the St. Thomas on Beacon hill has at 160 feet struck a good streak of ore that will run five ounces of gold to the ton.

Sellars & Co., leasing block 1 of the Mountain Beauty, sent out a 60-ton shipment last week that will run four ounces to the ton.

Cripple Creek August dividends were as follows:

Portland	$80,000
Creston Leasing	12,000
Gold Coin	10,000
Golden Cycle	10,000
Lillie	11,250
Modoc	5,000
Raven	9,750
Strong	25,000
Total	$143,000

IDAHO.

IDAHO COUNTY.

The country about Chamberlain and Thunder mountain is attracting attention. It is reported that there are large heavily mineralized veins in that section and some good assays have been obtained. The ores contain copper, lead, gold and silver.

The Sixteen to One, near Wallace, is employing the largest force of any mine in the Cœur d'Alenes not a shipper. The right of way for the two tramways is cleared. One will be a bucket line carried on wire from the lower tunnel, where the air compressor is being built, to the Custer mill. The other will be a car line from the upper tunnel to the mouth of the lower, for temporary use until connections are made between the tunnels. By the time the tramway is completed the mine will be in shape for a large force, and the property will be one of the heaviest shippers in the district.

J. A. Wilson of Butte, Montana, reports the discovery of rich placers in the Bitter Root mountains, in Eastern Idaho, above Elk City. Mr. Wilson is one of a party of five who made the discovery. Three of the men came out and brought with them $1155. That amount was shoveled into a sluice box in four days by four men. The largest nugget in the cleanup weighed $6.20.

Cuprum *Standard*: A strike was made a few days ago in the Buffalo No. 3 mine. At the depth of 30 feet ore was taken out that will run 60% copper. There were no indications of any importance found until the depth of 15 feet was reached, below which it improved. The Buffalo No. 3 is within a mile of Cuprum.

KOOTENAI COUNTY.

Harrison is a center of mining excitement. There have been 500 locations made in that district during the past two weeks. One hundred men are prospecting the vicinity of Carlin bay. A number of rich strikes are reported near Blue lake, five miles from Harrison. The Hand in Hand, Non-Permit, and Striker, the three claims recently discovered by Wells and Bond, have been formed into a corporation at Wallace, under the name of the Bay View G. & S. M. Co.

OWYHEE COUNTY.

The Black Jack mine at Silver City is reported sold to the Trade Dollar Con. Co.

The Black Jack has been a dividend-payer for years, but was closed some time since on account of a flow of water being met that was too heavy for its plant to handle.

The Trade Dollar company is so situated that it can work the property without going to any outlay for machinery. When the old Trade Dollar and Florida Mountain properties were consolidated, the Black Jack was left between the two groups of claims of the consolidation. The consolidated property is being developed by a long tunnel that will pass under the Black Jack, 300 feet below its deepest workings. This will drain the property and give a large area of stoping ground over the tunnel level. This purchase gives the Trade Dollar 8000 feet on the vein.

SHOSHONE COUNTY.

The Golden Gate Co., eight miles from Pierce, is putting in a sawmill, stamp mill and concentrating plant and hoisting machinery. The Crescent mine, near by, will soon start up. They will have a 5-stamp mill in place. Their ore averages by mill test $38 per ton in free gold. There are other smaller quartz mills working.

The White Elephant claim was discovered this summer in the town of Pierce. A shaft is being sunk. The lead is 30 feet wide between walls and carries sulphide ore.

Spokesman-Review: The output of the Cœur d'Alenes the past week will exceed that of any previous week in the history of mining in the region. The Bunker Hill & Sullivan, Empire State-Idaho, Standard, Mammoth, Helena-Frisco and Hecla are all running with full crews, and, with possibly one exception, taking out more ore than at any previous time. The Morning is producing its average amount of ore, there being 255 men employed in the mine, as many as were ever worked at one time. The Tiger-Poorman is working over 100 men, two-thirds of its full force, and is the only mine working in the camp producing less than the normal amount of ore. The Hecla claims to be turning out more ore to the number of men employed than any other, twenty men sending down four carloads of ore to the Standard mill every other day.

MICHIGAN.

HOUGHTON COUNTY.

Marquette *Mining Journal*: It is stated on authority that the Calumet & Hecla Smelting Works at South Lake Linden are turning out 150,000 pounds of copper daily.

MISSOURI.

JASPER COUNTY.

The Commonwealth Zinc Co. is the latest zinc company to be placed upon the Boston market. The company is capitalized for $500,000. Its properties consist of sixty-eight acres of land in the Joplin Galena district, part of which property has been known as the Rauch & Co. mines. J. C. Houston is president of the company.

MONTANA.

DEER LODGE COUNTY.

It is reported that a new mining region has been discovered at the head of Blackfoot river. The ore carries copper and gold. The claims located are sixteen miles from Cooper lake. The nearest postoffice is Helmville.

SILVER BOW COUNTY.

At the Never Sweat mine men are tearing down the old frame buildings to make room for a new steel gallows frame. An iron frame building is to be erected, to lessen the danger of fire. This building will be occupied by a new 100-drill compressor.

There is a rumor from Anaconda that the Washoe smelter is to be built at once. At Missoula the Washoe Copper Co. has filed articles of incorporation; principal place of business, Butte; capital stock, $5,000,000.

NEVADA.

LINCOLN COUNTY.

The Horse Shoe Co., at Deer Lodge, have made a strike in one of their mines.

STOREY COUNTY.

The unwatering of the Comstock mines through the C. C. shaft proceeds slowly. The latest official telegram is as follows:

VIRGINIA, NEV., Sept. 28, 1899.

TO AUG. WATERMAN, Secretary Comstock Pumping Association, San Francisco: — Stopped No. 2 elevator yesterday morning. Permitted water to raise until 4:30 P. M., when it was 19 feet below the 1950-foot level station. Then started No. 1 elevator and ran it until 7:15 P. M. The water was then 35 feet below the station. Let the water rise again. Ran No. 1 elevator at intervals during the night four hours. Water is now 23 feet 6 inches below the 1950-foot level station. Will commence taking out No. 2 elevator and columns for examination.

JOS. R. RYAN.

NEW MEXICO.

SANTA FE COUNTY.

J. B. Mayo is the managing director of the Old Reliance M. Co., that holds a lease on the Grand Central Nos. 1 and 2, the Broad Gauge Nos. 1 and 2 and the Narrow Gauge Nos. 1 and 2, in the southern part of the Ortiz grant. During the past year Mr. Mayo has profitably treated the low-grade gold ores of these claims at the Graves mill, at Golden, and the company has concluded to put up a 100-stamp mill at the mines. The six claims mentioned are large masses of low-grade ore. One vein is 300 feet wide and 175 feet high.

OREGON.

BAKER COUNTY.

Sumpter *Miner*: The Intermountain mine, twenty-eight miles from Sumpter, has been bought by E. C. Finch of Rossland, B. C., and W. C. Calder of Sumpter, from Schnarr & Hahn. The Intermountain has ore of such high grade as to justify shipments under unfavorable conditions. Finch & Calder will build roads and put in machinery this fall. There is a large quantity of ore on the dump.

Baker City *Republican*: A. J. Harting, F. Teubroeck, E. Gardner, Dr. J. C. Hendryx and C. H. Stuller have made a number of locations on a discovery of copper, gold and silver ore, twenty-five miles from Baker City, on North Powder, and across the divide from the E. & E., Columbia, Golconda, Ibex, Ohio and Cable Cove districts. In the center of the group is an outcrop 300 feet in diameter, and the ore stands 100 feet above the surface. The croppings assay $2.40 in gold, silver $1.60, copper 8⅔%. The ledge has been traced and located for two miles across North Powder river.

Baker City *Republican*: Elmer Cleaver reports that prospectors and miners are at work on nearly every hill and in every gulch in the district beyond Granite. —— Manager Ralph E. Blewett of the Last Loaf mine, owned by the Van Anda Mining Co., says they intend to put in a 20-stamp mill.——In the tunnel on the lower level of the Last Loaf claim, 200 feet in the hill, they are in ore 10 feet and not yet through it.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Deadwood *Independent*: Two men on the Otto Grantz property, on the divide between Gold Run and Poormans gulch, took out $10,000 in one day last week.

UTAH.

BEAVER COUNTY.

A report from the Homestake mine, in the Mount Baldy mining district, near Marysvale, says that a vein of ore has been found, at a depth of 60 feet, that carries $40 gold and sixty ounces silver per ton.

GRAND COUNTY.

J. B. Skewes, of the Big Indian group, says

work is being concentrated on the shaft which is to go a depth of 500 feet, or greater. It is now down 60 feet, with six men employed. A steam plant will be put in as soon as depth requires.

JUAB COUNTY.

Salt Lake *Tribune*: M. Kopp, manager for the International M. Co., in West Tintic, reports the mines improving. It is reported that in the Silver Summit a strike has been made and shipments will commence.——J. Hupper, Supt. Blue Bird at Diamond, reports that ore has been encountered, cutting the station on the 325-foot level, that was identical with the high-grade ores in the Joe Bowers and Showers Con., adjoining the Blue Bird.

SALT LAKE COUNTY.

W. Hatfield has acquired control of the Sunrise group of a dozen claims in Carr Fork, Bingham district, for $46,000. Associated with him are J. Dederich and J. R. Middlemiss. Shafts have been sunk and tunnels driven in prospecting the ground. Recently the owners uncovered a body of ore that carries high-grade copper.

The Highland Boy smelter has shipped 300,000 pounds of gold and silver bullion to the Perth Amboy, N. J., refinery.

SUMMIT COUNTY.

Park *Record*: At the Massachusetts during the week a vein of ore has been uncovered in the winze being sunk from the 300 level.—— The Crescent Co. is shipping 1000 tons of sulphides from their concentrator. There are 4000 tons altogether.——Work is progressing on the pipe line between the Alliance and Silver King; by Oct. 1st there will be abundance of water at the Silver King, and the mill will be running regular shifts and turning out 200 tons of concentrates daily.

TOOELE COUNTY.

It is reported at Stockton that the Galena King will put in a steam jigging plant for the purpose of concentrating low-grade galena. At present the mine is shipping high-grade ore.

The consolidation of the Annapolis and Golden Seals companies at Mercur has just been made, and in future will be under the control of the Annapolis Con. Co. This gives the Consolidated sixty acres of ground on the gold-bearing zone, and a new shaft on Annapolis territory will begin under the direction of F. J. Leonard.

WASHINGTON.

FERRY COUNTY.

In the Surprise, of the Lone Pine Con. Co., they have opened a 4-foot body of ore which sampled $500 per ton. For the past ten days the values on this drift have run from $30 to $150 per ton. The ledge is widening. In No. 2 tunnel of the same mine another ledge has been struck, the width and values of which have not been determined. This is 300 ft. south of the point where the rich ore was encountered.——On the Hill Side claim, at Republic, the ledge has been stripped 40 to 60 feet in width. Manager H. L. Percy believes that when opened it will be the largest body of ore in the camp. It is low grade as far as opened. A shaft is to be started.——In the Insurgent there is said to be 8 feet of ore in the crosscut. The Lone Pine Co. is extending its drift from the Insurgent shaft into the Last Chance ground.

Spokesman-Review: At the Jim Blaine, in Republic camp, the drift on the third level of the Republic mine is being extended into it, which will open the property at a depth of 380 feet. Arrangements have been made for working the mine through the Republic workings.——There are 85 men on the payroll of the Mountain Lion; this number will be increased to 100. The winze from the drift at the 320 level is down 50 feet, and values are higher in the bottom than in the drift, according to Supt. Wyatt. The shaft is being sunk 5 feet a day. Machinery for the mill is at Northport and at Grand Forks.

OKANOGAN COUNTY.

The Roanoke, twelve miles north of Loomis, has made a strike in a tunnel on the vein, the tunnel now being 500 feet in.

WYOMING.

CARBON COUNTY.

A. McKinnie of Rawlins reports that he has sold to California capitalists the Seminole gold mines, thirty miles north of Rawlins, for $82,500. They were formerly owned in New York. The property includes five patented claims and they have been opened by 2500 feet of tunneling.

LARAMIE COUNTY.

Laramie *Boomerang*: E. Hofman of Cheyenne has found on his ranch on the Sybille, thirty miles west of Wheatland, rich samples of copper ore. This prospect was opened twenty years ago. Hofman brothers will reopen the workings, which have caved, and put in machinery.

FOREIGN.

AUSTRALIA.

Wood & Co. at Maryborough have opened up the first reef intersected by the tunnel and thirty tons raised, from which they picked out thirty-two ounces of specimens, and the nine tons eighteen hundredweight treated yielded an additional one and one-half ounces to the ton.

The Kalgoorlie mines in Western Australia produced in July 60,032 ounces gold.

BRITISH COLUMBIA.

The Le Roi mine at Rossland is to work ninety machine drills, having ordered another 40-drill compressor.

C. P. R. graders have cut another large ore body on the Oro Donoro, in Summit camp, 250 feet north of where they had previously opened up a large body of shipping ore. R. Thompson, vice-president of the company, has a large force quarrying out the ore where the railway first cut it. The property will soon be in a position to ship 100 tons of ore daily. The main shaft is down 185 feet.

Men set to work to strip the Kitty W., on Pathfinder mountain, struck clean ore at a depth of 2 feet. The cropping is reported 350 feet wide.

L. H. Webber, Mgr. of the B. C. Bullion Extracting Works, the custom cyaniding mill at Rossland, says that if his company can get the tonnage they will increase the capacity of the plant to 200 tons.

Personal.

A. C. MIZNER has returned to San Francisco from the Klondike.

A. W. KINNEY, of Los Angeles, Cal., is located at Cripple Creek, Colo.

JOSEPH PORTER is Supt. of the Altoona quicksilver mine, at Cinnabar, Cal.

A. B. W. HODGES is superintendent of the Granby smelter, Grand Forks, B. C.

C. L. LANG, late of Sonora, Cal., is Asst. Supt. Gold Belt M. Co., Doniphan, Idaho.

C. C. DERBY, superintendent of the New Almaden, Cal., mine, is visiting San Francisco.

C. N. CROWDER is now superintendent of the Doctor mine, Cripple Creek district, Colo.

W. E. JOHNSON recently returned to Denver, Colo., from an extensive trip through the East.

D. JUTTON of San Francisco is in Nevada county, Cal., examining mines for San Francisco parties.

T. CLARK left Placerville, Cal., this week for Colombia, S. A., to superintend the Playa De Oro mine.

H. A. COHEN has gone from Salt Lake City to Inyo Co., Cal., to examine property for J. R. De Lamar.

J. W. NEILL, of Salt Lake City, Utah, is in Boston, in connection with Bingham, Utah, developments.

J. F. COLEMAN, developing the Mammoth copper mines at Kennett, Cal., left for New York City this week.

H. A. CLAPP, of Rex Investment Co., Cripple Creek, Colo., is in Sonora, Mexico, engaged in some mine development.

W. H. LEFFINGWELL, M. E., of Cripple Creek, Colo., has been sojourning the past few months in California.

A. EKMAN, in charge of the mining department, California Paris Exposition, made an official visit this week to Shasta county, Cal.

W. J. O'DONNELL, of Shasta, Cal., is field deputy of the Cal. Paris Exposition Commission for collection of ores of Shasta, Siskiyou and Humboldt counties.

S. F. EMMONS, department of economics, U. S. Geological Survey, has returned to Washington, D. C., from an extended observation through Montana, Utah and Colorado.

H. H. HUNTER, who negotiated the transfer of the Afterthought copper mine, near Redding, Cal., is in San Francisco, to complete the sale of the property. Salt Lake and Butte capitalists are the purchasers.

R. E. BROWN, the American mining engineer, who obtained judgment for $5,000,000 against the Transvaal Republic, fears that the present imbroglio with England may interfere with the ultimate collection of his claim.

J. A. FERSON, of Madera, is Supt. of the mines of the California Copper Co. at Dalton, Madera Co., Cal. H. B. Nicholls of the Selby Smelting works will be Supt. at the smelter. F. F. Sharpless is general manager, with office headquarters at Madera, Cal.

J. H. MEANS, who has been a field assistant to the State Mineralogist of California for several years and who is a graduate of the University of Indiana, has accepted a position in the interior of China, with Moring & Co. of London, large mining operators, at a salary of $4000 and expenses. Mr. Means joins H. C. Hoover, also formerly of San Francisco, who has been in China for some time past. He left Friday on the steamer Coptic for the Orient.

PROF. L. L. DYCHE of the University of Kansas is in San Francisco, Cal. He has been making a study of the large living mammals of the Pacific coast and has recently given particular attention to the seals and sea lions. During the week he has delivered two lectures under the auspices of the Academy of Sciences, one on Monday evening on "Danish Greenland," and on Wednesday night on "The Arctic Highlands and the Problem of the Pole."

Recently Declared Mining Dividends.

Montana Copper Co., 18%; Sept. 25.
Mercur, Utah, $50,000; payable Oct. 20.
Boston-Duenweg Zinc Co., 1%; Sept. 25.
New York Zinc Co., 1%; payable Oct. 2.
Boston-Providence Zinc Co., one-half of 1%; payable Oct. 2.
Gold Coin Mining & Leasing Co., Victor, Colo., $10,000; Sept. 25.
Raven G. M. Co., Cripple Creek, Colo., $10,000; payable Oct. 20.
Cloverdale Zinc M. Co., Joplin, Mo., quarterly 2%; payable Oct. 10.
Pennsylvania M. Co., Grass Valley, Cal., 23rd, 20 cents per share; Sept. 25.
Anaconda M. Co., Butte, Mont., $1.25 per share and 75 cents per share extra; payable now.
Amalgamated Copper Co., first dividend $1.50 per share, 50 cents per share extra; payable Oct. 16.
Mountain Copper Co., Shasta Co., Cal., $540,000; Sept. 30.
Giant Con. Powder Co., 50c per share; payable Oct. 10.
Boston & Colorado Smelting Co., quarterly dividend of 1¼%; payable Oct. 2.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING SEPTEMBER 19, 1899.

633,409.—BICYCLE DRIVING GEAR—W. H. Abercrombie, Tacoma, Wash.
633,227.—HAT HOOK—W. S. Bractie, Oakland, Cal.
633,420.—SAW GAUGE—J. Brown, Rockwood, Ogn.
633,984.—WATER WHEEL—W. A. Doble, S. F.
633,285.—CAR AND TURN TABLE—G. A. and R. F. Dunn, Dinuba, Cal.
633,440.—DRAFT APPLIANCE—G. N. Farnsworth, Grimes, Cal.
633,548.—SCORING TOOL—O. C. Fenlason, Hoquium, Cal.
633,441.—OIL CAN—W. E. Forest, Los Angeles, Cal.
633,263.—SURVEYOR'S INSTRUMENT—D. Grant, Petaluma, Cal.
633,264.—INVALID'S BED—G. Huntington, Santa Ana, Cal.
633,267.—CULTIVATOR—Jensen & Rowe, Watsonville, Cal.
633,382.—EYE GLASS FRAME—H. L. King, Spokane, Wash.
633,461.—DOOR SECURER—O. Kure, Chehalis, Wash.
633,247.—LEMON SQUEEZER—E. D. Middlekauff, S. F.
633,530.—HOP BIN—L. M. Meyers, Newberg, Ogn.
633,290.—SLIDING DOOR—A. Newell, Pasadena, Cal.
633,291.—SLIDING DOOR—A. Newell, Pasadena, Cal.
633,292.—TOBACCO PIPE—I. Nicholson, Vallejo, Cal.
633,474.—ROTARY PUMP—R. J. Northam, Los Angeles, Cal.
633,475.—ROTARY PUMP—R. J. Northam, Los Angeles, Cal.
633,476.—ROTARY PUMP—R. J. Northam, Los Angeles, Cal.
633,477.—ROTARY PUMP—R. J. Northam, Los Angeles, Cal.
633,478.—ELECTRIC MOTOR—Northam & Nolan, Los Angeles, Cal.
633,248.—ROLLER CRUSHER—A. J. Petter, Randsburg, Cal.
633,153.—MATCHER HEAD—W. W. Philbrick, Seattle, Wash.
633,154.—MATCHER HEAD—W. W. Philbrick, Seattle, Wash.
633,489.—SHARPENING FILES—J. F. Revalt, S. F.
633,493.—REIN HOLDER—J. G. Ryckman, Knappa, Ogn.
633,537.—LEAK STOPPER—S. M. Stewart, Escondido, Cal.
633,254.—CONCENTRATOR—F. W. Wood, Los Angeles, Cal.
31,515.—DESIGN, BADGE—W. S. Tarrant, Seattle, Wash.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STAMP AND ROLLER CRUSHER AND PULVERIZER.—A. J. Petter, Randsburg, Cal. No. 633,248. Dated Sept. 19, 1899. This invention relates to an apparatus for crushing and pulverizing ores. It consists of a circular mortar having an annular die fixed therein, stamps, the stems of which are guided in a frame which is rotatable about a central shaft. Rollers are journaled upon the revoluble frame between the stamps having faces adapted to travel upon the dies. A mechanism is carried upon the revolving frame including horizontal shafts and gears and cams on the shafts so that the stamps are raised and allowed to fall while the apparatus is revolving, the rollers following the stamps and adding their crushing effect. Suitable screens are arranged around the periphery of the mortar for the discharge of the pulp when it has been sufficiently reduced and the rollers are carried upon the lower ends of spring-pressed standards by which any pressure upon the rolling faces may be produced.

CAR AND PORTABLE TURNTABLE.—George A. Dunn and R. F. Dunn, Dinuba, Cal. No. 633,235. Dated Sept. 19, 1899. This invention is designed for use in handling fruit or other goods which are to be moved from place to place, and comprises a car having two frames, the lower one mounted upon bearing wheels which travel upon a track, and the upper portion has a mechanism by which it may be raised or depressed, and a turntable attached thereto and carried thereby, with mechanism by which it may be raised from the surface when the upper portion of the car is raised, the car then traveling in any desired direction upon its rollers. When it arrives at a point where it is to be turned to travel at right angles, or in some other direction, the turntable is pressed down at the center of the meeting tracks, and the whole of the lower part of the frame and wheels are lifted from the surface and can then be swiveled around upon this portable turntable until the car stands in line with the new direction in which it is to travel. The wheeled frame is then lowered upon the tracks and the turntable being lifted clear of the surface, the car is ready to travel in its new direction.

Books Received.

"*Architect's Hand-Book on Cements*," A. H. Clarke; 12 mo., 96 pages. Devoted to a classification of cements used in building, with directions for mixing and using them. Useful to builders. Published by W. M. Clarke & Son, Baltimore, Md.; $1.

"California Mines and Minerals; published by the California Miners' Association under the direction of Edward H. Benjamin, secretary, for the California meeting of the American Institute of Mining Engineers, San Francisco, Cal., 1899," is the title of an unusually handsome quarto of 500 pages, a souvenir compilation commemorative of the first meeting west of the Sierras of the American Institute of Mining Engineers. Where merit is so manifest praise is superfluous. In style and execution the work is worthy of the event that called it forth, and is of unusual value. It is a good advertisement of a State that doesn't get advertising enough; it gives facts and figures; it has able articles by practical men; it is finely put together, treats technically of all kinds of gold mining in all parts of the State, discourses on the development of other forms of mineral wealth, discusses new and improved appliances and furnishes considerable up-to-date information. The names of the contributors are a guarantee of merit in the various articles, and the typographical excellence of the work adds to its general value. No man can read this book without an increase of knowledge concerning the mineral resources of California, and an increased respect for the State which has contributed so largely to the permanent wealth of the world.

Industrial Notes.

—A further advance is reported in iron and steel.

—Salt Lake City, Utah, has a daily smelter output of 800 tons.

—There are 100 artesian wells in the town of Roswell, New Mexico.

—Interest charges, even in the South, are being reduced to 3% per annum.

—Northwestern counties are refunding their bonded indebtedness at 4% and 5%.

—News from Johannesburg, South Africa, reports a partial cessation of the Rand mining industry.

—The Southern Pacific is going to build a cut-off from Wells, Nevada, to Salt Lake City, Utah, 180 miles in length.

—The San Francisco boiler makers are quarrelling over good wages and have concluded to strike. Rival ports do not object.

—It is now expected that the "Valley road," giving San Francisco a second transcontinental line, will be finished and in operation by Februrary 1st, 1900.

—Santa Rosalia, Lower California, reports a scarcity of men at the mines and smelters of the Boleo Co. About 250 went to the fabled placer fields near San Roque.

—The Burlington railroad is erecting a tie-preserving plant at Edgemont, S. D., to cost about $40,000 and to be completed about Oct. 1st: 3000 ties a day will be treated.

—The Philippine troubles have created an immense emergency business at San Francisco, resulting in an increase in prices of all manner of supplies throughout California.

—The Southern Pacific Co. has again abrogated class tariffs and put into effect its former freight schedule, which is a raise of about 30%. The new rule begins October 10th.

Commercial Paragraphs.

TRUAX ORE CARS have recently been shipped from the Denver, Colo., shops to Honolulu, Hawaii, and Joplin, Mo.

THE Sullivan Machinery Co. have started a diamond drill at work in Breckenridge, Colo., district for prospecting purposes.

MCFARLANE & Co. of Denver, Colo., shipped a car of crushing machinery on the 20th inst. to Pueblo for the Philadelphia Smelting & Refining Co.

M. E. HOPKINS and associates have opened a machine shop at Cripple Creek, Colo., under the corporate name of Cripple Creek District Machine Works Co.

MR. ROY D. HUNTER, Western Mgr. Sullivan Machinery Co., Denver, Colo., reports the installation of fifteen 3-inch Sullivan drills at Capt. DeLamar's mine at Mercur, Utah.

THE Silver King mill, Utah, is arranging to use Frue vanners for the finer slimes, five 6-foot Frue vanners having been ordered from Fraser & Chalmers after a satisfactory test of the 6-foot Frue.

THE pneumatic cyanide process has been adopted at a new cyanide mill, recently put in on the Colorado group, in Royal mining district, Mineral county, Colo. The property belongs to R. Darling and H. E. Lang.

FOR the convenience of their customers, Fraser & Chalmers have established sales offices at 1426 to 1429 Marquette Building, Adams and Dearborn Sts., Chicago. Their main offices will be located at their new works, Twelfth St. and Washtenaw Ave. All letters and communications for them should be addressed Fraser & Chalmers, Twelfth St. and Washtenaw Ave., Chicago.

THE new third edition of the catalogue of the Electrical Engineer Institute of Correspondence Instruction of New York shows the interest which all classes of workers are taking in this new educational departure. A strong feature of the Institute's work lies in the fact that all its instruction papers have been prepared by eminent specialists and authorities in their respective fields. In the new catalogue is a complete synopsis in detail of every topic in every course which the Institute teaches. In the new edition are many letters from students of the Institute, both at home and abroad, who express great satisfaction at the benefits that the studies have conferred upon them. The Institute is reported to be meeting with remarkable success, due to the high standard which it has taken in the preparation of its instruction papers and the conscientious manner in which it deals with its students. Mr. Joseph Wetzler, M. E., E. E., is the president of the Institute and Mr. T. C. Martin, editor of the *Electrical World and Engineer*, is vice-president. Both these gentlemen are well and favorably known in the electrical engineering profession. The Institute's catalogue will be sent free to any one on application by addressing the main office, 120-122 Liberty St., New York.

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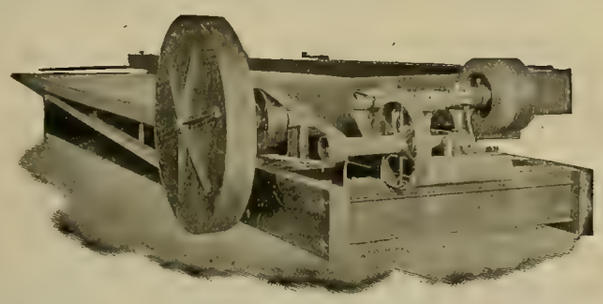
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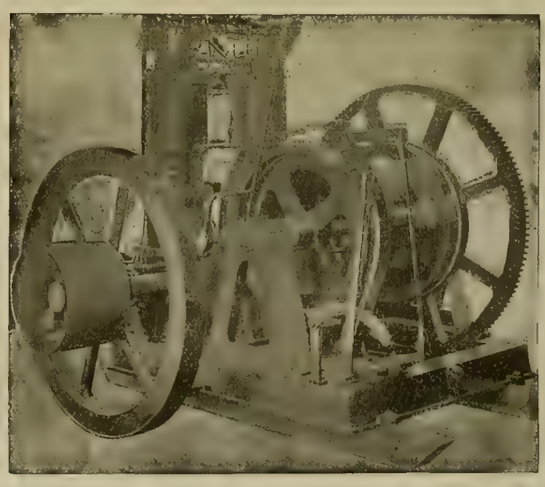
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4. It requires little or no attention when once adjusted and no expert is required to either adjust or run the machine.
5. It will save much expense in power and room, and the first cost of a mill requiring concentrators.
6. It has no expensive belts to crack and wear out, nor complicated machinery to keep in repair.
7. It is the only sensible plan of concentration, as any kind of material can be worked, which is not true of any style of belt machine.

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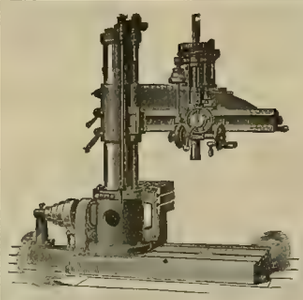
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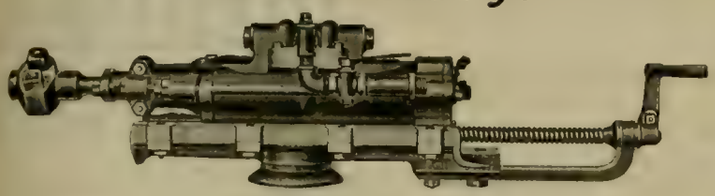
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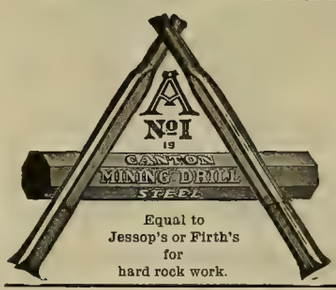
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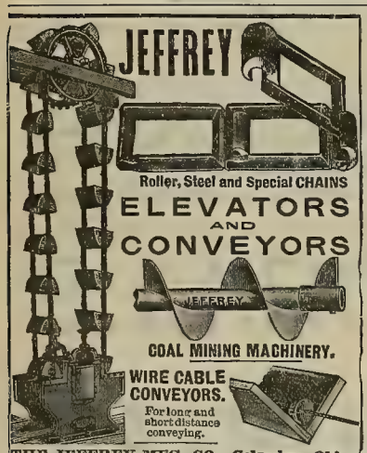


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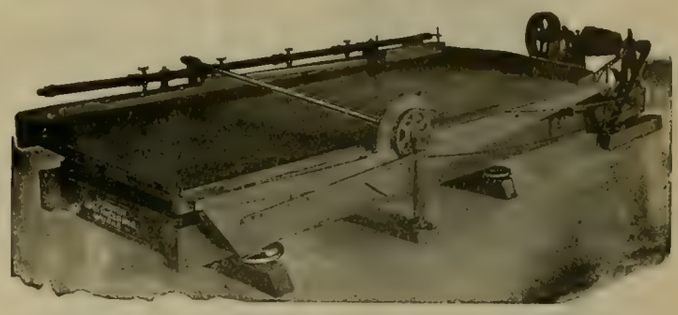
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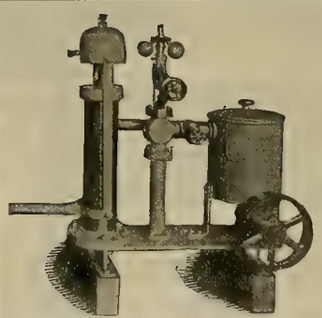
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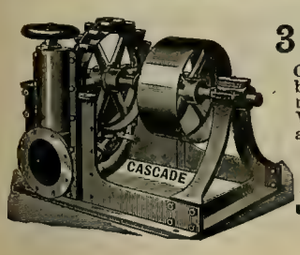
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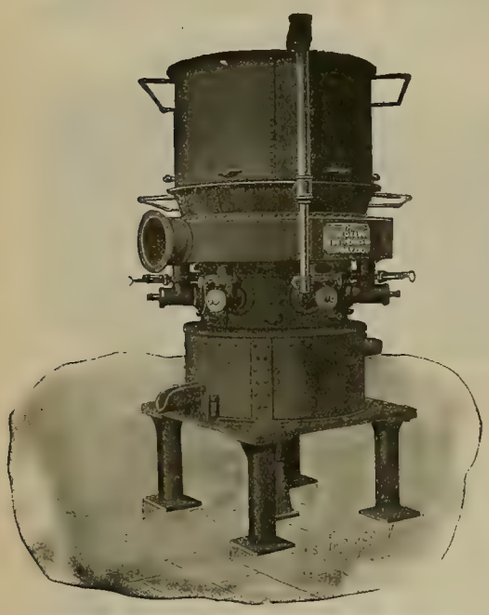
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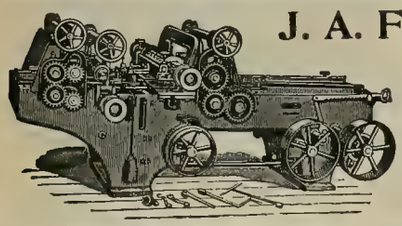


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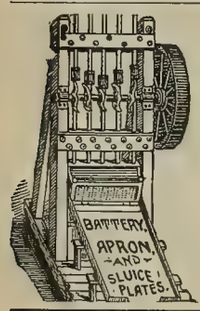
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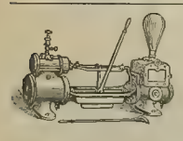
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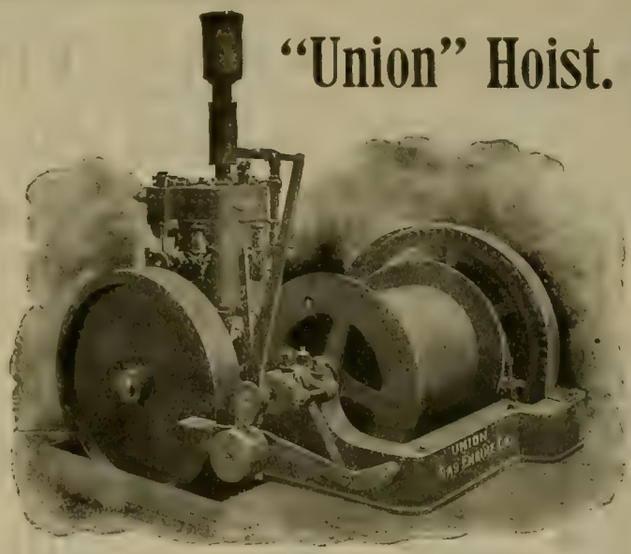
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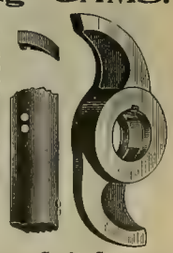


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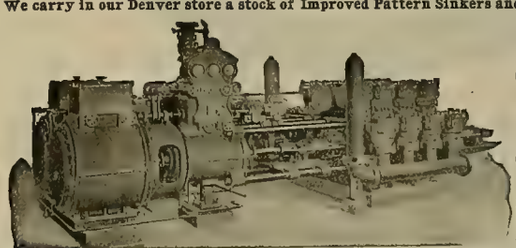
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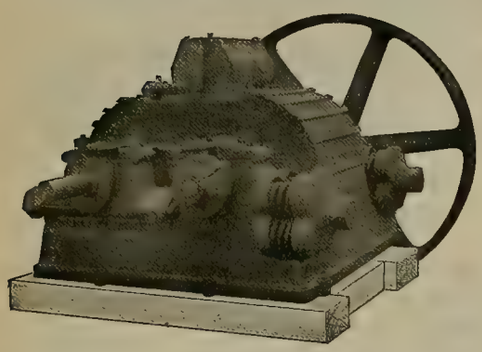
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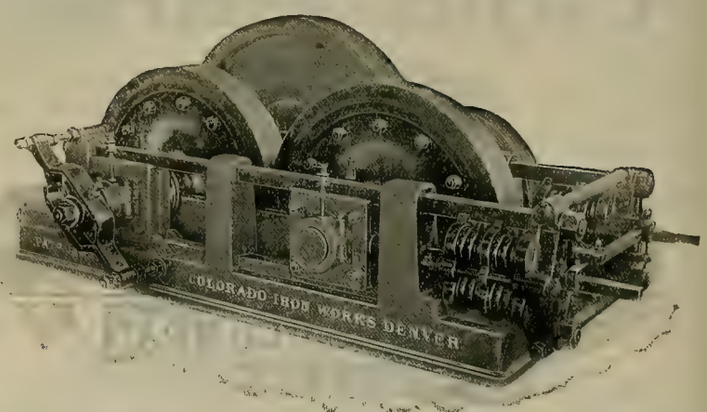


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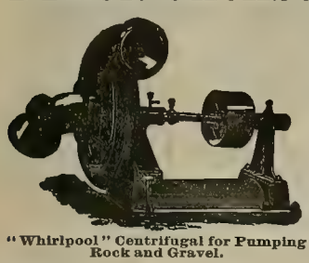
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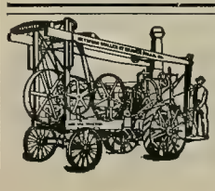
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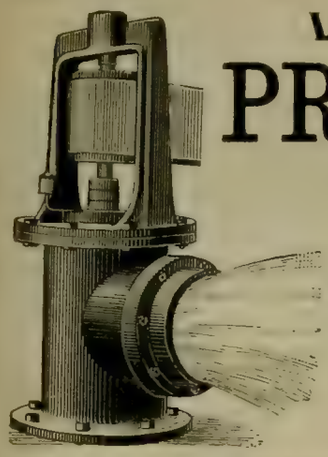
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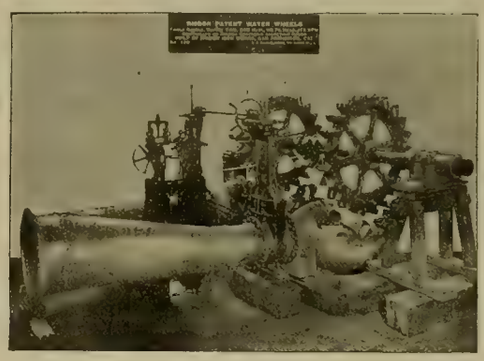
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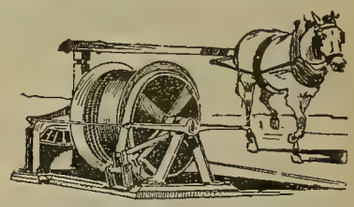
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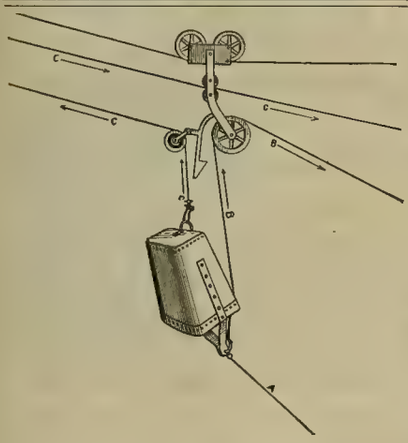


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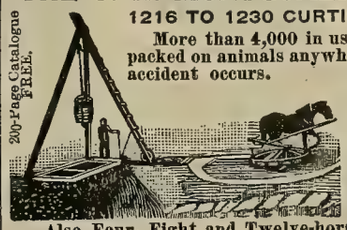


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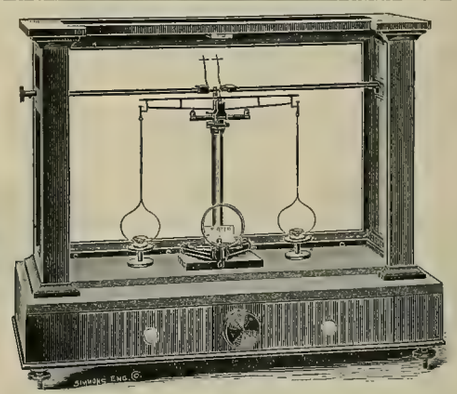
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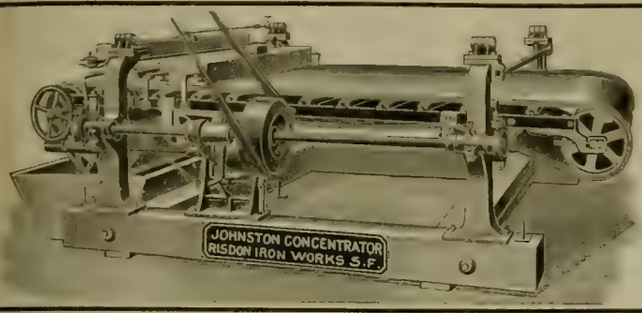


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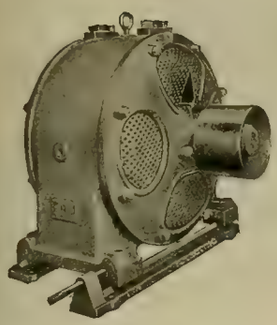
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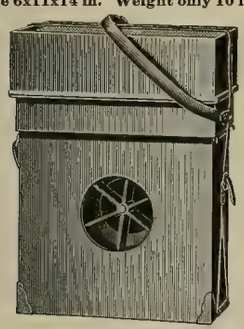
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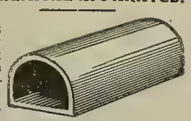
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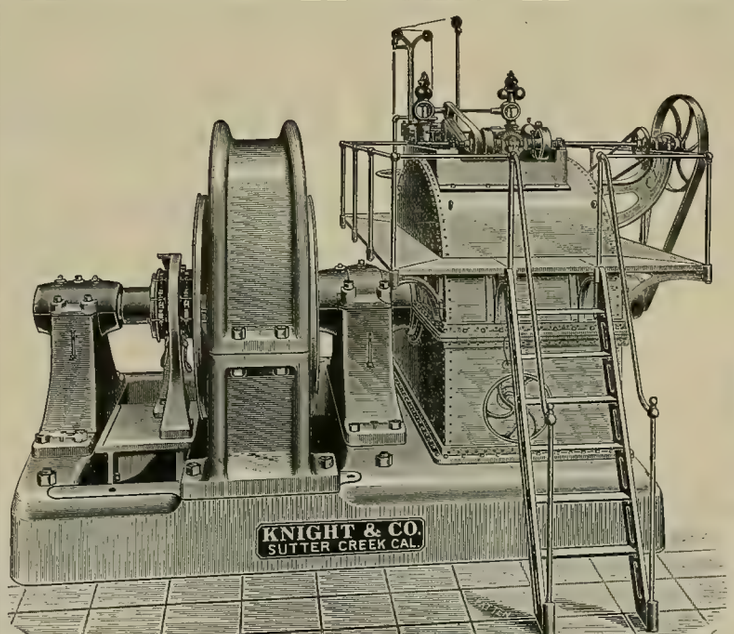
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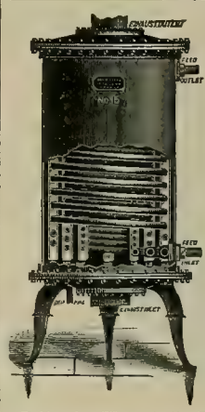
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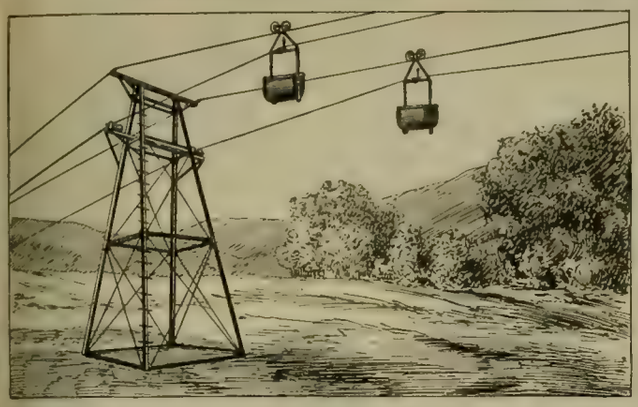
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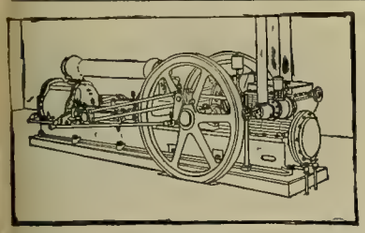
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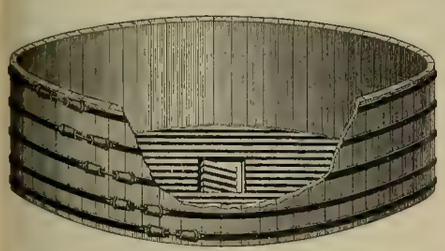
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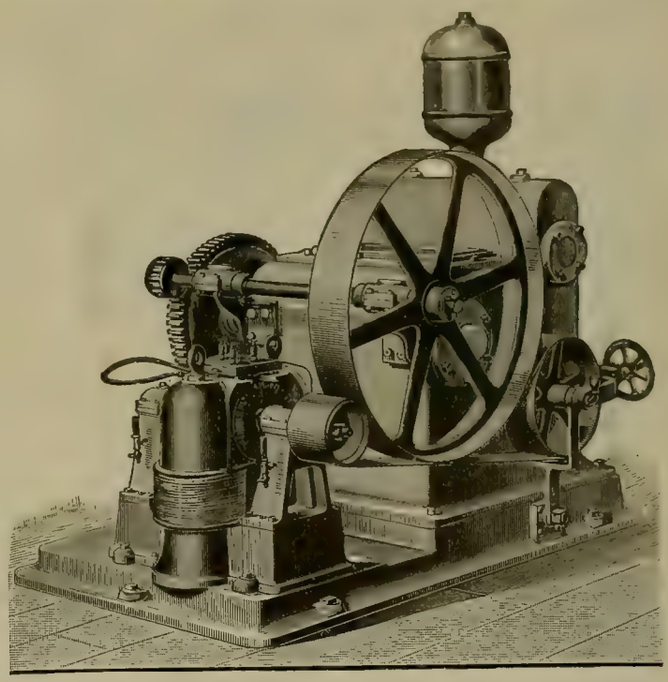
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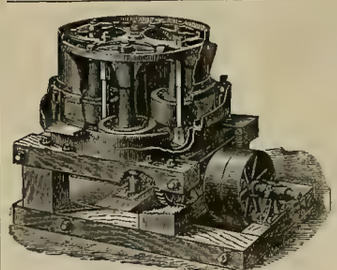
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Market Reports.

SAN FRANCISCO, Sept. 28, 1899.

SILVER.—London, 27d; New York, 58⅛; San Francisco, 58⅛@58⅝; Mexican Dollars, 47¾@48⅜; New York exchange, sight, 12½; telegraphic, 15 cents premium.

Director of the Mint Roberts is quoted as saying that there is no bullion out of which to make fractional silver except some uncurrent coins, which are being recoined. There is less than $1,000,000 of these coins in the treasury, and $2,000,000 have been used up in the last two weeks.

LEAD.—New York reports quiet, $4.62½ bid, $4.67½ asked; brokers' price, $4.40. Local, pipe, 7¼@7¼c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¼c.

COPPER.—New York reports Lake very quiet at $18.50; brokers' price, $18.37½@18.50. Local—Mill copper plates, 23½c.

Copper this week is showing a faint sign of weakness in the brokers' price, which is $18.37½@18.50, where heretofore it has firmly remained at $18.50. Some large dealers predict for the year 1900 steady market at 15 cents per pound.

IRON.—American, soft, $23.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

The production of pig iron in the United States for the year ending June 30, 1880, was 3,835,191 tons; in 1885 it was 4,044,526; in 1890 it reached 9,202,703, and in 1895, 9,446,308. It is estimated that in 1899 it will reach 14,000,000 tons. The following is Mr. Jeans' estimate of the pig iron production of the principal iron-making countries of the world for 1899:

	1899. Tons.
United States	14,000,000
Germany	8,250,000
United Kingdom	9,500,000
France	2,700,000
Belgium	1,200,000
Sweden	550,000
Austria	950,000
Total	37,150,000

STEEL.—11¼@20c per pound.

TIN.—Weak, $31.75 bid, $32.15 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $46; export, $40.50@41; carload lots, special rates.

The local market is firm, but no change in price during the week.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2¼c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8½c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
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Wallsend	$7 50	Cumberland	$9 00
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COKE.—Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

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	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	11¼	12
12-thread (⅜ dia ....)	11¾	12½
6 and 9 thread (¼ and 5-16 dia.)	12¼	13
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Bale Rope (2, 6 and 8 strand)	11½	12½

In quantities not less than 10,000 lbs.

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9:30 A. M. SESSION.

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250 Con. Cal. & Va.	$1 55	100 Ophir	$1 05
100 Union Con	38c	200 Potosi	56c
200 Gould & Curry	23c	200 Sierra Nevada	71c

2:30 P. M. SESSION.

400 Mexican	36c	100 Sierra Nevada	70c
100 Gould & Curry	22c	400 Overman	31c
600 Best & Belcher	40c	200 Alta	5c
100 Con. Cal. & Va.	$1 55	100 Andes	12c

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. B. Jacks, in the Badger Hill mine, near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek and Woods Ravine, and from John O. Smith et als., in the Smith's Blue Gravel Mine, near Ono, Shasta Co., to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 9, 1899, at 1:30 P. M.

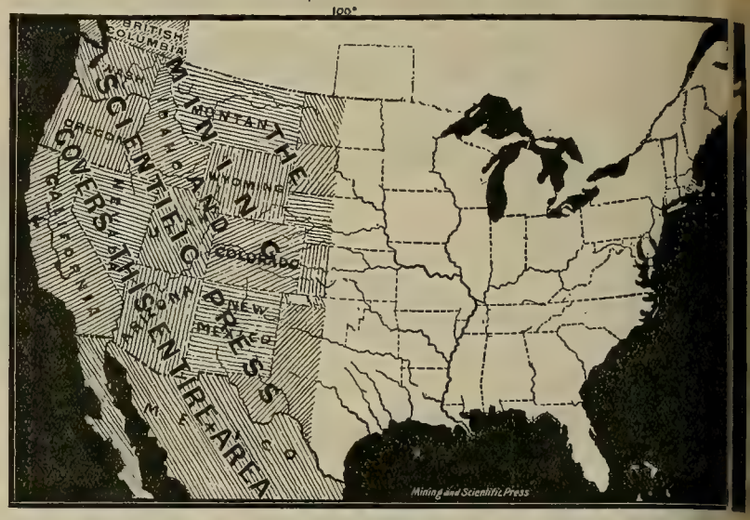
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WANTED—To purchase working gold mine with mill and machinery; give full particulars. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of September, 1899, an assessment (No. 20) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES ROVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.— Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1899, an assessment (No. 1) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of October, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 28th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of September, 1899, an assessment (No. 14) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 8) levied on the 9th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
W. G. Loewe	122	500	$50 00
E. Hamann	126	500	50 00
G. F. Schwarz	209	50	5 00
M. Ile-Baird	158	1000	100 00
J. H. Pein	200	500	50 00

And in accordance with law, and an order from the Board of Directors, made on the 9th day of August, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on WEDNESDAY, the 11th day of October, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Guy C. Earl	73	800	$4 00
Guy C. Earl	161	320	1 60
D. M. Kent, Trustee	273	1,867	9 33½
Mrs. Elizabeth Weaver	315	500	2 50

And in accordance with law, and an order from the Board of Directors, made on the 12th day of September, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California, on SATURDAY, the 7th day of October 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. J. CRAWFORD, Secretary.

Office—1209 Claus Spreckels building, San Francisco, California.

STOCKHOLDERS' MEETING.

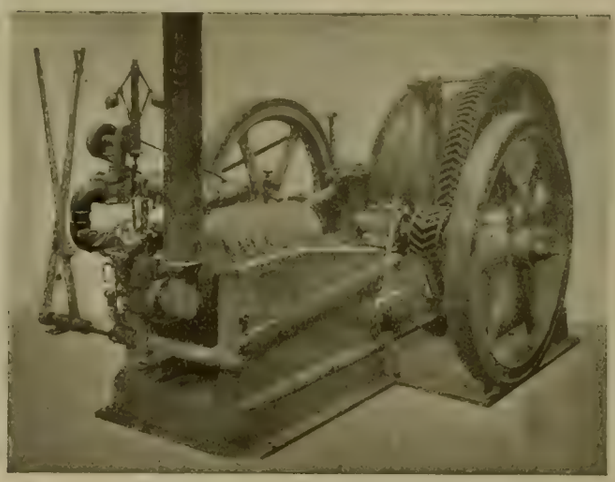
Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each. JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

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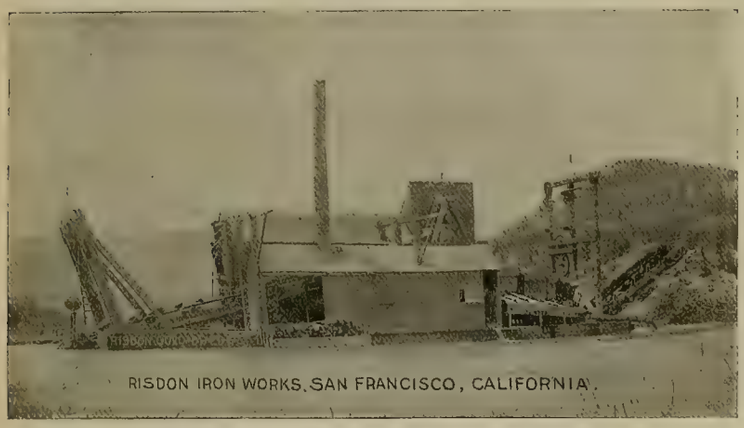
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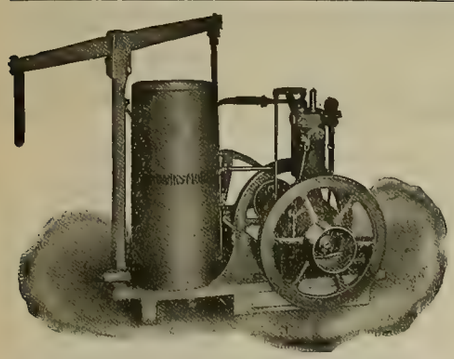
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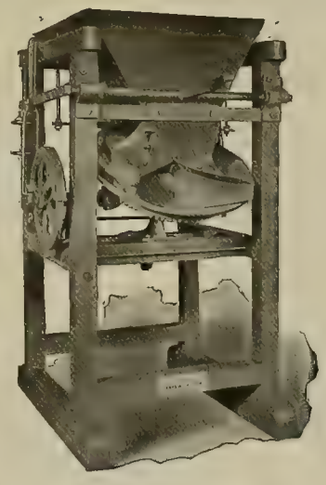
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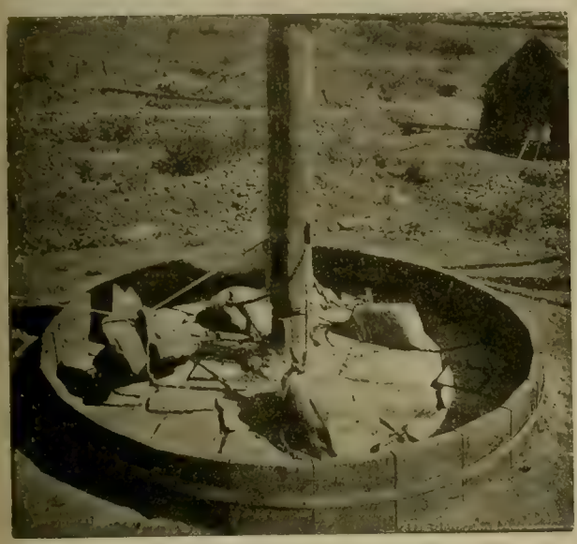
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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 2048.—VOLUME LXXIX. Number 15. SAN FRANCISCO, SATURDAY, OCTOBER 7, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Scenes in Lower California.

Until comparatively recent years Lower California has been a terra incognita, but within the past decade the country has been more thoroughly explored than ever before and it is now known to possess many and valuable undeveloped resources. Among these the most prominent or, at any rate, the most quickly and easily available, are its mineral deposits. One of the most important mining concerns operating in Lower California is the Ybarra Gold M. Co. of Calmalli, and San Francisco, Cal., which owns and operates some of the richest mines on the peninsula. Their mines are at Calmalli near the gulf coast. There are numerous claims, of which that having the greatest development is the Otilia. This has two shafts—one vertical, the other inclined—the former 400 feet deep, the latter 600 feet. They are 500 feet apart. The underground workings have a lateral extent of about two miles. The property is equipped with a 20-stamp mill and concentrators. Steam power is employed. The veins occur in slate. The mineral belt is from one and a half to two miles wide and has a length of about fifteen miles. From 200 to 300 men are employed. On this page are views of the shafts and mill of the Ybarra Company. These well appointed works form a striking contrast with the old Mexican arrastra. Near the head of what is known as the Hardy-Colorado river in the Copaca region not far below the international boundary, are some remarkable mud geysers. There are about sixty of these vents to the subterranean forces, covering several acres of land. They are of spasmodic action—remaining quiet for a time, when a series of explosions signal an approaching eruption, and mud, water and steam are ejected several feet into the air. The illustration of the mud volcanoes gives a very good idea of their appearance. The crater of the Sierra Prieta is that of an extinct volcano in the northern portion of Lower California. Near the crater and geysers are lakes of inky water. The color is due to fine sediment in suspension. The illustrations are from J. R. Southworth's "Baja California Illustrado."



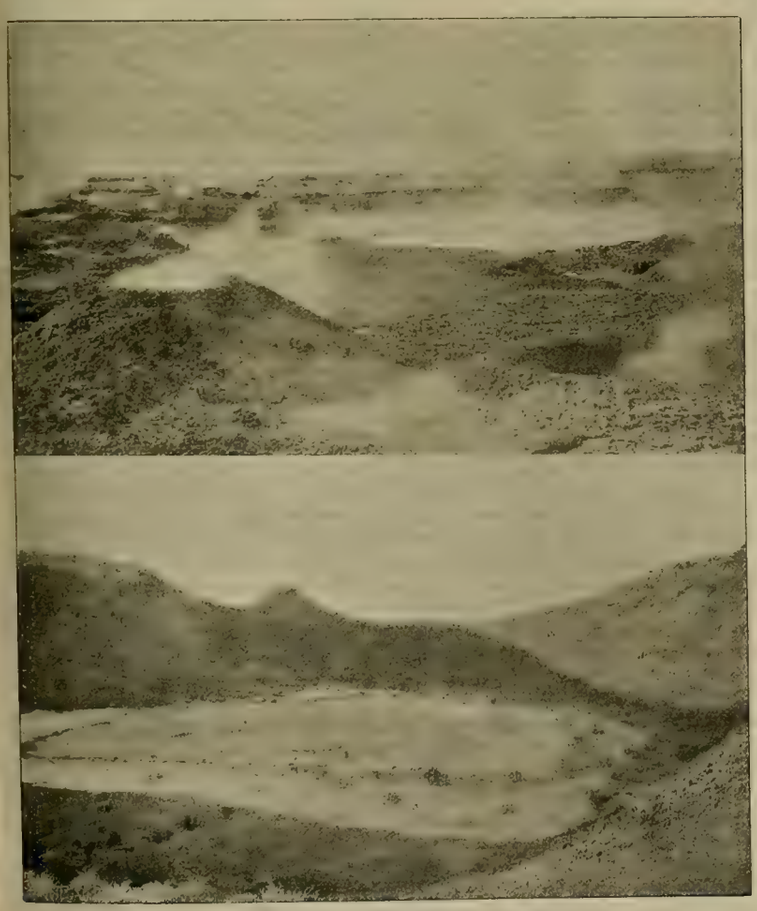
Mexican Arrastra.



Twenty-Stamp Mill, Calmalli, Lower California



Incline Shaft, Otilia Mine, Calmalli, Lower California.



Mud Volcanoes, Six Miles From Cucapa Indian Village, Lower California.
Crater of Sierra Prieta, Eighty-Five Miles From Campo, Lower California.



Vertical Shaft, Otilia Mine, Calmalli, Lower California.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Largest Circulation of any Mining Journal on the American Continent.

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J. F. HALLORAN.....Publisher

San Francisco, October 7, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Mexican Arrastra; Mud Volcanoes, Six Miles from Cucapa Indian Village, Lower California; Crater of Sierra Prieta, Five Miles from Campo, Lower Cal.; Twenty-Stamp Mill, Calmalli, Lower Cal.; Incline Shaft, Otilia Mine, Calmalli, Lower Cal.; Vertical Shaft, Otilia Mine, Calmalli, Lower Cal., 401. Deep Mining at the Utica, Angels, Calaveras Co., Cal., 404. Completed Rock Cut, Chicago Drainage Canal; Building Retaining Walls, Chicago Drainage Canal, 406. Latest Mining and Metallurgical Patents, 407. Cyanide Plant at Gilt Edge, Montana, 408.
EDITORIAL.—Scenes in Lower California, 401. Timbering at the Utica Mine, Cal.; "Theory" and "Theorists;" Miscellaneous, 402.
MINING SUMMARY.—409-410-411.
THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 426.
MISCELLANEOUS.—Concentrates, 403. Deep Mining at the Utica, Angels, Calaveras Co., Cal., 404-405. An Historical Automobile; A Great Engineering Project; Deep Mining in Nevada Co., Cal., 406. Latest Mining and Metallurgical Patents, 407. Cyaniding at Gilt Edge, Montana; Recognizing One's Voice Through the Telephone, 408. Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Catalogues Received; Obituary; Recently Declared California Dividends; Rock Drilling Contest, 411-412.

THE Minister of Mines for New South Wales, Australia, has had a law passed that no inexperienced person shall be allowed to work in the face of a coal or other mine unless accompanied by some person who has had at least two years' experience as a miner. This appears like a sensible law, for, even though an inexperienced man may escape injury himself, his timber work may be defective and subsequently result in the death or injury of others. All miners have to learn their business, and new men and boys must be employed in mines; but it is not proper to place these inexperienced men and boys in positions of responsibility, where others may suffer from their lack of knowledge.

A MINING BUREAU has been opened in Jerome, Ariz., in which has been placed a fine collection of ores and relics found in the ruins and mines of prehistoric Arizona. Besides these the bureau is prepared to furnish information relative to the resources of Yavapai county and of the Territory. This is an excellent thing and is in line with a suggestion made by the MINING AND SCIENTIFIC PRESS some months ago. The county officials of each county should take up this matter and provide a suitable apartment for a display of the county's minerals and other resources, accessible at all times to the public. With such a collection at the county seat, in event of an exposition at some important point the county would be prepared to send for exhibition the best that its mineral resources would afford, at little expense and without delay. Such a step could not fail to benefit the section making the display. Jerome's example is worthy of emulation.

WITHIN the past six months the price of iron and steel has doubled. Such a condition never before confronted the industrial world and the question everyone interested is asking is, How much longer will it continue and to what price will iron go? The mining industry is particularly affected, as the machinery employed in and about mines, reduction works and mills is all ponderous and heavy, consuming a large amount of raw material. Under the impetus of a rising market the great iron mines of the Lakes region, and those in the Southern States and elsewhere, have been urged to extraordinary effort and their output has been very large, but not sufficient to meet the demand. In a few weeks more the Lakes will be closed and transportation will stop, but the demand for machinery and structural iron is not likely to cease at the same time. To add to the uncertainty of the future of the iron business there is no surplus of any considerable amount on hand. In 1897 there were stocks on hand amounting to 1,000,000 tons of pig iron. In the past month this had decreased until but 160,000 tons remained. This shortage of iron and inability of manufacturers and founders to promptly fill orders is affecting the mining industry more than the high price of iron, for there are comparatively few orders withheld on account of the latter condition.

Timbering at the Utica Mine, Cal.

During the recent session of the American Institute of Mining Engineers in San Francisco, Cal., a paper was presented entitled "Deep Mining at the Utica, Angels, Cal.," by J. H. Collier, a student of the University of California. It is reproduced on pages 404, 405 and 406 verbatim. Mr. Collier had the advantage of two years' practical experience in the Utica mine and describes in detail some of the practice of that mine.

The paper is well written and is a credit to its author's observation and industry. There are, however, several points which deserve comment. Passing those paragraphs descriptive of the geology of the mine, as expressing the opinions of an individual, with which others may or may not agree, the practical working of the mine is reached, and the methods of stoping and timbering are described.

The method of placing shaft timbers with the narrow face upward offers no advantage, as the compressive strains coming from the sides would be better resisted by placing the plates with the wider side upward. Moreover, the manner of framing offers no resistance to the crowding in of posts by pressure from the surrounding rock masses. The ends of the posts rest flush on the end pieces, top and bottom, according to the description and drawing. This method saves time in framing and also in putting the posts in their places in the mine, but for the reason stated the practice does not appear advisable.

In the stopes when a level is started the posts of the first floor sets are stood up on the solid rock, with 6 inch spreaders and 12-inch round sprags between the posts at the bottom. Over the spreaders a floor is laid.

In dispensing with sills the stoping up and connecting of levels can only be accomplished with difficulty. The author of the paper says: "Sills are not, as is generally supposed, an advantage in working up under an old stope."

The illustrations accompanying the articles indicate sills beneath the first floor sets, but they are only the length of a single set. Sills of such length are wholly unsuited to the purpose for which they are intended. All sills should be at least two sets in length and those having the length of three sets are much more satisfactory. Sills of the latter dimensions will afford abundant support to the filling of the stope above, if covered with a floor of lagging, and would prove in every respect superior to a floor of planks laid upon spreaders. Moreover, long sills do not subside from beneath the foot of the posts as described in the paper, though short sills may do so.

In the sets a 2-inch space (and sometimes a larger one) is left between the ends of the caps, the idea evidently being that there should be a certain amount of flexibility or "give" to the timber sets. It is the practice or the intention to insert a 2-inch block or another of suitable size between the ends of the caps to fill this space, but it is not always done. In a stope 100 feet wide sustained by twelve sets, each 8 feet, a subsidence of 2 inches on each set, making no allowance for the crushing of the timbers, would admit of a movement of fully 2 feet on the hanging wall side. To this add the compression of the timbers by the weight of the ground and the result may be surmised, and that is what occurs; large rents and gaps are found on the hanging wall side of the mine, being always an element of extreme danger.

The principles of mine timbering are to render the entire structure as rigid as possible and permit no subsidence to occur, for, as a rule, when the superincumbent weight has started no timber can hold it. Filling is now extensively practiced in the Utica with beneficial effect. In its early history it was neglected and disaster resulted.

The caps are only framed on one side, making it necessary for the men to cut and fit timbers underground by the light of the sickly glow of small oil lamps attached to each man's hat. That this is less expensive than framing on the surface with gang saws, there is reason to doubt. Men cannot work in the dark stopes of a mine with ax and saw as cheaply as the same work can be done on the surface, even if the same tools are employed; nor is the element of time required to put the timbers in place to be overlooked. In any modification of the square-set system, the previous framing of all timbers on the surface, so that each individual member shall be interchangeable for another of its kind, affords the best results. The timbers used at the Utica are all round, except in the shaft, and of course these timbers are not uniform in length (though nearly so, and might easily be made so), nor are they of uniform thickness. This is given as a reason why so rude a system is employed. In the Wildman mine, at Sutter Creek, in Amador Co., Cal., round timbers are also employed with the same disadvantages as to inequalities in size as those at the Utica; but a system of framing is in use which dispenses, to a great extent, with the necessity of framing underground.

At the Wildman the posts are framed with tenons 6x12 inches, which on top of the post are 8½ inches long, and on the bottom 3½ inches long. The posts rest upon each other (after the Nevada system designed for top pressure), the caps being framed with a tenon 12x12 inches, which is 4 inches long. These tenons rest upon the shoulders of the posts. Double sprags are also employed, so placed as to abut against both upper and lower post at their intersection. The right-hand sprag binds the cap on the right and the left-hand sprag that on the left.

Mr. Collier says: "The system seems to have all the merits of the square-set system used on the Comstock, at the same time being cheaper and more flexible. It is cheaper because the cheaper round timber is used and the framing is much more simple. Much of the framing is done in the mine, while waiting for the partially framed timber to come from the surface."

The logic of the above argument is not apparent, for the reasons already stated, and if the delay caused by the failure to promptly deliver timber is the only excuse for its use it would seem that it is a difficulty which might easily be overcome.

On the whole, the system of timbering at the Utica mine appears to be unnecessarily cumbersome, rudely built and placed in position under greater disadvantage and at the expense of more time than should be necessary.

"Theory" and "Theorists."

The time has gone by when the term "theorist," or a sneer as to "theory," conveys much influence. Theory is now recognized as a necessity, a force, a vital influence. Fanciful beliefs, false assumptions, idle notions, fads and chimeras have no part in real theory, for a theory is as susceptible of being real as any tangible result. There is nothing done of merit or value that did not begin as a "theory." Without "theory" there would be no practice. Certain definite views of the way in which a thing is to be done, the "how" of it, is the theory; following out this "how" is the practice; theory is the foundation, practice the structure. Before one does anything worth doing he must have a definite plan; the theory is the generalization from known facts, the application of knowledge, observation and experience. A man knows something; he theorizes thereon or therefrom. If such theory be sound, success attends its practical application. The successful demonstration of a theory makes it a known truth. Those who are too ready to ridicule "theories" forget that nearly everything we know was once only a "theory;" when the "theory" was demonstrated it became a fact. Theory is the force that directs and precedes all action. Time was when it was a "theory" that the earth was round; there were "theorists" who thought that air was resolvable into elements; other "theorists" believed that electricity could be generated and the current interrupted, producing light and power; "theory" predicated the locomotive, the telescope, the battleship, the automobile. There are theories and theories; demonstrable theories mean ultimate success, the other kind failures. But theories are necessary. Like the twin impulses of love and hunger, they rule the world, and are the most potent present force on earth or off it.

Concentrates.

"AUROCYANIDES" are resultant values from zinc precipitation in the cyanide process.

IT is reported that tin ore has been discovered near Salida, Chaffee county, Colorado.

OXYLIGNIT is the newest coined word and signifies the cartridge of liquid air used for blasting.

ALL the Comstock mine companies interested have signed the contract with the Truckee General Electric Co.

CYANIDE OF POTASSIUM is probably the best solvent for iodide of silver; hyposulphite of soda is also a good solvent therefor.

CARBORUNDUM is a competitor of emery in all the uses of that abrasive, and is produced in large quantities at Niagara Falls, N. Y.

UNITED STATES railroads are increasing the length of rails from 30 to 45 and even 60 feet, the advantages outweighing the objections.

THE De Beers diamond mine in South Africa is considered to be the largest mining dividend payer in the world; it paid last year $7,687,300.

ONE of the richest mines in the Aspen district, the Emma, has been in litigation almost constantly since a short time after its discovery in 1880.

THE stock of a New Jersey corporation can not be assessed; that of a Colorado corporation may be; in California (under certain conditions) it must be.

THERE is little commercial demand for asbestos in San Francisco; if of long fiber and superior quality, there might be a limited sale, delivered, at, approximately, $30 per ton

THE development and prosperity of the works of the Mountain Copper Co., at Keswick, Cal., is a good example, happily illustrative of the combination of English enterprise and American opportunity.

A PROMINENT Denver mine operator writes: "It took lots of 'nerve' to write and publish that article 'Not Thoroughly Understood,' in the paper dated Sept. 23rd, but it is worth $10,000 to you; shake!"

SUPERHEATED steam is that which is further raised by the application of additional heat to a temperature above that which belongs to its equilibrium of temperature and pressure when in contact with its liquid.

MACHINE DRILLS do not work to advantage in soft ground. The bits cut rapidly but quickly churn the soft material into a thick paste that is pounded into the bottom of the hole, retarding the operation of the drill.

BLANKETS were at one time much in use for the purpose of concentrating sulphides from tailings but they have in recent years been replaced by cheap brussels carpet or still more commonly by canvas of various grades.

JANUARY and October of the same year begin with the same day of the week. So do April and July, also September and December. February (except in leap year), March and November also begin with the same day.

WHEN required assessment work on an unpatented mining claim has been actually done, and can be definitely proved by responsible witnesses, no one can legally "jump" that claim. It is, however, safer to record the work.

SEA water is successfully employed in extracting gold by means of the cyanide process, in Chile. The fine gold found in some beach sands could probably be extracted in the same manner. It is a material well suited to leaching.

In some of the Central American countries the native miners strike single handed, using a 10-pound hammer having a handle 18 inches in length. The blows fall slowly, but in time they put a hole down. They consider a 3½-pound hammer a toy.

THE first railroad grant in the United States was made to the Illinois Central Railroad Company in 1850; the last was made to the Southern Pacific Company in 1871. During the twenty-one years was thus given to the railroads 44,261 square miles.

MAGNETITE is magnetic iron ore, usually occurring in octahedrons, also in dodecahedrons, often granular; sometimes found in dentritic form between sheets of mica, forming peculiar and interesting figures, but destroying the mica for commercial uses.

WOLFRAMITE is the technical term for tungstate of iron. Hubnerite is the term for tungstate of manganese, both of which are found in the vicinity of Gladstone, Colo. Stolzite, tungstate of lead is believed to exist in the Red Mountain, Colo., ores.

IN many of the gold-bearing veins of southern California, Arizona and southern Nevada molybdate of lead occurs in small quantity and is often mistaken for gold by inexperienced prospectors, when panning the crushed ore. It will be completely decomposed by hydrochloric acid.

AMERICAN mining machinery is securing worldwide recognition on its merits. In South America, South Africa, Australia, Russia, Japan, etc, the most advanced mine managers, regardless of nationality, stipulate that mining machinery of American manufacture shall be used.

IN a high-grade compound engine an engine horse power should be developed with from 16 to 20 lbs. of water; in non-condensing single engine from 22 to 24 lbs.; good large non-condensing, 28; average size condensing, 30; small, 30 to 45; pumps, elevators and non-expansive engines, 50 and upwards.

THE rise of the Colorado river this year has been high and prolonged to an unusually late season. The stream is sending a portion of its water through the old channel known as New river into the Salton basin. This has not occurred since 1892, and not so late in the season in recent years.

A VENDOR who brings principals together is in general considered to be entitled to commission, whether business is done direct, or through him. Such matters are, however, determined largely by special agreement, which, in case of any consequence, should be in writing, so worded that the intent cannot be misunderstood.

HUBNERITE is worth $50 per ton and upwards according to its purity. It is found in Mammoth, Nevada; Ouray and Silverton, Colorado; Lead, S. D. A small amount is used in the manufacture of steel. The Bethlehem Steel Works, Bethlehem, Pa., can give the further information desired.

THE longest electric power transmission line in the world is in southern California, the pressure being 40,000 volts; the line now building from Allegan to Jackson, Mich., is expected to be completed in 1900, ninety miles, when that will be the longest power transmission line; the pressure on the latter is 25,000 volts.

ALL the California County Miners' Associations are entitled to representation at the convention of the State Mining Association on the 23rd inst., in proportion to the number of members, and each delegate has equal voice and vote in all questions brought before the convention. Nevada county is entitled to 100 delegates, San Francisco county to 10.

IN many of the old river channels of California the trees which grew along the banks of those ancient streams were enveloped in the flow of volcanic mud and became petrified, and are found by the miners, standing where they grew but turned to stone in most cases. In others only a hollow is left to mark the tree, the wood having acted as a mould and later decaying.

SECRETARY TELLER has ruled that lands containing mineral springs, not of a saline character, are subject to sale under the agricultural land laws. By saline is meant those springs containing a large amount of chloride of sodium, for which mineral they are chiefly valuable. Deposits of rock salt and salt beds fall within the designation of the term "salines." Sulphur springs are not regarded as salines.

THE tin oxide found in the mines of the San Jacinto Estate, near Corona, Riverside Co., Cal., occurs in a black, heavy rock, composed almost wholly of fine needle-like fibers of tourmaline, some of it being massive. The cassiterite is scattered about this rock and occasionally is found in bunches forming very rich ore. The tourmaline veins are large in places but the best tin ore is found where the vein is small.

FIFTY-EIGHT questions sent to this office in the last eleven days are answered on this page. To publish the questions themselves would more than take up the page, while the condensed answers are of value not only to the questioners themselves but to the mining world in general. During the year nearly 3000 different queries on mining and scientific matters are thus attempted to be correctly answered.

UP to last week's rock drilling contest at Denver, Colo., the best record was that made by Hupps and Lindgren, at Ouray, Colo., July 4, 1898—37⅞ inches. The Victor victors last week won a $900 prize and trophy, as stated in detail on page 412. At Ouray, one year ago, Richard Conly of Cripple Creek, Colo., single handed, drilled 20¾ inches in fifteen minutes, in Gunnison granite, with a ⅞-inch drill, holding the championship to date.

A FLAME is a body or current of gas carrying in it solid particles at such a temperature as to glow or give out heat and light. These solid particles are usually carbon in a finely divided state, and the heat of the flame is roughly measured by the degree of the incandescence or glowing of these particles. Flame is produced when the supply of oxygen at the place where ignition occurs is not quite sufficient to form at once a gaseous product of the combustion.

POWER losses on an electric transmission plant are calculated as follows: Steam engine friction, 10%; loss in belting between engine and generator, 3%; loss in generator, 10%; (loss in the conductor depends on its length, thickness, care in placing, etc., but may be from 10% to 20%); loss in motors may vary from 10% to 18%. The total efficiency may thus be figured at 55%, but may be increased to 65% if the distance is short and the installation made with care.

CONGLOMERATE is a mass of gravel, sand and cobbles, all more or less rounded by attrition on a lake or sea shore or in a river bed and cemented by some material, such as lime, iron oxide, silica, etc. Breccia is a mass of material similarly cemented, but the fragments are all angular. It may be the result of a volcanic eruption or may be rock in situ which has been fractured by dynamic forces and subsequently cemented. Either may contain ores and valuable metals.

AT one time in the history of the Grand canyon of the Colorado river in Arizona volcanic eruptions occurred on the plateau in the neighborhood of the canyon and the black basaltic lava poured out over the surface and flowed to the edge of the canyon, over which it plunged in cascades, filling the canyon bottom to a considerable height. Subsequently the river has cut its way down through this hard, tough rock and through the underlying rocks, indicating that the fresh appearing lava flows, which appear that they might have been outpoured recently, are really very old.

THE first important discoveries of mines in Utah were made by soldiers under Gen. Connor, who established the military post at Fort Douglas, east of Salt Lake City, in '63. His men were the discoverers of Bingham, Stockton, Little Cottonwood and other camps in Utah, and they also found mines at Pioche, Nev. The most important mining districts of the Wasatch are at those places, where the mountains are highest and most massive—where the granite has uplifted the quartzites and limestones and in the later porphyries have intruded the sedimentary rocks.

THERE are two fixed points of temperature which are used in graduating thermometers: the point at which ice melts and the point at which water boils under a pressure of one atmosphere. The latter is given by Regnault's determinations, of 14.7 pounds per square inch above vacuum, or 2116.2 pounds per square foot. The Fahrenheit scale calls melting-ice temperature, that denoted by 32° on its scale, and boiling water temperature is 212°. Its zero point is thus 32° lower than melting ice. The Centigrade scale divides the 180° F. between melting ice and boiling water into 100 parts, and places its zero at the melting ice point. The Reaumer scale divides the 100 degrees of the Centigrade scale into eighty parts. The first named—the Fahrenheit—is in most general use.

PLACER ground containing clay can be worked successfully in a rocker but it should first be well puddled. If the clay is tough and sticky it had better be picked out by hand and allowed to lie in the weather until it disintegrates or becomes hard, for otherwise the small balls of clay produced by the rocking motion will attach all the gold with which it comes in contact and pass out of the rocker robbing the miner of his gold. Where the clay contains gold it should be burned and pulverized. This will usually free it. The quantity of ground handled by the rocker depends on the size of the rocker, character of the earth and somewhat on the quantity of water available.

MONAZITE is a phosphate of cerium mineral and usually contains also thorium. Cerium and thorium are employed in the manufacture of the white mantles used on the so called incandescent gas burners. These substances must be combined in a definite proportion in order that they shall give the maximum of light. Pure thorium or pure cerium, made into a mantle, give about one-seventh as much light as a mantle containing 99% of thorium and 1% of cerium. The remarkable thing is that so slight a quantity of cerium added to the thorium should so greatly increase the illumination, especially in view of the fact that a combination of equal quantities of thorium and cerium give practically no light.

IN the manufacture of artificial ice two methods are usually employed: in the can method the cooled brine surrounds thin metal cans within which is enclosed the distilled water to be frozen in one system: in the plate method the cooled brine or ammonia itself in coils circulates between hollow plates, say 10x14 feet in area, on the outside of which the ice forms in the water tank. In the can system blocks weighing 300 lbs. will be frozen in from fifty to sixty hours: in the plate system the ice forms 14 inches thick over their area in from nine to fourteen days. The can system is more usual for ice venders, since the supply of ice blocks is continuous, but the product of the plate system costs less although the plant costs more. The Vulcan Iron Works, 505 Mission St., San Francisco, can furnish all necessary appliances relative thereto, or a complete ice-making plant of any required capacity.

THERE is somewhat of a difference between the rights of the locator of a tunnel site and the locator of a mining claim who may desire to run a tunnel to develop his location, the mouth of the tunnel being outside the lines of the claim. If A has located a tunnel site, under the mining laws, subsequent mining locations on the line thereof are prohibited so long as work is being prosecuted with reasonable diligence in the tunnel; consequently, if B locates a mining claim subsequent to A's tunnel location, the latter is senior in point of time, and A may drive his tunnel through B's claim without his consent. If, however, A and B are each simply locators of mining claims which may be near or join each other, A. has no right to pass through B's claim, although B may be junior in point of time to A. In other words, the location of a mining claim does not carry with it the right to pass through other claims subsequently located. The consent of the junior locator is essential. In these controversies at law there is often much which does not require the services of a lawyer to determine what is right. The laws are framed with a view of justice to all; as the law guarantees to the bona fide locator of a claim the absolute possession of all within its boundary planes, it is unreasonable to presume that one may enter upon another's property for any purpose without his consent.

CONCENTRIC decomposition of rocks is a process which many massive rocks undergo when subjected to atmospheric or other decomposing agencies. By it the outer portions of an angular block or mass undergo decay, the decomposition advancing from the surface inwardly, the process seeming to develop in the rock a series of concentric layers or shells, one within another, enveloping the nucleus, which is but little or not at all altered. Undoubtedly the structure of the rock in these cases is normally concentric, a condition which it probably assumes upon cooling from the molten magma, but which would not be observable were it not for the subsequent decay of the mass. In regions where this condition obtains in massive rocks, such as granite, diorite and many other porphyritic rocks, the surface is often seen strewn with large boulders of hard rock when the main mass is soft, and may be shoveled without trouble. Where this occurs it is usually the result of the concentric decomposition, which has removed the decayed outer portion of angular masses, leaving only the nucleus. Not infrequently on the under side of these boulders the evidence of this process of decomposition may be found in the form of shell-like layers of the rock, showing it to be in situ, though having the appearance of an erratic boulder. Concentric decomposition of rocks is not uncommon in the vicinity of mineral veins. The peculiar, boulder-like formation of the masses of ore found in the Bassik mine of Colorado is due to this process.

THE separation of zinc and gold, resulting from precipitation of gold from cyanide solutions, is effected in iron vessels by digesting the material with dilute sulphuric acid. At first a quantity of acid (determined by the amount of slimes to be treated) is poured upon the wet slimes. A violent effervescence results from the first contact of acid and zinc, and dense fumes are evolved. The slimes should be stirred with a wooden hoe or paddle until the chemical action becomes less violent when additional quantities of acid may be added from time to time, and with it equal quantities of hot water, stirring occasionally. Effervescence will continue at the end gently until all the zinc has been dissolved. After being allowed to stand for a couple of hours, a little more acid may be added, when, if no further effervescence takes place, the zinc may be presumed to have been wholly dissolved. Hot water is then run into the vessel, slowly stirring the while. this is done to dissolve the zinc sulphate resulting from the action of the acid upon the zinc. It is then allowed to stand several hours, when, having become clear, it may be syphoned off, care being taken not to disturb the precipitate remaining at the bottom. A second wash of hot water is applied and when clear is syphoned off, as before. Several times this is repeated until the zinc sulphate is wholly removed. When this process is complete the precipitate may be removed to the filter box. When filtered, the precipitate is dried in an iron vessel over a fire, by low heat, several hours being required to accomplish this. There is no standard flux for mixing with cyanide precipitates. It is a matter for experiment. At Bodie, Cal., F. L. Bosqui employs on a zinc precipitate containing 36% silver and 11¼% gold, with every 100 ounces of precipitate a mixture of fifty ounces of flux containing four parts borax, two parts soda and one part sand; with a precipitate containing 36% silver and 9⅛% gold, with every 100 ounces he uses seventy-five ounces of the same mixture as above. In some works powdered glass is employed.

Deep Mining at the Utica, Angels, Calaveras County, California.*

By J. H. COLLIER JR.

The mother lode, or mineralized belt, at Angels, in Calaveras county, California, is three miles wide. At least a region of that width has been, and is being, prospected which has shown considerable mineralization. The lode proper divides into three lodes, or groups of veins, at this point. On all of these branches mines have been operated with more or less success.

On the most easterly of these three groups, and therefore known locally as the East lode, is situated the Utica-Stickle mine, in the town of Angels. This lode was in an early day worked as open cut. The cut is still open for some distance, showing the strike of the vein very clearly. The cut would also give the impression that the mine was a simple fissure deposit. Underground development, however, has shown it to be a much more complicated deposit, at least to mine.

It might more properly be called a gold-bearing, mineralized zone rather than a simple vein. The zone consists of a large mass of crushed diabase which, under pressure, has developed a slaty cleavage. The crushed mass has been more or less altered into a schist containing considerable mariposite and white mica. In this mass the ore occurs as large bodies of massive quartz of a brownish-gray color; as masses of quartz veins from 1 to 3 inches wide, interspersed with micaceous schists in a distinctly banded structure; as masses of more or less altered diabase, containing filtrated silica often in reticulated veinlets; and as impregnations in massive diabase, all containing free gold and auriferous pyrites.

In working upward on the ore bodies they sometimes change from massive quartzite to a schistose character, and thin out toward the hanging wall. Crosscuts run into the foot wall, then show the ore-making next the foot wall, and soon widening out to the original width on its upward course, thus showing that the ledge was cut off by a large horse of diabase, split from the hanging wall and fallen to the foot wall. In this way the ore body is made up of several parallel lenses or masses, at different points dipping at a high angle to the eastward with a greater southerly pitch, ranging in all from 10 to over 100 feet in width.

With this outline of the general nature of the deposit the difficulties of mining, more particularly stoping, such a deposit will be better understood. Not only must the stopes be properly supported and economically worked, but the ground must be thoroughly prospected as the work proceeds.

The prospecting must be thorough to ensure the most economical use of the long levels through which the ore is removed. These levels are often driven in extremely hard diabase, and are not only costly in driving and fitting with tracks and compressed air pipes, but are often very expensive and difficult to keep open, on account of the settling and crushing of the rock.

The prospecting, on account of the varying character of the ore, offered many difficulties, but the supporting of the stopes offered much more serious difficulties by the extreme width and chrushed character of the ore body. After many difficulties and a serious cave, simple timbering was abandoned in the stopes. At the present time timbering and stowing are used together. The timber is put in place as fast as there is room, and no opening more than 16 feet vertically is made without stowing. By this means Mr. William Miller, the foreman, has succeeded in carrying the stoping and prospecting along together, the waste from the prospect crosscuts in the wall rock being used for stowing.

Shaft Sinking.—Before giving a detailed explanation of the excavation of the ore it will, perhaps, be more logical to speak of the shafts. In all there have been four shafts sunk on this property. The North Utica, 700 feet deep, sunk a short distance back in the foot wall, is still a good shaft. The South Utica, about 900 feet deep, was sunk on the ledge, and, after being kept open to hoist ore through only, at a large expense, had to be abandoned, and now gives some difficulty in stoping around it. The Stickle shaft, 1000 feet deep, was sunk on the ledge and has been almost entirely retimbered twice, at considerable expense, at one time necessitating the shutdown of the Stickle mine and mill for about a month.

Profiting by the experience with the other shafts, the new Cross shaft, which it is intended to sink to a depth of 1500 feet, on the Stickle mine, has been sunk at a safe distance in the foot wall from the stopes. As this is the newest shaft, and represents the best practice, I will give a detailed account of it.

After the removal of the surface soil churn drills were used to put in holes 2 inches in diameter at the collar, tapering to 1¼ inches at a depth of 6 or 7 feet. The holes were charged with five or six sticks of No. 2 Judson dynamite, 1⅛ inches in diameter and 8 inches long. The powder was exploded by means of safety fuse and percussion caps.

After reaching solid rock Ingersoll Eclipse machine drill were used. Four drills were run together, two in each end hung on bars extending horizontally across the short way of the shaft, about 3 feet from the bottom. When the drillin was completed one machine was removed from each bar an fastened by means of a rope to the bottom of the bucket an hoisted to the surface. The remaining machines were the turned parallel to their respective bars and clamped. Eac bar, with its machine, is then hoisted to the surface also. setting up the machines the reverse operation is performe In this way the time and labor required to handle the m chines are reduced to a minimum. The holes are drilled sy tematically in eight rows, of three holes each, across th short way of the shaft, with a V cut in the middle, consistir of six holes. The best results were obtained by drilling th holes from 6 to 7 feet deep. The cut, with the next row

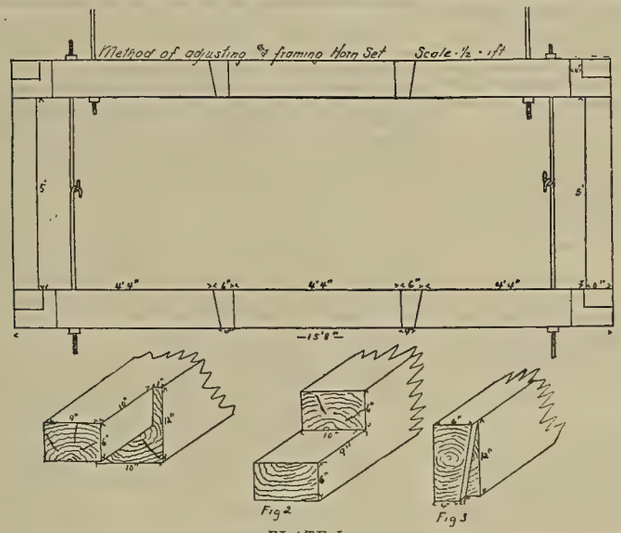


PLATE I.

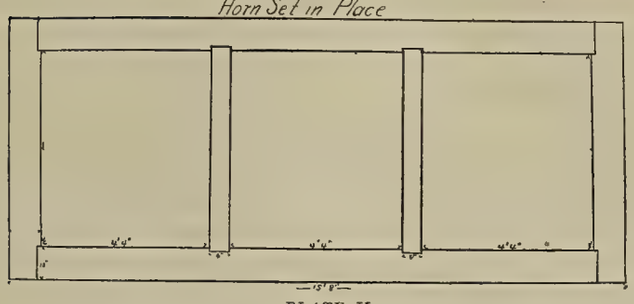


PLATE II.

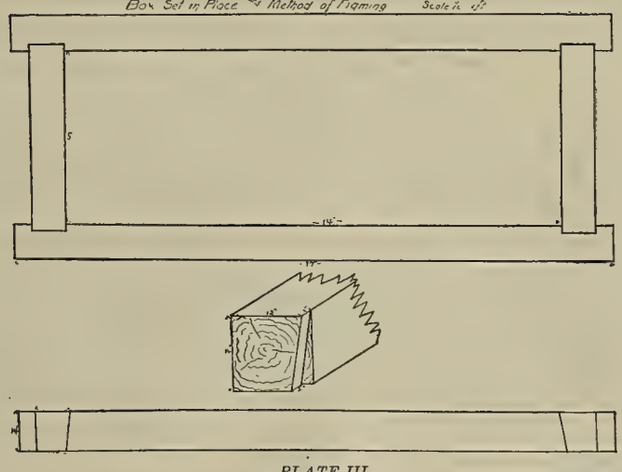


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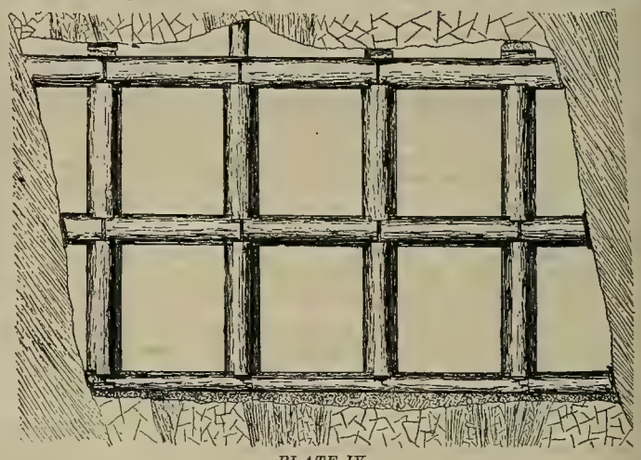


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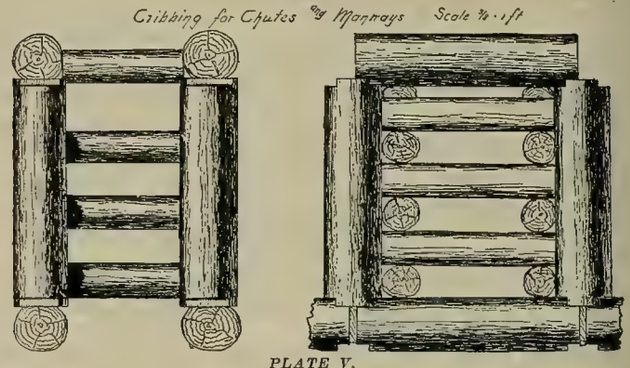


PLATE V.

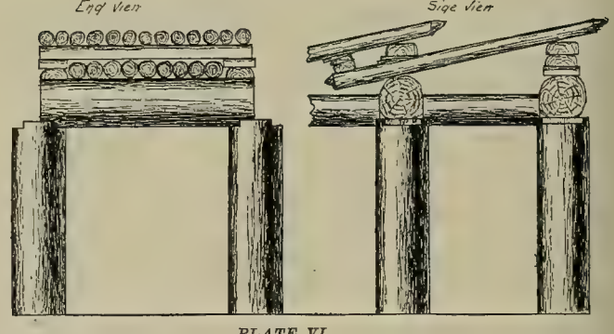


PLATE VI.

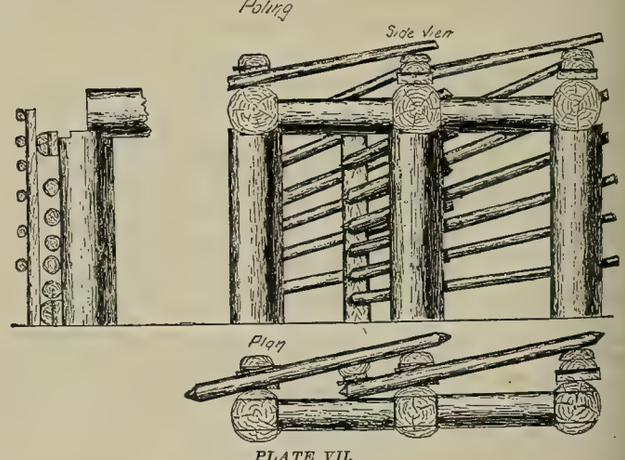


PLATE VII.

Transactions A. I. M. E., San Francisco, Cal., Sept., 1899.

each side, was shot first and, if it broke well, the others were charged and fired as soon as sufficient rock had been removed to reach them. Each hole was charged with from six to nine sticks of the No. 2 Judson dynamite. At first safety fuse and percussion caps were used to explode the charges, but later the charges were fired by electricity.

Near the surface, where the ground is loose, the shaft is built up of 12x12-inch timber, the ends of the wall plates and end pieces being halved together. After reaching solid rock the shaft is timbered in sets 5 feet apart, which are 5 feet wide and 14 feet long in the clear. By means of the center braces the shaft is divided into three compartments, each 4 feet 4 inches by 5 feet.

The system of timbering used is what is called the horn set (Plate I). The wall plates and end pieces are framed from 10x12-inch Oregon pine. The end pieces are framed at either end with a 10-inch horn, 9 inches wide and 6 inches thick, leaving a shoulder 1 inch wide, which engages the inner side of either wall plate (Plate I, Fig. 1). The wall plates are framed with 9-inch horns at each end, 10 inches wide and 6 inches thick (Fig. 2). The center braces are of 6x12-inch timber, and are dovetailed into the wall plates at either end (Fig. 3). The wall plates have a total length of 15 feet 6 inches, and the end pieces 6 feet 8 inches. Exactly 1 foot from each end of the wall plate is a saw cut, square across the 12-inch face, for convenience in plumbing when placing the timbers in position. Near each end of the wall plates are two auger holes, 1½ inches in diameter and 6 inches apart, through which are passed hanging bolts, one passing upward to the set above, the other downward to support the set being put in place. These hangers are made of 1-inch iron, about 4 feet long. On one end is a hook, on the other a thread is cut for about 1 foot from the end.

The new wall plate is let down the shaft lengthwise by means of a chain on the bottom of the skip, which is fastened just above the middle of the timber. The timber thus hangs vertically in the shaft, and, when it has passed the timbers in place, is easily turned into a horizontal position, as the weight is nearly balanced on the chain. A hanger is then inserted in each end, with the hook upward, which engages the hook hanging downward from the corresponding end of the plate above. The other wall plate is similarly placed, and the two are then drawn to their approximate positions by means of the nuts below the plate on the hanger. The end plates are now dropped into place and the corner posts, which are 8 inches square and 5 feet long, are successively stood in place and held by drawing the wall plate and end piece up against it by means of the hanging bolts. The center braces are then put in place and the set lined by means of a plumb line over the saw cuts in the set above and the new set. The set is then blocked and wedged securely into place by blocks placed behind the wall plates opposite center braces and end pieces, and behind end pieces opposite wall plates. By this precaution only compressive strains are brought on the different members of the set. Plate II shows the horn set in place.

The hangers are left in place until two or three sets are put in below, and then removed to be used again. Skip guides of 6x6-inch Oregon pine are fastened to the end pieces and center braces by means of lag screws, with the heads sunk into the guide, so as to prevent the shoe on the skip catching on them. The shaft is lined with 2-inch plank, in 12 foot lengths, behind the wall plates and end pieces.

A cheaper form of timbering used in the inclined winze in the Stickle mine is shown in Plate III. The framing is simpler and no center braces are used. It answered very well for the purpose, but would not be satisfactory in a working shaft, especially in heavy ground.

In sinking the Cross shaft the following men were employed: Six machine men and six helpers, divided equally on three eight-hour shifts; two engineers on twelve-hour shifts; two machine men with helpers and three timber men, who worked only when the machines were running and were allowed full time each month. It was found that the timber men could work to the best advantage while the miners were drilling. All hands received $3 per day. At the end of seven months the shaft was sunk and timbered to a depth of 825 feet.

The special method used in sinking the Stickle shaft has many strong points. The only serious defect was the problem of ventilation, aggravated by the large amount of "powder gas" caused by the blasting. This defect detracted very seriously from what otherwise would have been an extremely successful method in regard to both time and economy. The shaft was down some 500 feet when the Utica Company purchased the mine. They immediately started to sink this shaft and, as the Utica was deeper than this shaft, a level was run over and a raise started. The sinking was carried on practically as already described, except that ground was encountered which gave difficulty in drilling down holes, while the up holes in the raise gave no trouble at all.

The raising was cheaper on account of the economical handling of the rock, which is brought about as follows: As soon as the raise had progressed far enough a chute door was put in at the bottom. A line of stulls was put in near one side of raise across the short way, on which was fastened, on the side toward the larger compartment of the raise, a lining of 6-inch lagging. The larger compartment was arranged for a chute, the smaller for a manway, the ladders being nailed to the lagging.

After drilling a round of holes after the same system as used for a shaft of the same size, the drills and tools were stowed in the manway. The top of the manway was covered with heavy timber, leaving a small opening for the miners to pass through. The end of the compressed air hose was adjusted so as to throw the air into the head of the raise and be safe from the blast. The fuse was fired and the last man pulled a piece of timber over the remaining opening as he descended. The broken rock then fell into the large compartment, called by the miners the "bull pen." After two or three hours the air would clear enough so that the miners could return to their work. The miners meantime had removed twenty or thirty cars of rock, so that sufficient working space remained at the head of the raise.

This method made it possible to remove the rock at the smallest possible cost, as no shoveling was necessary. After connecting with shaft above timbering was commenced, the rock being withdrawn below as the timbering advanced.

Development Work.—In exploiting the mine crosscuts were driven into the ledge every 100 feet. After encountering ledge matter drifts were run, taking out the rock from wall to wall. In this manner the full extent of the ore body was determined, as well as its average value.

These drifts and crosscuts are never timbered, unless absolutely necessary, until it is determined whether or not they are to be used in the excavation of the ore. Permanent drifts are timbered up substantially with round timber, from 16 to 18 inches in diameter. The ordinary tunnel sets are used with 7-foot legs, 6 feet apart at the bottom, leaning in at the top to support a 5-foot cap.

The excavating in the levels is done entirely with machines. From nine to twenty holes are drilled in a round, depending on the nature of the ground. The V cut is commonly used, generally with twelve holes and with the cut vertical. In this system three horizontal rows of four holes are drilled. The middle two holes of each row are inclined toward each other and come near together, or, in very hard ground unite. These two holes of each row are thus made to explode together. The outer holes of each row are inclined slightly into the wall, in order to prevent the narrowing of the drift.

The upper row always, and sometimes the middle rows, is given an upward pitch. The holes will then keep clear in most ground if drilled dry, but when water, under pressure, can be obtained, it is an advantage to keep the holes clear by this means, using a hose and a small nozzle which can be inserted beside the drill in the hole. The bottom row always, and sometimes the middle row, is given a downward pitch sufficient to make the holes hold water well. The water mixes with the drillings and is thrown out as mud by the drill, from time to time, thus keeping the hole clear. The water may be thrown into these holes with a cup or by means of a hose, as before. The water under pressure is best, as it keeps the holes washed almost perfectly free from drillings, thus greatly reducing the time required to drill the holes.

From this last statement must be excepted the case of extremely soft rocks, such as talc and micaceous schists. In these rocks the drill cuts so fast that the dust does not have time to become mixed with the water, and so packs very tight around the shank of the drill. This stops the progress of the drill, and no further headway can be made until the hole is cleaned and water again admitted to the bottom of it. As an example of an extreme case of this difficulty might be mentioned a piece of ground in which a top hole of proper pitch could be drilled to a depth of 7 feet in a half hour, while a hole of same depth with a downward pitch, drilled wet, required fully two hours to drill. In a case of this kind only the bottom holes are drilled wet.

Some ground is found to break better with the cut horizontal. This is done by drilling four horizontal rows of three holes each, with the holes of the second row from the top pitching downward, to meet the corresponding holes of the third row, which pitch upward.

In ground which is difficult to break it is found necessary to increase the number of cut holes from six to eight. In still more difficult ground the back holes also have to be increased, so that as many as twenty-four holes are found necessary. It is also found necessary, sometimes, to increase the width of the drift, in order to give the cut holes a greater cut. Whatever system is used, the holes are given as nearly as possible the same load. The most central are arranged to be shot first, followed by the other cut holes in pairs. The middle holes of the adjoining rows, on either side of the cut, come next, followed by the remaining holes in each row.

If the ground is extremely schistose, or if there is a slip or gouge seam following along one wall, nine holes may be sufficient for the first breaking to the slip or the side of the drift. If there is no gouge seam or slip, the drift may be kept straight by breaking alternately to one side and the other.

The easiest and most difficult ground to break have only a slight difference in structure. They are both schistose, and have an extremely gnarled structure. But the difficult ground has been infiltrated with silica, which has so hardened it that it has to be literally burned out with powder.

Occasionally soft and running ground is encountered, which gives some trouble. The difficulties offered by this sort of ground are overcome by an ingenious system of poling, which will be described in connection with stoping.

Stoping.—In the excavating operations an enormous amount of timber is used. This timber is all round and comes in 16-foot lengths, from 12 to 26 inches in diameter. Poles are from 6 to 12 inches in diameter, and come in 20-foot lengths, which are cut in two for use in the mine. The posts for the sets in the stopes are generally made from the timber of the largest diameter. The logs are cut in two, in the middle, for stope timbers. Posts are framed to 14 inches on two opposite corresponding sides of each end, to a distance of 3 inches from each end. The caps are framed on one side at each end, leaving 7 feet between the joggles and about 6-inch horns.

A stope is started by breasting out the ore to the full width of the deposit. Crosscuts are run into both walls, to be sure that all the ore has been removed. The opening is then timbered with 8-foot stope sets. If the ground is solid, no timbering is done until the whole mass of the rock covering the area of the stope has been removed. The posts are then set in the solid rock, with 6-inch spreaders and 12-inch round brace sprags between the posts at the bottom. A floor is then laid over the spreaders.

If the rock is loose or soft, one set is put in at a time as fast as room is made for them. In the soft ground heavy sills are laid, as shown in Plate IV, to give a solid foundation for the posts. Sills are not, as is generally supposed, an advantage in working up under an old stope. Good floors laid across the spreaders, even though they have been in place so long as to be badly decayed, are found to be more serviceable than sills. The sills are seldom in place when reached, and have to be caught up securely, or they are liable, by their own movement, to start a serious run in the waste above them. After the sill floor is opened and timbered (as shown in Plate IV, which represents a stope 36 feet wide) a raise following the foot wall is run up to the level above.

This raise is necessary for the proper ventilation of the stope, as well as the economical introduction of timber and waste into the stope, the timber and waste being thrown down the raise into the stope. The raise is located in the most convenient part of the stope and, if possible, where there is a seam of gouge on the foot wall, which greatly lessens the cost of the work by lessening the difficulty of breaking the ground. If the rock is hard and solid, machines are used and the raise is timbered with full-sized stope sets, if timbering is necessary, so that, as the stope is carried up, the timber of the stope is joined on to that of the raise. If the ground is loose, the work is all done by hand and the raise is built up solid with round timber, halved together at the ends, making the raise 4 feet square in the clear.

The second floor above the level is now started from the raise, the ore falling to the sill floors, where it is shoveled into cars. After this floor is excavated a set for the full length of the stope is lagged on tops and sides with half-round slabs, made by cutting 12-inch logs, 8 feet long, in two lengthwise. This set is then kept open for the gangway, along the line of which the chutes and manways, leading up into the stope, are started. All the remaining space to the top of the sill floor set is now filled with waste. This waste is obtained from three sources within the mine: first, from the vein rock, by hand sorting in the mine; second, from crosscuts run in the wall rock from the different floors of the stope, for the double purpose of prospecting the ground and supplying the waste; and, third, from the dead work in different parts of the mine, which is brought through the raise from the level above.

From this time the chutes and manways are carried up by means of cribbing (shown in Plate V) to within one set of the back of the stope. When the ground is heavy similar cribbing is used to help support the ground. In wide and heavy stopes a row of such cribbing is generally put in extending the full length of the middle the stope, and is stowed with waste as rapidly as possible.

The different floors are started successively from the raise. As soon as a floor has been advanced far enough from the raise to prevent the mixing of the quartz and waste, filling is commenced by throwing waste down the raise. When the floor is completed, the lower floor—remote from the raise—is stowed with waste from the crosscuts. In order to supply sufficient material for this purpose, the crosscuts, which start out with small dimensions, are widened out into large chambers. In this way no opening in the stope is kept open to a greater vertical height than 16 feet.

When a level is being worked, a large mass of rock is left in place in the ledge, opposite the shaft, until the last thing before the level is abandoned. This precaution protects the shaft, which is already weakened by the cutting of the station.

When the vein matter is badly crushed and broken up, an ingenious system of lagging, called poling, is used. Poles are run out over a cap or sprag, depending on the direction of the work, whether with or across the vein, which supports the ground until the timber is in place (Plate VI). In some cases the poles are a necessity to prevent the ground from running, in others they are put in more for a protection to the miners working beneath them. In the latter case the trouble is caused by detached pieces which continually slack away, due to the presence of water and slight settling.

In running ground, the poling has to be performed with great care. The ends of the poles are sharpened and worked in over the cap all together by working the rock loose around the points with a bar and driving the poles ahead with a hammer. As the poles are advanced over the cap, the broken rock is raked back from the points of the poles and left standing on the natural slope to prevent its running. Side poles are also put in, if necessary, beginning next the roof and working them in as the rock is removed, and the face breast boarded to prevent the loose rock running around the points of the poles. Proceeding in this way, room is made for one set at a time.

The details of this work are shown in two sets of drawings (Plates VI and VII). When the set of timbers is put in beneath the poles, a bridge-piece is put in supporting them, so that they can not come down on the cap before the next poles are started. After the poles for the next set are run out over the cap, wedges are inserted between the poles and the bridge-piece and driven until the weight is taken off the short blocks supporting the bridge-piece. The blocks are then replaced by poles. Where the ground will permit, pieces of 2-inch plank are inserted crosswise behind the poles, this adding greatly to the efficiency of the poles.

The system seems to have all the merits of the square set system used on the Comstock, at the same time being cheaper and more flexible. It is cheaper because the cheaper round timber is used and the framing is much more simple. Much of the framing is done in the mine while waiting for the partially framed timber to come from the surface, which always causes more or less delay when several crews are to be supplied through the same shaft.

It will be remembered that the caps were only framed on one side before being sent into the mine. There are several reasons for this. As the logs are not always exactly 16 feet long nor cut square on the end, it is found necessary to leave a space between the ends of the caps of about 2 inches to allow for this irregularity. This is brought about by framing the ends of the posts to 14 inches and the caps so that they measure 7 feet between joggles, which, if the log was exactly 16 feet, wou'd leave 6-inch horns. If the side pressure was great enough, this space might be reduced the full 2 inches, thus reducing the hitch formed by the two adjacent caps (if they had been framed) to 12 inches instead of 14 inches. Again, the ends of the posts not being exactly square, they would raise one of the caps higher than the other. The caps, being made from the logs, have the natural taper of the tree and so the ends are not of equal dimensions, the difference in diameter being often as much as 6 inches. As the posts in the stope do not settle equally, use is made of this irregularity to keep the line of the caps horizontal. The end of the cap of the largest diameter is placed on the lowest post. When the next set above is put in, the joggle over the higher post is cut deeper than the one over the lower post of the under set. It is, therefore, evident that the size, to which the end of the cap is framed, depends on the circumstances in the stope, and therefore can only be done to advantage in the stope.

The general dip of the ore body is nearly vertical, but in places where it bulges the wall rock sometimes has a pitch of 45°. The timbering is adapted to this case by first leaving a horn on the cap extending over the post nearest the foot wall. When this horn must be so long as to greatly increase the weight of the cap, a short butt cap is used instead. This butt cap is framed the same as an ordinary cap on one end; on the other it is beveled to fit the wall rock. The length of the butt cap is increased as the wall recedes, until the distance between the post and the wall rock becomes great enough for a full set. A hitch is then cut in the foot wall for another post. While the caps on the footwall side have been lengthened, those on the hanging wall side have been correspondingly shortened. Full sets are also dropped on the hanging wall side as they are taken up on the footwall side. By these means the system may be applied to a ledge which has a comparatively small angle of dip, as well as considerable width.

The method, as a whole, has as much rigidity as the extreme width and the constant settling of the ledge will permit, combined with a sufficiently low cost, to allow of its being applied in the excavation of large bodies of comparatively low-grade ores.

Hoisting and Tramming.—Each shaft is supplied with a double acting water-power hoist. Two Dodd water wheels, 9 feet in diameter, are placed on the pinion shaft in reversed position, so that power may be applied to run the hoist in either direction. The water is applied through three nozzles, so that the power can be readily proportioned to the load. The nozzles are served by a 10-inch wrought-iron pipe, which delivers the water under a head of 420 feet, giving a standing pressure of 180 pounds, which falls to 130 when the hoist is in operation.

Wire ropes, 1 inch in diameter, are used on 5-foot drums. The ropes, which last from three to eight months, are inspected daily, and at the least sign of failure are condemned and removed. The rope passes from the drum over a 7-foot sheave wheel at the top of a gallows frame, 80 feet high.

Two skips are used, each covered by a sheet-iron bonnet and supplied with an automatic safety clutch. When the skip descends faster than a certain rate of speed, which can be regulated, a parachute under the bonnet raises and releases the clutches which grip the guides, and so arrest the descent of the skip.

The rock skip is constructed of sheet iron, with a capacity of two tons. It is loaded from the chutes in the shaft at the different levels. At the surface it is dumped automatically by means of a curved switch, which turns the sheet-iron box containing the ore out of the line of the guides over a chute leading to the rock breaker. The frame remains on the guides, and, as it ascends, it turns the box bottom up on the axis at the bottom of the frame. The skip frame is then lowered, which turns the box back again into position, where it is locked automatically.

The water skip is also made of sheet iron, 3 feet square and 8 feet long, holding about 500 gallons of water. The tank is filled through a butterfly valve in the bottom of the tank. When it reaches the surface, one wing of the valve is opened automatically by a system of levers, which are actuated by a bumper on the gallows frame, and the water is discharged into a tank at the side of the shaft.

On the levels ton cars are used to transport the ore from the stopes to the shaft. The cars are constructed of sheet iron and run on light T iron rails laid on 3-inch ties. The tracks are laid along the line of the chutes leading up into the stopes. The cars are loaded from these chutes and run out to the shaft, where they are dumped into a chute, which has a capacity of fifty or sixty tons. This chute has a door opening into the shaft through which the skip is loaded.

Pumps.—The drainage of the mine is further provided for by a pumping plant consisting of two 7-inch bucket and one

8-inch plunger pumps. This plant is run by a 6-foot Dodd wheel, geared to a long reciprocating rod in the shaft, which supplies the power to the pumps at the several stations in the shaft. The capacity of this plant is about seventy-five gallons per minute, from a depth of 900 feet. Most of the water is handled, however, by the water skip.

To supply a 60-stamp mill with about 300 tons per day requires two shifts of forty-five men each, consisting of miners, helpers and shovelers, working on ten-hour shifts. The two shifts alternate on night and day shifts, changing every two weeks. Each shift consists approximately of twelve miners, each with a helper, about fifteen shovelers, and six men running the cars on the level. This division of the working force is not constant, as it depends on the conditions in the mine, which are constantly changing. When the broken rock is plenty and easy to get at some of the miners may be put to shoveling pay rock, and some of the shovelers put to work on the stowing. On the other hand, if rock is short some of the shovelers may be added to the force of miners. The miners are paid $3 per day; the helpers, shovelers and car men are paid $2 50 per day. In addition to these two shifts, a crew of ten timber men is also necessary, receiving $3 per day.

I would have been glad to add data as to the cost of the excavation of the ore, but as I was not in possession of any official data I thought it would not be best to give an estimate without the company's permission. For the opportunity to collect the information which this paper contains I am indebted to the kindness of Mr. William Miller, under whom I have worked for about two years, as well as during the vacation periods of my junior and senior years at the University of California. I am also indebted to Mr. C. D. Lane and Mr. Alvinza Hayward, through whose courtesy not only I, but several others in the College of Mines, have been able to gain considerable valuable experience in the mines at Angels.



FIG. 1.—COMPLETED ROCK CUT, CHICAGO DRAINAGE CANAL.

An Historical Automobile.

An illustration appeared in the *Mechanics' Magazine* for January, 1834, and is thus described in the accompanying text: "The carriage represented in the drawing is built to carry fifty passengers. The wheels are about 6 inches broad in the tires and 8 feet in diameter. The crankshaft worked by the cylinders is connected by an endless chain with the axles of the hind wheels of the carriage, and each wheel has a separate axle. The spokes of the wheels are so constructed as to operate like springs to the whole machine—that is, to give and take, according to the inequalities of the road. The boiler consists of a series of double tubes, one within the other, placed in a vertical position around a circular fireplace and communicating with it; the heated air passes through these tubes, which are everywhere surrounded with water. The tubes are in the form of siphons, to counteract the effect of unequal expansion. The draught is produced by a fanner worked by the engine, and the furnace is made to consume its own smoke. Birmingham, Oct. 3rd, 1833."

ON the electric railway now building between Kansas City, Mo., and Leavenworth, Kan., are being used seventy-six miles of 350,000 circular mils aluminum cable.

A Great Engineering Project.

In sixty days Chicago expects to turn the water of Lake Michigan into the drainage canal which has been in progress of construction since September, 1892. This canal, which is thirty-five miles long, was originally intended to be the means of purifying the water supply of Chicago. This it will do, but as the preliminary work went on larger scope developed, and the idea now is to also employ this great artificial waterway for the purposes of navigation between Chicago and Lake Michigan, via the Des Plaines and Illinois rivers, to the Mississippi and thus to the sea.

The accompanying illustrations give some idea of the work. It is one of the great engineering enterprises of the century, and will doubtless be an active success by the close of the year. The excavation proper involved the removal of 26,000,000 cubic yards glacial drift and 14,000,000 cubic yards of solid rock. Beside this was surface excavation; rivers and their overflow had to be taken care of, and in some instances the tools and appliances had to be invented or specially built. The cost of the canal is over $30,000,000. It will be 22 feet in depth. The span shown in Fig. 1 is 700 feet; the head tower on the right is 93 feet high: that on the left 73 feet. How the side walls are built is shown in Fig. 2. These retaining walls are 30 inches thick and average 18 feet in height. The great progressive city will, doubtless, have due celebration of the opening next December of the big waterway that gives it ocean access.



FIG. 2.—BUILDING RETAINING WALLS, CHICAGO DRAINAGE CANAL.

Deep Mining in Nevada Co., Cal.

TO THE EDITOR:—Being personally interested in the gold mining industry of Nevada Co., Cal., and its future, I address this letter to you in reference to what impressed me as most worthy of consideration in the speeches made at the banquet to the American Institute of Mining Engineers in Grass Valley, Cal., which may perhaps interest some of your readers. President Douglas suggested that the mines of Nevada county, in his judgment, needed the services of educated mining engineers; that modern mining elsewhere had proven that there should be no hesitation in sinking to deeper levels there; that in sinking, above all things, to crosscut, as parallel veins he had seen in the Empire mine had proven its advisability.

Mr. Ferry, a Canadian mining engineer, described a mine in Washington, where the veins greatly resemble those of Grass Valley, which mine barely held its own whilst sinking and drifting on a vein, from which vein later a 2-foot crosscut uncovered a parallel vein of fabulous richness, on which drifts are now being run alongside of the former. In Grass Valley heretofore the educated mining engineer has not been consulted as freely as in other parts of the world. This is partly due to the fact that most local mine owners have looked to the practical miner instead, who, as stated in an article on the first page of your issue of Sept. 30th, "gives most of his thought and attention to the conditions he finds from day to day in his shaft or in the face of his drift, giving little thought to the broader questions involving the origin of his vein and its relation to its surroundings."

Whilst in Grass Valley, recently, I was much interested in small machine drills (which can be readily handled by one man) for stoping in small veins, and would suggest their consideration to mine owners. Mr. Foote of the North Star mine, following in the footsteps of Mr. Stow of the Gold Bank mine of Butte county, Cal., is obtaining economical results with them.

J. R. K. NUTTALL.

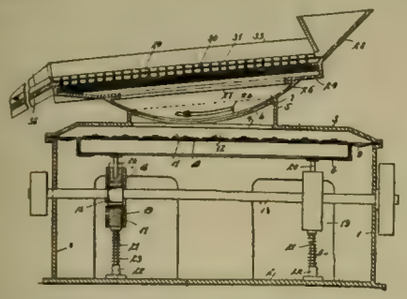
IT is not always possible in mine examinations to measure "ore in sight" as though it were a bin, particularly in an old mine, where the ore is irregular.

Latest Mining and Metallurgical Patents.

Patents Issued Sept. 26, 1899.

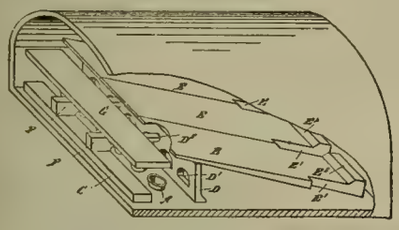
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ORE SEPARATOR.—No 633,456; W. Hooper, Ticonderoga, N. Y.



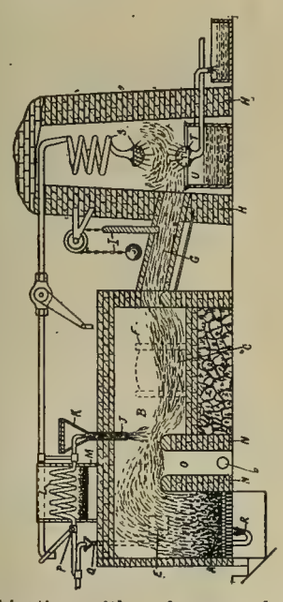
A separator comprising a frame or casing, a bed of flexible material secured in frame or casing and inclined from its longitudinal center to each side of the casing, strips of metal or the like on the upper side of the bed, the strips being extended from the center of the bed laterally at an acute angle, plates extending longitudinally of the bed near the upper part of the inclined surface thereof and at each side of its longitudinal center, forming a central conduit; separator strips on the first-mentioned strips and arranged at a reverse angle thereto, the strips extending from the outer side of each longitudinally extending plate to the frame or casing, and a dam extending across the frame or casing at its outlet end, the dam being connected to the lower series of the first-named strips and of equal height therewith, means for adjusting the longitudinal incline of the separator, and means for agitating the flexible bed.

CUPEL COOLER FOR ASSAY FURNACES.—No. 633,462; W. D. Longwood, Deadwood, S. D.



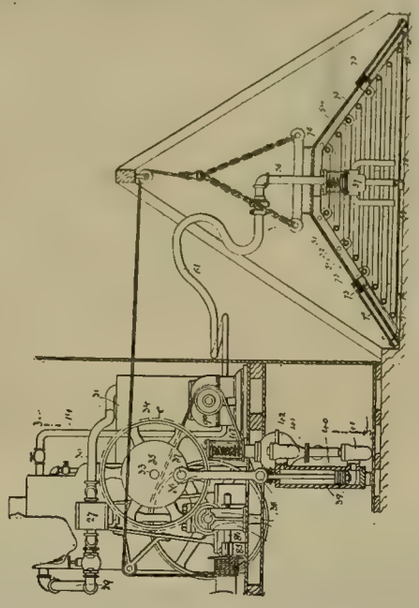
A cupel cooler for assay furnaces, comprising a flat tile bar, a tile having two sets of openings therein and arranged to be set on edge to form a vertical partition, a shield or cover formed of a plurality of tiles adapted to rest at one end on the partition and having their edges at the other end cut out to form openings and each provided on one side with a projection at end, bars adapted to rest upon the first-named bar and to engage one set of the openings in the partition, and a tile plate adapted to rest upon the bars, the whole being adapted to be arranged in a muffle.

APPARATUS FOR PURIFYING AND RECOVERING METALS, ETC.—No. 633,568; W. J. Clapp, Birmingham, England.



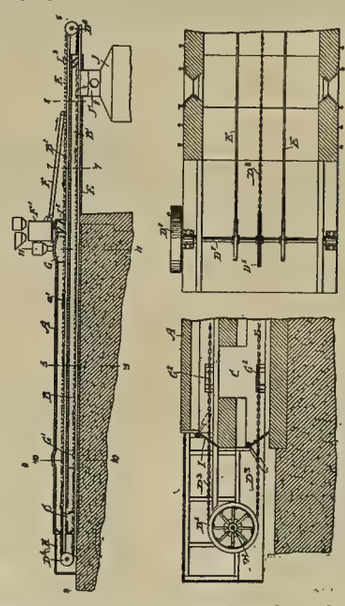
The combination, with a furnace, of a vessel for holding a purifying agent such as powdered lime, a steam pipe for blowing the agent into the heating chamber of the furnace, means for superheating the steam in the pipe, a stack receiving the gases from the heating chamber, a water bosh in the base of the stack, a spray pipe for water projecting upwardly into the stack, and a spray pipe for steam projecting downwardly in the stack, the gases from the furnace being admitted to the stack between the two spray pipes.

THAWING APPARATUS.—No. 633,627; C. Taylor and C. E. Robertson, Montreal, Canada.



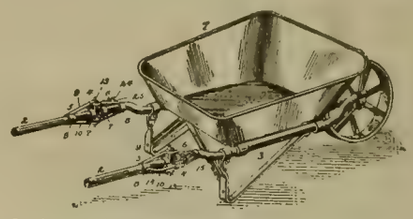
A thawing apparatus comprising a length of pipe coiled in conical form, a reflecting conical shield adapted to extend over conical coil, an air heater, an air supply to heater, a conductor for the heated air connecting air heater to coil and an outlet from coil adapted to spray the heated air upon the substance to be thawed, conductor consisting of a pair of tubes located one within the other, the outer tube being constructed with a reflecting interior surface and covered with insulating material, the inner tube being of sufficiently smaller diameter than the outer tube to provide a space between tubes, and a series of spiders located at intervals along inner tube and adapted to maintain the space between tubes. A combined steam generator and air heater; an engine; a communicating pipe connecting steam generator to engine; an air compressor, an operative connection between engine and compressor, a communicating pipe connecting air compressor to air heater; an adjustable yielding check valve adapted to control the passage through pipe; a heat distributing device; a flexible conductor connecting the air heater to distributing device; distributing device comprising a coil of pipe having its discharge end controlled by an adjustable yielding check valve.

CALCINING FURNACE.—No. 633,777; C. M. Allen, Basin, Mont.



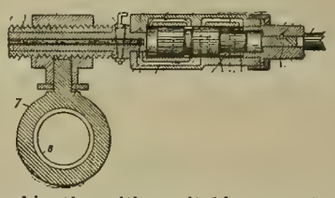
A calcining furnace provided with a plurality of hearths located one above the other, the uppermost hearth being shorter than the hearth beneath it, leaving one end of the roof of the lower hearth exposed to form a drying floor leading to the entrance end of the upper hearth, the other end of the upper hearth being connected with the unexposed end of the lower hearth which is provided with a discharge at or near the end of its exposed portion, the material to be treated traveling over drying floor and through the upper hearth in one direction, to then travel in the reverse direction in the lower hearth, floor being capable of freely taking up the high heat emanating from the outwardly moving material in the exposed portion of the lower hearth, floor being also capable of imparting such heat to the material passing into the upper hearth, feed devices for discharging the material to be calcined on the outer end of the drying floor, whereby the material is heated in the open air, to be dried for the purpose described, plowing or agitating devices, means for moving devices through the hearth from one to the other, a receptacle at the discharge end of the lower hearth, to receive the calcined material and the gases from the lower hearth, inlets for the products of combustion to the hearths at or near the entrance ends thereof and an outlet for the products of combustion at the discharge end of the lowermost hearth.

ATTACHMENT FOR WHEELBARROWS.—No. 633,648; C. W. Kauffman, Deadwood, S. D.



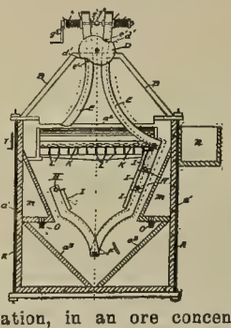
A device of the class described comprising a hinge designed to connect a folding handle with the body portion of a wheelbarrow and a locking device composed of longitudinal bars provided at their adjacent ends with lugs, one of the bars having a lip extending beneath the other bar, a lever fulcrumed on the bar having the lip and having its engaging end opposite the same and a spring holding the lever in engagement with the lugs, the spring being substantially V-shaped and composed of two sides detachably interlocked with the lever and with the adjacent bar.

AIR DRILL.—No. 633,661; A. P. Schmucker, Denver, Colo.



The combination with a suitable support, of a hollow feed screw mounted thereon, an air tube passing through the feed screw, a cylinder attached to its forward extremity and provided with ducts communicating with the air hole and arranged to deliver the air to the front and rear of the piston, a piston located in the cylinder chamber and adapted to be reciprocated by the action of the air, the piston being fashioned to allow the air to cross the chamber from one duct to another, a drill supported to be actuated by the reciprocating piston, and suitable means for rotating the air tube, the cylinder and their attachments, comprising a rotary motor attached to the screw shaft, a gear wheel fast on the air tube, a pinion operated by the motor and meshing with the gear, and a suitable means for conducting the air to the motor, comprising a tube or conduit communicating with the hollow air shaft at one extremity and with the motor chamber at the opposite extremity.

ORE CONCENTRATOR.—No. 633,686; G. T. Cooley, Joplin, Mo.



The combination, in an ore concentrator, of a water tank; a gate, or sieve, mounted in the upper portion thereof; a pair of wing arms carrying swinging valves or gates and adapted to be reciprocated under the sieve or grate; springs tending to press the pair of wing arms together; a cam adapted to contact with the rollers carried by the wing arms, forcing them slowly apart and permitting them to be suddenly thrown together; water supply compartments, containing water under pressure and spring-pressed valves in the supply compartments communicating with the space back of the wing arms.

Cyaniding at Gilt Edge, Montana.

Written for the MINING AND SCIENTIFIC PRESS by MATT. W. ALDERSON.

The western end of Montana is mountainous, while the eastern end is a rolling plain. From the main mountain range on the west a few ranges branch out called the Tobacco Root, Big Belt and Little Belt ranges, respectively. East of these are several small, comparatively isolated, ranges, known as The Crazy, the Snowy, the Little Rocky, the Highwood and the Judith. In the latter, a range about eighteen miles in length by five or six miles in width, and almost in the geographical center of the State, are gold mines which have attained considerable prominence, notably the Spotted Horse, the Maginnis and the Gilt Edge. The country to the east, north and south is practically unbroken for hundreds of miles. To the southwest is the Snowy and to the northwest the Highwood mountains, while to the west is the broad Judith basin, a rich agricultural and stock raising basin fifty miles in diameter.

The Judith mountains rise above the level of the surrounding country some 2500 feet, and the highest summit is 6880 feet above sea level. As one approaches these mountains he is impressed with the beautiful crags of grey lime of the Carboniferous age, which is the prevailing country rock. At their feet he passes over the upturned edges of the coal-bearing sandstones, and the camp presents the beautiful spectacle, at the New Year group, of a gold mine worked on top of a ridge, with a mill at the foot, the power for which is furnished by fuel mined practically at the door of the furnace room.

The district is greatly handicapped by its remoteness from railroads—over 100 miles in any direction—though five stage lines furnish connection with the outside world. The mines of the Maginnis group are idle. Some work is being done on the Spotted Horse mine, which in the past has produced over $500,000, but otherwise none of the properties worked as free milling years ago are in operation. The Spotted Horse, discovered in 1880, was the first mine opened in the district, and it and the properties of the Maginnis group were worked on an extensive scale for years. No efforts were made to save the tailings from the Spotted Horse and they flowed down the gulch. To-day there are four cyanide plants treating these tailings and making money by so doing, though the method of handling them could be very materially improved upon. At two of the plants an extraction of $5 to $6 has been obtained, and at one of these the tailings are now being treated over again and a further saving of about $3.50 a ton is secured. The material is finely ground, but not sufciently slimy to prevent percolation, though the slimes sometimes retain a considerable proportion of the values; otherwise there seems to be no difficulty in treating the tailings. Most of the plants are owned and operated by persons having little technical knowledge of the cyanide process, and checks on the work by assaying are considered unnecessary.

The first attempt to work the ores at Gilt Edge was in 1892, with a Huntington mill, but the venture was a failure because of lack of free gold in the material. A Mr. Sherard, who had obtained a little knowledge of the then new cyanide process while employed at the Revenue mill, became interested with the then owners, Messrs. Collins & Armington, and a cyanide plant was put in in 1893.

The crushing part of this old mill was a rock breaker and a Chilian mill, where the wheels revolved on stationary axles, the bed traveling under the wheels, the crushed ore being scraped back and forth over a slotted cast iron portion of the bed about 1 foot wide outside of the solid portion, over which the large crushing wheels revolved. This crusher is said to have handled satisfactorily thousands of tons of ore a year, and would easily crush 100 tons a day to such size as was deemed necessary for successful leaching.

Some difficulty in precipitation was found when the mill first started, but this was finally overcome and the plant has been in operation almost continuously since, though it has had a very checkered career, principally because of bad management. Some years ago the property fell into the hands of a New York speculator, who soon wrecked the entire proposition. It then fell into a receiver's hands. This gentleman—Mr. Woodbury—had a business head on him and he operated the property, making a financial success of his trust. E. W. King, who had put in the water works and the first electric light plant at Great Falls, with L. G. Phelps, a banker of that city, purchased the property and ran it for some time. In August, 1898, they parted with two-thirds interest to the Great Northern Mining & Development Co., Mr. King being retained as manager. A new mill was constructed at the mine and the accompanying illustration gives a very clear idea of it and the nature of the surrounding country. It is the largest, finest mill in the State treating ores by cyanide direct. In the illustration the machinery and engine rooms are first on the left, the crushing room and ore bins in the center, and the tank room on the right, with precipitating room in the lean-to in front. The machinery and engine room is 56x84 feet, the tank floor 32x180 feet, solution room 16x30 feet, and the room occupied by the extractors and for cutting down the product by sulphuric acid 32x44 feet.

The ore enters the mill in cars direct from the mine, the main ore bin, back of the mill, as shown, being 19x33 feet, 26 feet high. From here it falls onto an endless belt which conveys it to a No. 5 Gates crusher. It passes thence to a revolving dryer of the usual type. The fuel used is coal, obtained from a mine three miles distant, but the company expects soon to open a mine of its own within 1½ miles. The coal costs $5.00 a ton and 850 pounds are required to dry 100 tons. The cost for drying is 2½ cents per ton and the ore leaves the dryer carrying 4% moisture. The dry ore is then elevated to the top of the mill, where it falls on a grizzly. Such ore as passes this grizzly goes direct into the ground ore bin, which has a capacity of 100 tons. The ore which does not pass the grizzly now goes to two Gates rolls, each 15x30 inches, the coarse to one and the fine to the other. The crushed ore then passes to revolving trommels, from whence such as passes ¼-inch round holes is elevated to the crushed ore bin and the rejection goes again to the rolls.



CYANIDE PLANT AT GILT EDGE, MONTANA.

The leaching room contains six steel vats, each 28 feet in diameter by 3 feet high. They are charged from the crushed ore bin by an iron car driven by a wire cable and thirty minutes is all the time required to load a vat with the usual charge of seventy tons. Seventy-two hours are given to each vat, from the time of one filling to the next. Of this time twelve hours is required for emptying. The leached ore is discharged from the vats, through a hole in the center of the bottoms, to cars which are conveyed to the dump by an endless rope. On account of the presence of considerable kaolin and talc in the ore and the scarcity of water sluicing is not deemed advisable, but a mechanical contrivance for moving the tailings by machinery is being experimented with in an endeavor to save shoveling and expedite the emptying of the vats.

The first solution used contains 4% cyanide (eight lbs. to the ton). Of this, about one-quarter of a ton to each ton of ore is used and this is allowed to remain in contact with the ore for eight hours. What is called the leaching solution, carrying .24% to .25% cyanide (five pounds to the ton) is then turned on through a 1-inch hose and this percolates slowly through the material for fifty-two hours. The ore is then washed twice, about six and a half tons of fluid being used for each wash on a seventy-ton charge. The first wash is fluid that has been used as second wash on a previous vat and after being used twice goes into the leaching solution. The final wash is always clear water and the vacuum pump drains the charge after this wash. The ore enters the leaching vats carrying 4% moisture and is discharged carrying 13%, showing a waste of nine tons of fluid to each 100.

There are two solution tanks, each 12 feet in diamater by 4 feet in height, one sump tank 14x4 feet, one water tank 14x12 feet. The precipitation room contains six zinc boxes. The product is refined by the use of sulphuric acid. The ore contains very little silver and is remarkably free from base substances generally. The refined bullion is 900 to 950 fine and the bars of almost pure gold, containing in the neighborhood of sixty ounces each, are as handsome in appearance as one ever sees.

The company owns seventeen different mining locations but the ore treated at present is derived from four only. Of these the Chicadee and Lookout are the principal producers. The Chicadee is the mine near the mill and the ore occurs here in large pockets, sometimes 100 feet in width. It is good ground to hold up; some square sets are used, at other times heavy stulls and in some places cribbing and filling are resorted to. The lowest depth attained is 290 feet.

The great body of the ore treated is porphyry and altered lime. There is very little quartz and the ore does not contain on an average over 20% silica. The porphyritic ore assays from $3 to $10 and the lime as high as $120 per ton. Everything assaying as high as $3 goes to the mill. The ore treated averages about $7 and the tailings assay from 40 cents to $1.40, the average being less than $1.00. Work on the new mill started in September, 1898 and finished in February, 1899. Its cost is given at $75.000. Its capacity is 140 tons a day. During July, 1899, it handled 2800 tons at a cost per ton for milling of $1.32. The mining during this period cost $1.41, making the total cost for mining and milling $2 73. The cyanide consumed for this month was 2580 pounds, about eight-tenths of a pound per ton. The motive power of the mill is a 125 H. P. Corliss engine, for which two 65 H. P. boilers furnish steam. A 3-drill Rand air compressor is used in the mine, and both mine and mill are lighted by electricity.

RECOGNIZING one's voice through the telephone makes it doubly hard to realize that the voice one hears over the telephone is not the voice of the person who is talking. It seems almost exactly like the real tones, drawn out thin and small and carried from a long distance by some mechanical means—but it isn't. When one speaks into the instrument, a little diaphragm, like a drumhead, begins to vibrate, and each vibration sends a wave of electricity over the wire. These waves set up a mimic vibration in another diaphragm at the opposite end, which jars the air and produces an imitation of the original voice. This is not a scientific explanation, but it is the fact.

ABOUT 650 tons of lime and 615 tons of coal are theoretically required to make 1000 tons of carbide. In practice, 1025 tons of lime and 710 tons of coal are necessary to make that quantity.

ELECTRIC HEADLIGHTS are now in use on San Francisco street railway cars, and electric foghorns are projected on the California coast.

THE Illinois Central R. R. Co. has equipped and placed in operation an inspection car propelled by a gasoline motor.

Mining Summary.

ARIZONA.

Yavapai county has 299 patented mines—the largest number of any county in the Territory. Cochise county has 236, Pima 152 and Mohave 99. Yavapai's total assessment of mines and improvements is $953,090, that of Cochise $564,007. Of the $953,090—the assessed valuation of the Yavapai mines—the United Verde mines at Jerome are assessed, including Mr. Clark's private holdings, for $500,000—over half of the total assessed valuation of the mines in the county. Following is a table showing the assessment of patented mines:

County.	No.	Patented Mines.	Improvements.	Total.
Cochise.....	236	$ 17,050	$ 72,874	$ 89,924
Graham.....	74	214,990	349,017	564,007
Gila	53	152,900	.....	152,900
Maricopa....	14	7,300	.....	7,300
Mohave.....	99	38,674	87,205	125,879
Pinal.....	37	39,500	75,840	115,340
Pima.....	152	59,100	13,000	72,100
Santa Cruz .	40	35,000	1,935	35,935
Yavapai....	299	329,812	623,278	953,090
Yuma.....	18	2,550	70,170	72,730
Totals.....	1,022	$896,876	$1,393,319	$2,190,095

J. B. Seager has filed deeds for record transferring the Helvetia group of copper mines, for $5,000,000, to the Helvetia M. Co. These mines were purchased nine months ago for $50,000. The mines are thirteen miles east of the Azurite mines.

GRAHAM COUNTY.

Graham *Guardian*: Fifteen and one-fourth tons of copper ore from the Laurel mine, in the Lone Star mining district, netted the lessees $1183.24. It was bought by the Arizona Copper Smelting Co. This ore was taken out in six weeks by two men. In addition to taking the ore out, they completed a tunnel during the time, which taps the vein at considerable depth.——Three new whims have been taken to the San Juan group, belonging to Qualey Bros. The Arizona Copper Co. have added forty miners to the force on the San Juan group ——The Arizona & Boston Copper Co., owners of the Lone Star of Texas group, lately bought from Lindsey & Anderson, have ordered the machinery to commence development. The first work will be the sinking of a 300-foot shaft on the Lone Star Extension and the timbering of the present 137-foot shaft.

Phœnix *Republican*: The Trumbull Copper M. Co. are working twenty men on properties recently bonded from Mr. Albritton and others on the San Carlos strip. A shaft is being sunk on the vein of the Richard Stonewall mine, down 125 feet and shows fine ore.——J. Bull and associates are to make another shipment of ore from the Copper Queen mine, on the strip.

PIMA COUNTY.

G. H. Sisson has sold to the Oxide Copper Co. of New Jersey thirty-five copper claims in the Silver Bell district for $5,000,000. These mines are in the same belt as the Rosemont, Helvetia, Azurite and Neilson Smelting Co.'s mines. It is reported that the purchase is in the interest of the Standard Oil Co.

Twenty stamps are being added to the Mammoth mill.

YAVAPAI COUNTY.

It is reported that the News mine, near Jerome, has opened a vein 14 feet wide, 5 feet of which is solid smelting ore, at a depth of 150 feet.

It is locally reported that W. A. Clark has refused an offer of $100,000,000 for the United Verde property at Jerome.

YUMA COUNTY.

The King of Arizona gold mine has shipped its first bar of bullion and is running steadily.

CALIFORNIA.

Alameda.

W. W. Mendenhall of Livermore has an option on the Hardin tract, near Pleasanton, with the right to bore, excavate, mine and develop petroleum and other hydrocarbons. The grantor is to be paid as a royalty one-tenth of the petroleum products.

Amador.

At the Oneida mine excavating for a 60-stamp mill is in progress.

The Mutual, a new property north of the Lincoln, is being developed by S. R. Porter.

Jackson *Ledger*: The Zenith M. & D. Co. has been organized at Stockton; capital stock, $250,000; J. A. Drains Jr., Oakland; W. B. Mathews, French Camp; W. L. Morrow, Plymouth; Nathan Nevin and W. C. Blodgett of Stockton. The company will operate near Plymouth.

Sutter Creek *Record*: The strike made in the Keystone mine at Amador City last week is holding out.——Arrangements are being made to start sinking a three-compartment shaft at the Fremont claim which adjoins the Gover and is included in the group owned by that company.——Supt. C. R. Downs has men at work on the Bunker Hill fixing roads and getting in readiness to begin sinking.

Butte.

At the Golden Trout mine, above Lumpkin mill, thirty men are employed. The company is building a quartz and a saw mill. At present both mines will be run by steam power. The company owns a good water power and it is probable that later they will be run by water power.

The Cheibecke mine, twelve miles from Oroville, near the North Fork of the Feather river, is being negotiated in London.

Oroville *Mercury*: The Gold Bank mine at Forbestown is equipped with a 40-stamp mill, canvas and chlorination plants. The mine is worked through an inclined shaft, the collar of which is several hundred feet below the upper levels of the mine. Two years ago a tunnel was driven into the mountain from a point 795 feet vertically below the collar of the shaft. At 1200 feet from the mouth of the tunnel a mineralized formation was struck, 60 feet in width. The tunnel was continued until it was 1861 feet in length, when an upraise was started under the formation mentioned. This upraise tapped the main shaft in a distance of 1118 feet. It has been enlarged to the same size as the shaft. All drifts are in the ledge nearly their entire length. The ledge varies in width from a few feet to more than 20 feet. There are places in the old works where it measured 28 feet. The ore is heavily sulphuretted. Machine drills are used in the drifts, and baby drills, operated by one man, in the stopes. H. P. Stow, one of the principal owners, is Supt.

Oroville *Register*: The Spring Valley hydraulic mine at Cherokee sent large quantities of sand and gravel down years ago to the vicinity of Pentz. This body of tailings, three miles long and a quarter to a half mile wide, is now being worked. Ballard & Hall of San Francisco and B. G. McLain of Magalia have put in a plant for working this debris. An elevator put in by the Risdon Iron Works will handle from 2000 to 2800 cubic yards in twenty-four hours. Fourteen men will be employed. B. G. McLain will superintend the mine. Two thousand two hundred and fifty feet of 16-inch pipe has been put in. There will be two flumes used and water will be obtained from the Cherokee ditch. The black sand will be saved and sent to the Selby Smelting Works. It is said this black sand will average from $340 to $450 a ton.

Calaveras.

The Garner mine, located on the Mokelumne river, near Big Bar bridge, which has been operated by S. H. Lucas for several years, has developed a long shoot of ore of uniform grade. The mine has recently been sold to Messrs. Posey of Colorado, Holmes of Salt Lake, Corrum of Massachusetts and E. M. Houghton, who took possession of the property on the 2nd inst. A corporation has been organized, which will be known as the Calaveras G. M. Co. The mine will be operated with machine drills. A new hoist will be put in to be run by compressed air. The ditch which supplies power to the mill, located on the opposite side of the river in Amador county, is being enlarged and a double penstock built, to run two turbine wheels, one of 25 H. P. and the other of 60 H. P. A new and larger compressor will also be added and a larger number of drills put in the mine. A pipe line connects the mill and mine, crossing the river on a suspension bridge made from old mine cables. This mine has a vein 2 to 6 feet wide, and is so situated that ore can be mined and milled at a cost of about $1 per ton. This is made possible by the fact that the power for running all machinery at mine and mill is direct from the free water power of the Mokelumne river, under low head, 12 to 14 feet. The ore is transported to the mill by gravity a portion of the distance, thence by mules to the foot of an incline, up which it is drawn into the mill by cable, on a winding drum on the breaker floor.

The Ames Estate of Boston, Mass., which recently bought the Empire copper mine at Copperopolis, has now bought the western extension of the Union mine and the 300-acre ranch of J. M. Lewis of that place for $6500.

The mines and mills of the Utica-Stickle Co., at Angels, are closed temporarily owing to shortage of water supply. During this time the electric plant will be installed, which when completed will furnish power for mines and mills.

It is reported that the Esperanza mine, two and a half miles from Mokelumne Hill, on Indian creek, is to resume operations.

The mines of West Point district nearly all occur in grano-diorite, the only notable exception being some veins one and one-half miles west of West Point where they are found in dykes of dark green diorite. The ores of this district are usually heavily sulphuretted, carrying principally pyrite, pyrrhotite, chalcopyrite and a little blende and galena. The values are principally in gold and in many of the veins runs over $50 per ton. The ores occur in shoots as elsewhere. In some portions of the district small veins are numerous, but those carrying high values have been worked to shallow depth by miners whose only capital was their muscle, and, as a result, there are hundreds of small dumps scattered about. This feature is particularly noticable about the settlement known as Bummerville, a short distance east of West Point. The ores having been worked out to water or to sulphides the mines are abandoned or worked in a small way by "coyoters." The Blazing Star, near West Point, it is reported, is to be started up once more. It has a complete equipment consisting of hoist, mill, chlorination and cyanide plants. The mine has been extensively worked down to the 400 level.

San Andreas *Citizen*: The Melones M. Co., at Robinson's, employs 226 men. The tunnel, which is to connect the 120-stamp mill, now in course of erection, with the shaft of the Reserve mine on Carson Hill is in 1300 feet. Its length will be 4000 feet. Three shifts are maintained, work being prosecuted with compressed air. The mill will be 225x320 feet.——At the Sheep Ranch mine 150 feet of water has been removed since bailing was started and two levels have been cleared. Caves and repairs to the shaft retard the work. An engine and a 200-light dynamo have been delivered at the mine.

Jackson *Republican*: The Violet mine, near West Point, is operated by E. G. Keeney. The property is worked by a tunnel which has been run on the vein 40 feet. At the mouth the ledge is 4 inches wide, but in the breast it is 30 inches in width. The ore pays $10 per ton. A 3-stamp mill is on the ground. ——The Leeper-Bennett mill on Angels creek is crushing ore from the Pilot Knob mine, adjoining the Gold Cliff mine on the west. The ore averages $2 per ton in free gold. The sulphurets are valued at $60 a ton.

Del Norte.

The Del Norte copper shipments to the Selby Smelting Co. average over 20%.

El Dorado.

Placerville *Nugget*: It is reported that a rich strike has been made at the Poverty Point mine.——A strike has been made at the Griffith Consolidated and a larger force will be put to work as soon as sufficient water can be secured.

Placerville *Republican*: Prospecting has been resumed on the Selby mine, owned by Larkin Bros. of Placerville. A portable engine and boiler has been taken to the mine to remove the water. Eastern people are doing the work.——The Toll House gravel mine at Smith's Flat, operated some years ago by W. P. Stanley and others, has been sold to Los Angeles people. Robt. Dodds is Supt., and they are getting ready to drift. S. P. Jewett, president of the company, is at the mine as manager.

Georgetown *Gazette*: The Darling mine is reported closed down for the want of more modern machinery to sink the shaft. Several men are at work pumping water from the shaft.——The Toll House mine, near Smith's Flat, has been sold to R. N. Bulla and others of Los Angeles for $60,000. W. L. Jewett of Los Angeles is in charge of the mine.

Kern.

The Star Oil Co. has been incorporated at Bakersfield by R. S. Elwood, J. M. Keith, J. J. Mack, C. Wible and G. G. Carter; capital stock, $500,000.

Randsburg *Miner*: U. C. Brotherson came into Randsburg recently from Goler with a nugget weighing 1 oz. 6 pwt. 20 grs. He and his partner disposed of one that returned them $80.

Bakersfield *Californian*: Several new water claims have been put on record within the last few days. Pumping from wells in Cuddeback lake, to furnish water for mining and milling purposes, is being considered.——A company has been incorporated under the laws of West Virginia by Boston parties to mine at Copper City, in this county. The capital stock is $2,500,000.——N. Hoff says that at the Slate range he has five tons on the dump of the Homestake that will mill $45 per ton.

Kings.

The Hanford-Cholame Oil Co. has been organized at Hanford by N. Weisbaum, R. Mills, J. Manasse, Hanford; J. W. Fisher, Parkfield, and J. Levy, Visalia; capital stock, $250,000.

Nevada.

The Lincoln G. & S. M. Co. has been incorporated at Grass Valley by T. R. Terrell, P. McAuslen, T. V. Snyder, T. R. Coughlin, Grass Valley, and F. Siehe, Sacramento.

The Keystone M. Co. has been organized at Grass Valley by H. A. Fairbanks, J. J. Hoskins, J. M. Thomas, W. D. Harris, Grass Valley, and J. H. English, Nevada City; capital stock, $25,000.

Grass Valley *Union*: The Murchie mine, northwest of Grass Valley, will in a few days be running full blast again. The property has lain idle since L. D. Blundell and his company suspended operations there over a year ago. The mine is leased to B. T. Vivian, E. Beedle, M. D. Morrison and W. B. Davis, who are miners. The shaft, which is about 250 feet deep, will be pumped out, the drifts retimbered and the mine put in shape. When the company quit they left considerable ground opened up. The property paid in former years, dividends having been declared when it was worked through the old 700-foot shaft. The ledge in the old works is the big blue lead, while in the new shaft the Cohoe vein is worked.

San Benito.

The Jose Copper M. Co. has been organized at Hollister by G. W. McConnell, R. Jose, J. Cofney, A. Johnson and N. C. Briggs; capital stock, $40,000.

San Bernardino.

Randsburg *Miner*: Twenty-three sacks of ore from a mine in the Slate range, owned by Mrs. Callahan, milled at the Black Hawk mill $180. More men have been put to work on the mine.

Plumas.

Quincy *Bulletin*: E. A. Halstead has interested San Jose capital in the purchase of the rights and privileges of the Elizabeth M. Co. to the mine on the Kellogg ranch, north of Quincy. Work has been resumed.

San Diego.

J. W. Rockford has been developing a quartz vein near Mesa Grande, in the vicinity of the Shenandoah mine, sinking a shaft nearly 100 feet deep. The mine has been bought by an Arizona man, who will operate it. The ores of this district are of good grade and free milling, occurring in mica schist.

Shasta.

(Special Correspondence).—Near Shasta work will be resumed soon on the Colorado and Gypsy mines by Howell & Turner.

In the Mitchel & Davis mine, upon which work was recently begun after long idleness, ore of fair grade has been found.

Coleman & Beall of New York are reopening the Cleveland Consolidated group of mines in the Bullychoop section. They have fifteen men at work. The tunnels aggregate 800 feet. Last week a large body of high-grade ore was discovered. The mill, concentrators and amalgamators started this week.

At the Mt. Shasta mine, near Redding, sinking is in progress for the 400 level and stoping continues at the 300. The ore is hauled nine miles to the Keswick smelter. It averages $47 a ton. The mine is producing $10,000 a month. This property has been in operation about one year, at the beginning of which it was taken up from an abandoned prospect. In the meantime it has produced about $100,000, of which one-half was profit. O. O. Howard of San Francisco is Pres. of the company and F. E. Ware is Gen. Mgr.

At the old Spanish mine, near Redding, of which L. F. Shepherd is Supt., a 32-foot gallows-frame has been erected and a 40 H. P. engine and boiler placed. The shaft is down 110 feet. The vein is 3 feet wide and is high-grade sulphuret ore.

Redding, Oct. 2nd, '99.

Shasta *Democrat*: On the property on Nigger hill known as the Nigger Hill group, owned by R. G. Dunn and D. W. Hall, Mr. Dunn has been sinking a double-compartment shaft down 100 feet. A drift is being run on the vein. At the bottom of the shaft the vein is 16 inches wide, solid ore and is very high grade. It is within half a mile of the Keswick smelter.——Supt. B. F. Iler of the Iler mine, three miles northwest of Keswick on a spur of Iron mountain, reports that recently a strike was made in the mine. The ledge is 10 feet wide and at the point of discovery the quartz is covered with gold. Nineteen men are at work in the mine.

Siskiyou.

It is reported that a large body of high-grade ore has been found at the Gold Ball mine on Salmon river. The Gold Ball adjoins the Black Bear mine.

A San Francisco company has bought the Blue Gravel mine at Yreka and begun work with a large force.

The Cherry Hill mill is idle for lack of water for use in the batteries. Ore is being taken from the mine and stacked for winter's work.

Yreka *Journal*: The Siskiyou Con. Quicksilver M. Co. has ten men prospecting at the head of West Beaver creek, Siskiyou mountain, developing ledges of cinnabar. It is proposed to rebuild the retorting works on a more extensive scale.——Parties have been negotiating for the Grater quartz mine on Horse creek, Klamath river, near Oak Bar, offering $10,000 for it, which Mr. Grater refused. He has a ledge 8 inches to 3 feet in thickness of high-grade ore.——Work is expected to be resumed at the Sheba mine on Patterson creek as soon as the air compressor is put in operation.——In the Cottonwood mining district, Doney Bros. are putting up a quartz mill. LaFlesh & Co., in the same section, are finding rich ore. Rich ore has lately been discovered on Old Craggy mountain at Humbug.

Yreka *Journal*: E. D. Baker is running the Gumboot mine at Scott river. The mill has been running four weeks and is fitted up with improved machinery. Thirty men are employed; part of them are building a road to Yreka.——The hands at the Greenhorn blue gravel mine quit last week and were paid off. The men went to dinner and supper half an hour before time—a rule carried out for some time. The new Supt., seeing a man go off at 11:30, asked the foreman where the man was going, and he replied: "To dinner." The Supt. then told him to dock him half an hour if he quit that early again for dinner, when the foreman also said he could dock him, too, and he would quit. The Supt. then told him: "All right; come around and get your money." The rest of the hands acted likewise.——The entire country on Squaw creek, a tributary of Willow creek, in the Gazelle district, and vicinity, has been located for mining claims. On Parks and Willow creeks good copper prospects have also been found.

Ætna *Advance*: C. Peregoy will open an asphalt ledge discovered on Craggy mountain, 3½ miles from Callahan's. He located two claims recently. The ledge is 6 feet wide.

Yreka *News*: J. S. Morley, who recently struck a good prospect, is developing it.——J. C. Otting has sold his quartz claim in Humbug district to J. J. Perkins.——E. D. Baker, Supt. Gumboot mine, has made improvements in the mill and will begin crushing the ore held in reserve.——M. A. Mitchell of Ashland, Or., has bought the quartz mine of C. H. Martin and J. Perkins for $2500. He expects to erect a mill.——The Commodore mine, under Supt. Wilkinson, continues to pay, and the mill will be enlarged to ten stamps. This is one of the best paying mines of its size in the county.——The Greenhorn blue gravel mine has been bought of Wetzel, Harmon & Ridenhour by Lezinsky, Page & Heard for the sum of $10,000. The new company has begun work.

Tuolumne.

An 80 H. P. engine has been installed at the Jumper mine near Stent, owing to the water famine that yearly occurs.

Most of the important mines of this county now have both water and steam plants, and some have also electricity. As the latter force is dependent upon the water supply, it is no more reliable than the water.

The Scott Bros., of the Black Oak mine, have made a strike in the Altamont claim near Soulsbyville, in a crosscut from the shaft. They are drifting on the vein.

Union-Democrat: At the Pauper's Dream, the west extension of the Longfellow, at Big Oak Flat, the shaft is down 300 feet, and fine ore is being found in both drifts at that level. The mine is under bond to a Boston company. J. M. Meighan is Supt.——Extensive forest fires are raging in the mountains of this and adjoining counties. Several mining companies have lost cordwood by these fires.

Sonora *Independent*: Stone & Ball, who are working the Hudson & Calhoun mine at Saw Mill Flat, have taken out several pockets of gold of late.——The mill at the Golden Gate mine, Sonora, is being run by steam power. ——At the Draper mine, near Soulsbyville, new machinery is being put in, including a skip, air compressor, etc., and machine drills will soon be in operation. When the sinking was discontinued, in order to erect the machinery, the vein in the bottom of the shaft showed free gold and was heavily mineralized. Two pumps discharge a 3-inch stream. G. F. Dyer is Supt.

Trinity.

Weaverville *Journal*: The Maple Creek M. Co., above Junction City, have done a large amount of work upon their property and will be equipped December 1st. Two and one-half miles of new ditch are completed, which will take water from Dutch creek. It is 6½ feet wide on top, 4 feet wide on the bottom and 30

inches deep, with a grade of 9.60 feet to the mile. One hundred and fifty men are employed. The company is putting in a saw mill to supply lumber. The pipe for the mine is on the ground. Supt. F. Hall has charge of the property. When the season is opened three giants will be in use.

COLORADO.

Considerable talk is heard from various sources to the effect that the American Smelting & Refining Co. are gradually withdrawing their business from the samplers, with the ultimate intention of forcing them out of business; that the big smelting company seeks to deal directly with the miners, to the exclusion of the samplers. Inquiry among the various samplers, however, does not afford a substantiation of the statement. The latter claim that, while it is natural for the smelters to deal directly with the larger producers, there is no likelihood of the public samplers ceasing to become a factor in the State, as their operations are a convenience and a benefit to both smelters and mines, by their readiness to handle the product of the small and medium mines.

ARAPAHOE COUNTY.

(Special Correspondence). — The Denver Smelting & Mining Co., said to have been organized by the members of the Kilton Sampling Co., are to erect a pyritic smelter at Denver, of which the Kilton sampling and ore purchasing plants will become feeders.

Denver, Sept. 28th, '99.

BOULDER COUNTY.

The Ingram mine, one of the steady shippers of the county, has been equipped with new machinery and, is now shipping from seven to eight cars of ore per day to the Kilton Works at Boulder.

The Melvina mine is again being operated by J. A. Harriman, Jr., of Boston, Mass., with J. J. Harris as Mgr. The work is being confined to development, with a view to its purchase.

The Marchioness tunnel is now in 300 feet, and machinery has been ordered to work with air drills.

The Scotia mine, at Gold Hill, is shipping two or three cars per day to the Culbertson mill.

The ten amalgamating plates of the Madeline mill, at Ward, were stolen recently. They are several years old and contain much gold.

M. F. Leech, Pres. Manila Mining & Investment Co. of Boulder, has bought for his company the right to use the pneumatic cyanide process in this county, and will begin the erection of a large custom mill in Boulder.

CHAFFEE COUNTY.

(Special Correspondence).—B. T. Brooks, under whose directions the Sedalia copper mine is operating, is reopening the Columbus mine in the Monarch district. The Columbus produces gold, silver and lead.

Sedalia, Sept. 29th, '99.

CLEAR CREEK COUNTY.

Georgetown *Courier*: The 700-foot level on the Allunde mine, being driven to explore the ore encountered in the 850 level, broke into the ore last week. It consists of an intimate mixture of ruby silver, gray copper and galena.——The Progressive Eight Co. have opened a vein of ore 120 feet in the Pueblo lode, on Griffith mountain. The ore is 4 to 10 inches in thickness, and a mill run returned 3¼ ounces gold and 16 ounces silver per ton.——Mr. Montgomery has men employed on the Scepter tunnel of the Astor mines. The Astor was a producer twenty years ago.

CUSTER COUNTY.

The Bassick mine is being unwatered and retimbered for resumption of production. There was 800 feet of water in the mine, and there has been much caving of drifts. At Lake creek, fifteen miles northwest of Silver Cliff, one of the copper mines is putting in a $20,000 plant.

The Geyser, at Silver Cliff, has an 8-foot vein of copper ore at the 2600 level. It has a concentrator and is ready to handle the ore as soon as it is brought out.

The Bull Domingo is reported sold to an Eastern syndicate, and it is also reported that a new hoisting plant will be erected. The old hoist was destroyed by fire a year ago. The Bull Domingo has a concentrating mill.

FREMONT COUNTY.

R. C. & W. M. Wilson, who have been working the Gray Eagle claim on Four-mile creek, at the foot of Sheep mountain, at a depth of 306 feet have a body of sylvanite ore that runs $196 to the ton.

GILPIN COUNTY.

It is reported that the Topeka has been sold for $400,000.——Russell Gulch parties on the West Calhoun are taking out mill and smelting ore and shipping. On the same hill is the French claim, owned by Judge Wells and W. Teller of Denver. Sixteen men are working in the main shaft, under a sub-lease, taking out only smelting ore, which markets at $70 to $85 per ton. A new shaft is being sunk 400 feet west of the old one.

The Central City mine is to have a new hoist. It is being worked by the Ross M. Co.

The California mine has a new 2200-foot steel rope on the reel of the hoist.

GUNNISON COUNTY.

The Lucky Strike mine at Chance has resumed work after five years of litigation.

J. H. McCormick has opened up pay ore in the Wahl mine, in the Tin Cup district, and is packing a carload to the railroad at Ohio City. The ore runs well in gold, much of it being free.

The Cortland M. Co. of McIntyre gulch, near Ohio city, is shipping ore that nets $1500 per car.

Pitkin *Miner*: R. W. Spensley, Supt. Union Park placer, has thirty men employed. They have 2700 feet of flume in place and have 1400 feet to put in before reaching the point where they begin washing gravel.

Pitkin *Miner*: The Granite Mountain mine is located in Jones' gulch, in the Gold Brick district and is being operated by the Pittsburg-Gunnison M. & M. Co. In development, 200 tons of mill ore have been taken out which will run from $12 to $40, and the company expects to erect a mill next spring.——The Perigo mine in Telurium gulch is working a large force and putting in a new air compressor and other machinery.——The Galena King is being worked under bond and lease by Olsen, Muller & Hunn of Aspen. They are now in 260 feet with crosscut tunnel.

HINSDALE COUNTY.

(Special Correspondence).—The 50-ton concentration mill of the Golden Fleece is almost complete. It will start up in October. It is equipped with crushers, rolls, jigs and concentrating tables. Supt. G. W. Pierce states that medium grade ore, of which they have one year's supply, will be milled. The high-grade ore will be shipped to the smelters, as heretofore.

The Hidden Treasure is milling 100 tons per day, the product being about twenty tons of concentrates. From 400 to 500 tons per month of concentrates and high-grade ore are shipped to the smelters.

New machinery is being put in at the Lellie, up Henson creek. WASCOTT.

Lake City, Colo., Sept, 26th, '99.

LAKE COUNTY.

(Special Correspondence).— The properties of the Iron Silver M. Co. are shipping from the Moyer shaft 200 tons per day, which consists of sulphides carrying gold, silver and zinc blende. The last-named material is shipped to Belgium. This company is remodeling the old mill in California gulch for concentration.

The old Elgin smelter has been purchased by the Boston G. & C. Co., who are equipping it for pyritic work. The plant will soon be started up. WASCOTT.

Leadville, Colo., Sept. 26th, '99.

Native copper has been found in Ruby No. 1, on Red mountain, Twin Lakes district. The ore was struck at 16 feet, and assays $250 in gold, silver, copper and lead.

A 10-inch streak of ore has been opened in the breast of the Gold Hill tunnel, Twin Lakes district, which assays from one to six ounces gold, five to ten ounces silver and 15% lead.

The daily shipments from Leadville mines average nearly 2000 tons.

Prominent miners of the Leadville district are talking of reviving the scheme to drive the tunnel from Malta, for which surveys were made several years ago.

The Twin Lakes M. Co., a London corporation, owning the Cache Creek placers, has been reorganized and more capital secured.

Leadville *Miner*: C. E. Osgood, Mgr. of the Sixth Street mine, is considering the purchase of residence property for additional dumping room. The west shaft can be put in shape for a cage and sunk to the Penrose level. Large bodies of iron, 100 feet thick and still going down, are known to exist. The steel-iron formerly netted $3 per ton for manganese contents, while the smelting iron carries 18 ounces silver and 54% excess.——H. Schrader has teams hauling lead ore from the Continental Chief mine, located above timber line at the head of Iowa pass.——G. Germon & Co. have recently taken the lease on the Four Per Cent and Cady mines, on Fryer hill, from Ovens & Harvey. They are also working the North Side and Buckeye shafts. In these workings are fine stopes of iron carrying from 4 to 8 ounces silver and from 42% to 52% iron excess. They also have a small streak of very rich lead ore, assaying high in silver. Sixteen men are employed.

Denver *Republican*: When the Home M. Co., composed largely of Leadville merchants, was formed, it seemed as if there was no hope of resumption in the down-town territorry, which had been drowned out since the blowing up of the Coronado mine in 1896. The large operators in the district had been offered substantial inducements in the way of leases on virgin ground of prospective value, but would do nothing. The future of the camp looked unpromising. A home company was finally decided upon, and after months of work the company was organized and operations commenced. The accident at the Bon Air shaft added more than $20,000 to the expense, and delayed the completion of the work more than two months. The original $50,000 deemed necessary to drain the mines was swelled to more than $100,000. The Home M. Co., if now reaping its reward. It has unwatered the ground, and a number of the best mines in the camp are once more in production. The water is handled easily and at comparatively light expense. Most of the mines affected have been repaired and are giving employment to more than 500 men. The tonnage is increasing and the company finds itself in possession of property worth a great deal more than the amount of its capital stock. The company is working through three shafts and hoisting fifty tons of ore per day, that carries from 70 to 100 ounces of silver per ton and about 170 tons of iron, carrying more than 70% excess of iron and a little silver. More than 100 men are employed by the company in addition to those employed by older mines, and the company organized for the relief of the camp from the strained situation of a year ago now finds that it has added a new enterprise to the camp and is making money for its stockholders.

OURAY COUNTY.

L. Summers and two partners, while prospecting for silver near Ironton, recently struck a large vein of uranium.

Denver *Republican*: The Treasury Tunnel & Reduction Co. has commenced the development of claims in the Red Mountain district and proposes to drive a tunnel 3000 feet. The tunnel is in 120 feet by hand and an air plant is to be installed. The workings are to be connected with the Silverton railroad by a spur a mile and a half long. Forty men are employed.——Recent developments on the Silver Queen, Bear creek, has exposed a 3-foot vein of high-grade silver ore.——The Bimetallist, Sneffels district, after exhausting the high-grade ore worked last year, has been driving for an extension of the same vein and last week struck it in the Hawkeye claim, the ore being high grade in gold.

RIO BLANCO COUNTY.

It is reported that J. Leiter, Jr., of Chicago is negotiating for the gilsonite fields of Colorado, lying next the Utah line. The vein of gilsonite that is the object of the pending negotiations is the only one of the Utah veins that crosses the Colorado line. There are three large veins in the Uncompagre Indian reservation, but this in Colorado is the only one open to location. It has been secured by Mr. Seiboldt and others. The material is the purest natural asphaltum known. The residue after combustion is very small and is one of the most valuable deposits of asphalt in the country, the only other approaching it in value being the deposit in an angle between the Uintah and Uncompahgre Indian agencies.

SUMMIT COUNTY.

The Duncan mine, which is being operated under bond and lease by C. Gallagher, has recently opened a body of ore carrying 45% to 65% lead and from half an ounce to an ounce and a half in gold. Forty to fifty tons per month are being shipped.

The Extension on Gibson hill is taking out forty tons per day of milling ore, supplying a 20-stamp mill.

The Eastern company which recently secured a bond and lease on the Hazel group in Cucumber gulch will prospect that locality by Diamond drill. The work is in charge of F. C. Alsdorf of Telluride.

Denver *Republican*: The Ella, on Mineral hill, at Breckenridge, has for some time shipped seventy-five tons of high-grade lead to the local sampler per month with seven men.——Breckenridge is now an eight-hour camp, as regards lode mines. The Breckenridge district is showing activity and the camp was never more prosperous.——At the Jackson placer the new people, through Mr. Revett, have had a large force at work the past three weeks, cleaning out ditches, diverting the Blue and getting in shape for work. This is almost completed.——The drill used in prospecting the ground on the Swan has been brought up to the Jackson placer and the property will be tested. By this method holes are bored to bedrock and the gravel washed.

TELLER COUNTY.

The gold output of the Cripple Creek district during September amounted to $1,731,000, surpassing all previous records. The production of gold in this district from the time of its discovery in 1891 to date is $62,057,292. September's output was as follows:

	Tons.	Per Ton.	Value.
Colorado City	8,500	$35	$297,500
Arequa	2,000	20	40,000
National, Florence	1,750	30	52,500
El Paso, Florence	4,000	32	128,000
Metallic, Florence	8,500	20	170,000
Smelting ore	11,000	93	1,023,000
Miscellaneons	....	..	20,000
Total			$1,731,000

Mining Reporter: Another strike has been made on the Gold Sovereign at Cripple Creek in the new level at the bottom of the Whisper shaft at a depth of 380 feet. The vein is 4 feet wide and 18 inches of it is high grade. At the Gold Sovereign heavy production is being made.——A discovery has been made on the surface of the Hoosier Boy, on the south slope of Beacon hill. On the north end of the claim a vein said to be the extension of the Black Belle lead has been cut and traced for a distance of 700 feet through Hoosier Boy ground. The assays return 3.58 ounces gold.

Cripple Creek *Times*: A strike has been made in the granite, in the city of Victor, the Mary Cashen Leasing Co. working the Mt. Rosa having found a 4-foot vein at a depth of 500 feet in a crosscut close to the shaft. Assays show 100 ounces gold to the ton. The vein matter is silicified granite, the same as is found in the Strong and the Gold Coin. The leasing company has been working twenty months and are getting their first ore. The strike proves that the ground between the Gold Coin and the Strong is not barren.

Cripple Creek *Times*: The Herrington lease on the Little Pedro has encountered pay ore 10 feet from the surface.——I. Barber has completed the erection of a shafthouse on the Cumberland, on Republic hill. A vein 3½ feet wide shows values of $12 a ton.——The Humboldt Co. started work on the Grouse claim, on Ironclad hill. The shaft is down 60 feet, and a contract has been let to sink 90 feet. Machinery has lately been installed.——On the Olive Branch nine sets of lessees are working.——A strike is reported in the Clara D of the Lexington Co. It is stated that the strike was made in the breast of the 225-foot level, and that the values across the 14-inch vein run $500 to the ton.

IDAHO.

ADA COUNTY.

The business done at the United States assay office at Boise during the month of September amounted to $202,526, against $131,894 for September, 1898, an increase of $70,631, or nearly 50%. For the quarter ending September 30th the total was $683,936.

IDAHO COUNTY.

It is reported that a discovery of a large and rich gold ledge has been made in the Summit mine, in the vicinity of Black lake. Development work was being done, when a 30-foot vein of free-milling ore was encountered. Pack trains are taking in provisions and mining supplies. The mine on which this ledge was struck is owned by Ford Bros., who have several claims in the vicinity and also a gold mine in Placer Basin.

Spokesman-Review: It is reported that Clark & Sweeny have given up their bonds on the Cracker Jack and Jumbo claims, in the Buffalo Hump camp, and it has been stated that the firm would withdraw from that camp; Mr. Sweeny is quoted as saying that he has confidence in that camp and expects to open there. He has bonded the Vesuvius group and has it under operation.——M. W. Musgrove is Mgr. of the company which is driving a tunnel through the Buffalo Hump mountain. The face shows stringers of quartz; but 60 feet remains to tap the first vein—that which crops on the Orizaba claim, which the company owns. The tunnel will tap other veins than those showing on the company's property. A four-drill compressor with equipment has been ordered, and the tunnel will be advanced with two machine drills. The Hump carries a network of veins and the tunnel will drain most of them.

Weiser *Signal*: Gabbart & Stewart of Spokane have bought the Silver King mine, near Warren, one of the oldest mines in the camp, which has always been known as a silver vein and on which a tunnel was run years ago and a rich chute of silver ore stoped to the surface. Messrs Gabbart and Stewart discovered that the hanging wall of the old workings was a parallel chute of $50 gold ore; they discovered that the pile of quartz boulders piled up around the end stake of the claim were rich in gold which had for years escaped the notice of those working the mine. They prospected the old claim and found it to be a bonanza.

Lewiston *Tribune*: The Myrtle group of copper mines on Snake river, eighteen miles above Imnaha, have recently been sold by Dr. Bibby and John O'Neill of Grangeville to Boston parties for $100,000, of which $5000 was cash, 10% on October 30, 10% on November 30 and the balance on December 30. There are eight claims in the group and except on one property nothing has been done beyond assessment work. On the Myrtle there is an 18-foot cut with 10 feet of ore in the face. There are sixty tons on the dump. It averages 10% copper, $20 in gold and six ounces in silver. It is copper ore in trap, occurring in ribbons of 2 to 4 feet for 180 feet across the claim, one wall of which has not yet been found.

KOOTENAY COUNTY.

(Special Correspondence).—The Keep Cool M. Co. are developing a group of four claims near Lakeview, under direction of W. H. Fawcett. An ore shoot stoped some years ago near the surface yielded $20,000, the ore being rich in lead, silver and gold. The ore in sight having been exhausted, the project was abandoned by the operator, and subsequently came into the hands of the company now working it. The old workings were cleaned out and intelligent prospecting has rediscovered the old ore shoot. The vein in which the high-grade ore occurs is from 1 foot to 5 feet in width, carrying steel galena and gray copper, rich in silver and gold. The main vein is from 50 to 70 feet wide, consisting of a mineralized zone in porphyry at a slate contact. The values are stated to be from $12 to $20 per ton, but the Supt. is following the high-grade shipping ore, with a view to making the property self-sustaining. The new ore shoot recently cut by a crosscut tunnel runs $200 per ton.

Lakeview, Oct. 1st, '99.

OWYHEE COUNTY.

Silver City *Avalanche*: The Gold Rock M. Co., operating the Mammoth in Blue gulch, has run a 750-foot crosscut, cutting four separate veins from 4 to 35 feet in width, and is drifting south on the Mammoth ledge 150 feet from the crosscut. A large order for rails, air pipe and other supplies has been placed, and work will be resumed on the crosscut tunnel. The company has bonded the Combination and Golden claims, adjoining. New buildings will be erected and an exhaust fan put in for ventilation.——The recent mill run from the Ontario of forty-four and three-tenths tons of ore yielded $5400 in bullion.——Mgr. Jenkins of the Cumberland is adding to his force and preparing for a mill.

SHOSHONE COUNTY.

A few days ago a strike of gold quartz was made near the headwaters of the St. Joe river, thirty-five miles from Salmon, by Green and Seeley. The ledge is 20 to 30 feet wide, and crops out for several hundred feet. There have been several locations made. A large number of men are rushing there from local points. Assays on samples run from $5.80 to $24 in gold.

MICHIGAN.

HOUGHTON COUNTY.

Sixteen copper mines are assessed for taxation at $149,300,000; the county is assessed at $42,500,000.

MISSOURI.

JASPER COUNTY.

Ninety per cent of the zinc producers in this district have shut down in the compliance with an order from the Missouri & Kansas Zinc Miners' Association in an effort to force the smelters to pay a schedule of prices laid down by the association a few weeks since, and which the smelters have thus far refused to accede to. At Webb City alone 1500 miners will be thrown out of work temporarily.

MONTANA.

RAVALLI COUNTY.

Work has been temporarily suspended on the Monitor mine on Mineral Hill, owning to the great amount of water in the shaft, which could not be handled with a windlass. The ledge, has developed into a large body of high-grade ore, and a pump, engine and hoist will be put up and a large force employed during the winter to prospect the claim.

The Mineral Hill mining district, comprises an area of over fifty square miles and i

covered with veins, bearing gold, silver, copper and lead. Hundreds of locations were made in the district ten years ago, but after a few representations they were abandoned, owing to the fact that the district is 100 miles from the railway and could be reached only by trail that was almost impassable the greater part of the year. This difficulty has now been overcome by the construction of a wagon road. Many new locations are being made and a concentrator is to be built at the Monitor, next season.

Butte capitalists recently took an option on the property of the Ward Placer M. Co. on Hughes creek and are prospecting the bars on the lower course of the creek. If the option is taken up they propose to put on dredging machinery.

In an eight days' run on the Canyon placer claim on Hughes creek, with six men, over 40 ounces of coarse gold were recently taken out.

FERGUS COUNTY.

At Lewistown the Great Northern Mining & Development Company has completed a $75,000 mill and cyanide plant and a similar plant is being erected by Johnson & Wright on the New Year group. The first named company owns the Gilt Edge property and both companies have large veins of low-grade refractory gold ore. The Spotted Horse mine, which has lain idle for months, is to be reopened by the owner, J. O. Bright of Columbus, O.

NEVADA.

ESMERALDA COUNTY.

Miller & Bacigalupi, who are working a mine near the Big Indian, have ore ready for shipment which will mill $40 per ton.

Hawthorne *Bulletin*: The Lee brothers at Huntoon have five tons of ore that will mill $300 per ton ready for shipment to Stewart's mill at Soda, besides this forty tons of ore on the dump that will mill $40 per ton. This ore will not bear the cost of transportation, and will be held until milling facilities are provided at the mine. They are tunneling to tap the ledge at a depth of 100 feet. The country is mineralized, and a large number of locations have been made the past month. The ledges are large and contain gold, lead and silver.

HUMBOLDT COUNTY.

Work is to be renewed in the Adelaide copper mines at Golconda.

STOREY COUNTY.

At the C. & C. shaft, Comstock lode, No. 2 elevator has been replaced during the week and is again at work. Following is the latest official dispatch:

VIRGINIA, Nev., Oct. 5, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco:—No. 2 elevator ran 17 hours and 35 minutes. At 6:30 this morning the water was 32 feet 2 inches below the 1950-foot level station. JOS. R. RYAN.

The water raised 1 foot 10 inches during the past twenty-four hours.

NEW MEXICO.

DONNA ANA COUNTY.

Colonel Henderson has men at work in the old Stephenson mine at Organ. The Stepenson was the first mine patented in New Mexico in 1871, and was then known as the St. Augustine.

OREGON.

BAKER COUNTY.

(Special Correspondence.)—F. R. Mellis of the Baker City Mining Exchange has shipped to the Spokane Exhibition that opens October 3rd, six tons of gold ore contributed by the various mines in the vicinity of Baker City. It is estimated that the six tons if worked by mill process would yield $25,000.

P. E. Poindexter of Sumpter, is also making a fine exhibit at the Spokane Fair taken from twenty-five different mines, embracing over ten tons of gold ore.

James Arthur of Cornucopia has a deal with Baker City men for 1100 acres rich quartz claims in the Virtue district.

Baker City, Oct. 1st, '99.

Sumpter *American*: The Climax mine, near the Columbia, is to be worked. It is owned by G. W. Grayson of San Francisco, who formerly owned the Virtue and Collateral mines near Baker. The development is in charge of Daniels & Boorman. The mine has two tunnels, the lower one being 600 feet long and striking the 18-foot ledge 200 feet below the surface, cutting ore said to run $9 to the ton. This property was sold to Mr. Grayson three years ago by Warren Cable, but has been shut down one year.

Baker City *Republican*: A newly discovered mining district, thirty miles south of Baker City, on the divide between Burnt and Powder rivers, has been opened by W. Eblen, J. Toynton and N. Hall, who have located four claims, which they call the Black Jack group, and have sunk a 25-foot shaft, which cuts through the ledge whithout any sign of either wall. The ore assays $25 per ton.

JACKSON COUNTY.

Ashland *Record*: At the Golden Standard, ore has been discovered which resembles the Gold Hill quartz. The vein is 8 inches thick, with walls of slate and porphyry. One rich deposit follows another, with high-grade between.——Another discovery like the Golden Standard is reported on Horse creek, south of the Big Applegate. C. Grater was the discoverer.

UTAH.

The output of auro-cyanides for the month of September from the various mills amounted to about 14,000 pounds.

BEAVER COUNTY.

The Blackbird Copper M. Co., whose property is in Copper gulch, have ore in their shaft at a depth of 135 feet. The ore is copper sulphide, carrying good gold and silver values. An assay returned 25% copper, $7 gold and thirty-one ounces silver.

BOX ELDER COUNTY.

Salt Lake *Tribune*: Of the Copper mountain group purchased by Lewisshon Bros. last spring for $140,000, Manager Tuttle says the result of development has been satisfactory, and that thirty miners are blocking out ores. The idea of erecting furnaces on the ground has been abandoned, and instead, a mill will be provided for the treatment of them, near Salt Lake.

IRON COUNTY.

Salt Lake *Tribune*: An ore shipment from the Johnnie is ready. Mgr. C. O. Newell says this is first-class ore and expects returns netting $2000 per ton. The ledge has increased in width until at 75 feet they are sinking in solid ore. Everything taken out will be put through the mill, which is soon to be started.——The Burro, which has reached a depth of 180 feet, is looking fine and a change has taken place in the ore, as it carries as much gold as silver.

JUAB COUNTY.

The ore shipments the past week from Tintic were as follows:

Mine.	*Cars.*
Bullion-Beck	10
Gemini	6
Centennial Eureka	17
Uncle Sam and Humbug	5
Grand Central	9
Mammoth	10
Swansea	6
South Swansea	2
Dragon Iron mine	14
Rabbit's Foot	1
Sunbeam (Woodmansee lease)	1
Total	91
Sioux mill, bars of bullion	2
Mammoth mill, bars of bullion	2
Total	4
Mammoth mill, cars of concentrates	3

SALT LAKE COUNTY.

Recent assays on samples taken from the new ore body in the Bingham copper and gold ground gave a general average of fifty-eight ounces silver, 32% copper and $39 in gold, with a market value of $168 per ton. The ore is dark, with an antimonial luster. This shoot is believed to be independent of the one opened above.

SUMMIT COUNTY.

Preparations for the $2,000,000 damage suit between the Crown Point and Ontario and Daly, and in which the Crown Point seeks to recover that amount for ores the defendants are accused of taking from its ground, have begun. The disputed territory has been examined by M. K. Harkness, A. Bemis and Messrs. Palmer and Keyes for the defendant companies. It is said that defendants would not deny having gone beyond their lines, but would justify their action under the law of apex.

TOOELE COUNTY.

Tribune: Preparation are again being made for milling Sunshine ores.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The recent strike made by Otto Grautz on the Hidden Fortune mine, on the divide between the Homestake properties and Poorman gulch, is in the quartzite lying at the base of the Cambrian, and overlying the Archæan, in which the Homestake ore deposits are found. The rock on its exterior surface often gives no indication of its value, but on being broken coarse and fine gold is discovered in quantity. The fact that all originally overlying formation has been eroded makes the mining of this shoot of ore inexpensive. It is not unlikely that similar shoots of ore carrying pay values will be found both east and west of the Grautz find, as the lower quartzite is found on some of the neighboring hills as remnants of a once co-extensive formation.

Deadwood *Independent*: In Lawrence county the Homestake mills on an average crush 3000 tons, valued at $15,000, every twenty-four hours; the Golden Reward, 600 tons, valued at $10,000; the Klidonan, 150 tons, valued at approximately $3000. Other mines, including Portland, Squaw Creek, Strawberry, Blacktail, Garden City, Uncle Sam, Ragged Top and Galena, the available ore will approximate 900 tons daily, valued at $12,000, the daily production being approximately 4650 tons, valued at $40,000.

WASHINGTON.

FERRY COUNTY.

Samples from the richer portion of the Republic ledge at the bottom of the 50-foot winze being sunk from the 400 level assay $4744.

The Surprise is drifting on 5 feet of solid ore, which assays $58 per ton. Recent assays across the face of this drift run as high as $465.

WYOMING.

CARBON COUNTY.

W. F. Cody (Buffalo Bill) is at the head of a company incorporating to build a smelter at Grand Encampment. The project is capitalized at $500,000.

FOREIGN.

AUSTRALIA.

Mining operations are being pursued with great activity at Broken Hill, owing to the better prices the different metals are bringing. Many of the small copper, lead, silver, zinc and tin mines in the district are resuming work, and the large lead and silver mines are in good ore and working full time. There is a scarcity of miners. Twice as many men could find employment. The Proprietary mine alone wants 400 additional men. The Broken Hill Consols mine is raising fine silver.

BRITISH COLUMBIA.

A strike has been made in Deadwood camp on the Primrose, the southern extension of the Mother Lode. The cutting of the spur line of the C. P. R. into the Mother Lode exposed a vein of yellow copper 37 feet wide. It is on the vein of the Mother Lode. P. Johnson is Supt. of the company. Work on the smelter has begun. For a week or two there was a delay, owing to some land required for a dump.

A 5-stamp mill at the Camp McKinney Mines, Ltd., in sixty-three days turned out twelve gold bricks, worth $5940. Five stamps are to be added to the mill.

A large deposit of coal has been discovered on the opposite side of Elk river from Fernie. It is said to be as good as the coal mined by the Crow's Nest Coal Co.

Spokesman Review: The output for Rossland camp for the week ending September 30th was 4586 tons, shipped as follows: Trail smelter, 2520 tons; Northport smelter, 2005 tons; B. C. Bullion Extraction Co., Silica, 61 tons. The I. X. L. mine, on O. K. mountain, joins the list of shippers sending out twenty-five tons.

The statement of shipments during the week and for the year to date is as follows:

	Week. Tons.	*Year. Tons.*
Le Roi	1920	66,440.00
War Eagle	1831	41,739 50
Iron Mask	150	3,510.00
Evening Star	60	968.50
Deer Park		18.00
Center Star	600	6,757.00
Columbia-Kootenay		111.50
Virginia		40.00
Mountain Trail		20.00
I. X. L.	25	25.00
Totals	4586	119,629.50

After a recent examination, a mining engineer who inspected the I X L property stated that there are 4000 tons of $20 ore now in sight in the mine. Twenty-five tons were shipped to the Northport Smelter recently. The management intend to commence regular shipments.

A large number of drills have been ordered by the Le Roi and War Eagle. The former placed an order for twenty-five drills and the latter for twenty-four.

New Denver *Ledge*: Some time ago the Miners' Union at Silverton passed a resolution declaring that members should not do work by contract. This forced the men on the Bosun and Wakefield to quit work. Last week the Union reconsidered the question and finally withdrew the resolution thus permitting the men to accept contracts in the lake properties. This action is understood to be a compromise.

CANADA.

American Manufacturer: The recently discovered Algoma iron range is 100 miles from Sault Ste. Marie on the north shore of Lake Superior, in the province of Ontario. The district is known as the Michipicoten district. The results of explorations indicate a width of sixteen miles. The bulk of the iron ore discovered so far lies in a U-shaped basin about the northeast side of Lake Boyer, which is ten miles inland from Lake Superior and stands at considerable elevation above the latter. A ridge of jasper lies along the foot side of the formation for two miles or more, and it is against this jasper that the ore lies. To the north the jasper disappears and its place is taken by a ridge of iron sulphide. All of the ore found so far occurs at the break near Lake Boyer, where the sulphide gives place to the jasper. Here a tongue of land protrudes from the east shore towards the middle of the lake about one-half mile. Upon this tongue is a deposit of brown hematite ore estimated to contain 600,000 tons, with nothing covering it but moss. Samples of the ore were found to be 60% Bessemer, close to the limit. The Minnesota Iron Co. has bought a harbor, and a railroad is being built to the iron lands. At present 200 men are at work grading the road.

LOWER CALIFORNIA.

San Diego *Union*: L. A. Wright of San Diego has returned from the Republica gold mine in La Huerta district, of which he is general manager. The 10-stamp mill at Republica has made its first run. The concentrates were richer than anticipated. A tunnel, now in 350 feet, is being extended. A saw mill is running and furnishing lumber for Alamo, forty miles away. Times are good at Alamo and every available man is at work in and about the mines. Maj. Russell is doing well in the Aurora mine. He recently made a good strike.

Yuma *Sentinel*: G. Simon has been on a prospecting trip in the Cocopah mountains, and exhibits a piece of ore rich in gold which he says is from a 4-foot ledge. The rock is free milling.

MEXICO.

The Parral Reduction Co., with $100,000 capital stock, will construct a smelter in the State of Chihuahua. It will have an office in Denver, Colo. The incorporators are B. Gilpin, Jr., J. F. Hopkins and A. B. Seaman.

In La Dura mine, in Morales district, Chihuahua, the ore carries high values in gold and silver. Gold is visible in most of it, but is of light color, owing to its being alloyed with silver. In the same ore may be observed a large amount of black sulphide of silver. The mine is well named, for the rock is extremely hard. Some work was done on it some years ago by an American company.

Mgr. McDonald of the Guanajuato M. Co. reports that the mill is saving 81% of the gold in the low-grade ore, and 91% is expected to be saved from the high-grade, which is considered a satisfactory saving in the first running of a combination gold-silver mill of the Boss type.

Two Republics: J. H. McKim, formerly of the Roi mine, in the Pilares district, Sonora, has returned to Missouri, having made a fortune by mining. He proposes to organize a company to work gold properties in the California Gulch district, Sonora.——A new discovery is reported from the Moctezuma district, Sonora, of a free milling gold vein near the Victoria, upon which work has recently been begun. The new vein was found by a Bisbee miner named Johnson.——The owners of the Seven Stars mine, in the Guaynopa district, southwest of Casas Grandes, will begin shipments of ore.——Representatives of the Pacific coast smelters have been recently visiting the mining districts of northern Sonora, and contracts have been closed for heavy shipments of ore.

NEW ZEALAND.

A bar of gold, 39½ oz. in weight, was taken to Invercargill from the Undaunted G. M. Co.'s property at Orepuki. Seventy-three and one-fourth yards of wash were put through to obtain this, the return thus giving an average of over one-half oz. to the yard.

The number of miners employed in alluvial workings, hydraulic sluicing and dredging in New Zealand during the past year was 8951; in quartz mining, 4721; and in coal mining, 2003; total, 15,675. The number of fatal accidents was twenty-two, or at the rate of 1.6 per 1000.

SOUTH AFRICA.

The Government has issued a notice of the measure to be observed in the event of war. The mines may continue working, reasonable protection being afforded. The liquor trade is prohibited, and special police will maintain order. The Rand gold produced during the war is to be deposited with the Government, who will mint therefrom sufficient to pay its working expenses. The rest will be returned after the war. Strict passport regulations have also been provided.

A press dispatch from Pretoria says the Transvaal Government has seized gold valued at £800,000, which is now lodged in the State mint. The Government, the dispatch adds, will indemnify the banks to which the gold is consigned.

South African *Mining Journal*: At the New Primrose, the report for July is as follows: 160 stamps ran twenty-eight days, three hours and thirty minutes, crushing 23,228 tons of ore, yielding 6,354.70 ounces of smelted gold, at a cost of 19,568l 7s 11d for milling, mining and general charges, including development, or 16s 10.18d per ton milled. Cyanide:—15,400 tons of tailings treated yielded 4,407 ounces smelted gold; cost, 2,847l 0s 4d, or 2s 5.42d per ton milled. Financial.—The total cost of working for the month has been 22,415l 8s 3d. Profit for month, 16,073l 6s 11d.—On the Witwatersrand, the question of white mining labor is becoming acute. There is a steady stream of skilled underground workers making its way out of the country. Already, most of the principal mines are handicapped by lack of sufficient machine-drillers, and there can be little doubt but that a large number of men, whose term of contract expires at the end of the month, will refuse to re-engage themselves.

TASMANIA.

London *Mining Journal*: The yield of the Lyell field is steadily increasing, owing mainly to the impetus given by the high prices for copper and other metals. A rough calculation shows that the market value of the thirty-seven listed companies located at Lyell is close on £5,250,000, of which the Mount Lyell Co. absorbs £3,475,000, and the North Mount Lyell £1,650,000.

Commercial Paragraphs.

BAKER & HAMILTON, San Francisco, Sacramento and Los Angeles, furnish complete refrigerating machines of any required capacity.

THE Vulcan Iron Works Co. of Seattle, Wash., have shipped to the Golden Thread, Weatherby, Or., a 5-stamp mill, hoisting and pumping plant.

THE Gillette-Herzog Manufacturing Co. are putting up steel buildings at Bland, N. M., for doubling the capacity of the cyanide plant of the Albemarle M. Co.

ON the 27th ult. the exercises of the Massachusetts Institute of Technology began. Alvan L. Davis, S.B., and F. L. H. Kimball, S.B., are now assistants in mining engineering.

AT Pentz, Butte county, Cal., the Risdon Iron Works of San Francisco has put in an elevator capable of handling 2700 cubic yards of gravel every twenty-four hours in the work of working a body of tailings three miles long and 500 yards wide from the Spring Valley hydraulic mine at Cherokee. About 2250 feet of 16-inch pipe has been put in. The black sand, which will average $300 per ton, will be sent to the Selby Smelting & Lead Co.

Catalogues Received.

THE Hendrie & Bolthoff Manufacturing & Supply Co., Denver, Colo., have issued an attractive booklet, in which they describe and illustrate their special line of hoisting engines, from the small prospecting type to the heavy double-drum, high-speed hoist for deep mines. Each type of hoist is represented by a clear-cut engraving, showing those operated by steam, electricity or gasoline.

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; Oct. 4.

Parrott M. Co., Butte, Mont., $1.50 per share; payable Oct. 12.

Mammoth, Utah, $40,000; Oct. 4.

Swansea, Utah, $5000; payable Oct. 10. Total to date, $185,000.

Industrial Notes.

—Marysville, Cal., is building an artificial ice plant.

—Dawson, N. W. T., has telegraphic communication.

—Salt Lake, Butte and Anaconda now have telephonic connection.

—Orders are more plentiful than material to fill them with at present.

—Water and scrap iron are the two scarcest things in California at present.

—About 30,000 inches of water have been developed in southern California during '98 and '99.

—The Overton Lumber Co., Nevada county, Cal., has an order for 1,000,000 orange boxes for southern California.

—"Machinery hall is chock full," says Secretary L. K. Armstrong of the mining department of the Spokane, Wash., Industrial Exposition.

—The gross receipts of the Mexican Interoceanic Railway for the week ending Sept. 23, '99, were $72,285.19; for the corresponding week in '98, $50,740.91.

—About 10,000 acres of coal land in Santa Fe county, N. M., have been sold by the Atchison, Topeka & Santa Fe Railroad Co. to the Colorado Fuel & Iron Co.

—The Morenci & Southern Railroad is incorporated at Phœnix, Arizona, to connect with the Arizona & New Mexico road at Guthrie. The road will be twenty miles long.

—The ton, the bushel and the pound were the old terms of measurement, but are passing away. When people are asked about anything now they generally answer by the carload. It is so with ore, cattle, lumber, potatoes, fruit, etc.

—Thousands of troops leave San Francisco weekly for the Philippines. On the transports also go thousands of tons of supplies. In the hold of the Glenogle, which sailed on the 2nd for Manila, was twenty-five miles of railroad—all but the ties.

—At Denver the Colorado Fuel & Iron Co. has increased its capital stock to $25,000,000, of which $2,000,000 is preferred and entitled to 8% dividends. The directors are authorized to issue $12,000,000 additional stock in payment for property and improvements.

—The South Yuba, Cal., Water Co. is building a new reservoir at Banner Ridge, Nevada county, to supply the Union Hill and Brunswick mines with water for power. It is 800 feet long, 250 feet wide and 8 feet deep. Ten thousand feet pipe will connect the mines with the reservoir; the first 8000 feet is 22 inches diameter, the last 2000 feet 18 inches.

—This week freight rates on antimony, antimony ore, asphaltum, bituminous rock, beans, canaigre chips, copper, cement, glue, hay, hemp, infusorial earth, lumber, ore, manganese ore, chrome, rags, borax, canned salmon, rubber junk, canned goods, junk, saponified red oil, hair, cattle, blue vitriol and wine will be raised by the Southern Pacific Co., from 45 and 60 cents per 100 pounds to 75 cents from all California points to all Texas points, New Orleans, New York and Boston.

—The Utica, Cal., gold mine's owners have put in a 3000 H. P. electric generator, to operate their stamp mill and compressors. The Butte County, Cal., Electrical Co. has taken up a water right and will deliver electric power at Oroville and Chico. The Visalia plant has a 3000 H. P. and gets power from streams on Mount Whitney. It has seventy miles of pole lines and delivers power to Visalia, Porterville, Tulare and Hanford, Cal. By the aid of this plant the foothills are irrigated and have been turned into a fine fruit country. The Porterville, Cal., Light & Power Co. have purchased the plant of the Porterville Electric Light Works.

—Samuel Gompers, president of the American Federation of Labor, says: "Trusts grow and will grow, and the organization of industry upon a higher and more scientific basis will continue to grow. It seems to me the lesson it teaches should be of benefit, particularly to the wage-earners. Wherever the workers are organized and have maintained their organizations their wages are higher and hours lower and conditions better, in spite of combinations of capital. Instead of trusts and combinations of capital opposing and antagonizing the labor movement they should take a more comprehensive view of the situation and try to make better friends of the organized wage-earners than they have done in the past. Organized labor will aid in formulating a proposition controlling the trusts."

Rock Drilling Contest.

At the annual Festival of Mountain and Plain at Denver, Colo., last week there was a three-days' rock-drilling contest in which eleven teams competed: the winners, McGilvray and Carboneau of Victor won first prize with a bore of 38⅝ inches. Following are the names of the teams and their records in the competition:

McGilvray and Carboneau, Victor	38⅝
Andregg and Chamberton, Cripple Creek	38 5-16
Lyons and Sapp, Altman	36¾
Hupps and Lindgren, Ouray	35⅝
Martelon and McCloud, Idaho Springs	35 1-16
McKenzie and Trewick, Leadville	34 15-16
Humphreys and Kirkbride, Gold Hill	34 7-16
Delphy Bros., Black Hawk	33¼
Coughlin and Pittman, Gold Hill	33 3-16
Ecker Bros., Black Hawk	32 5-16
McGowan and Dougal, Prescott, Ariz	32 1-16

Time allowed for each team, 15 minutes.

Personal.

F. W. PAGE is appointed Supt. Blue Gravel mine, Yreka, Cal.

W. B. WILSON is now Ass't Supt. Le Roi mine, Rossland, B. C.

N. S. BERRAY is now Supt. Commonwealth M. Co., Pearce, Arizona.

GEO. W. TEAL is now Supt. Pennsylvania group of mines, Boulder, Colo.

ERWIN D. TREADWELL is the new manager of the smelter at Big Bug, Arizona.

M. M. KETCHUM is the new Supt. at the United Copper M. Co., Cuprum, Idaho.

M. C. MURTAGH is Gen'l Mgr. Idaho Consolidated M. Co., Golden Gate, Idaho.

J. C. CAMPBELL is the new Supt. of the Mountaineer mine, Nevada county, Cal.

WARREN CABLE has charge of the White Elephant and Booth mines, Sumpter, Or.

COL. ALEX. MAJORS, now in his 86th year, is locating mining claims at Republic, Wash.

JNO. SUTHERLAND is the new Mgr. of the Golden Horseshoe M. Co., West Australia.

PROF. S. H. EMMENS of "Argentaurum" fame, is now president N. Y. Liquid Air Co.

E. H. KIRBY of Denver, Colo., succeeds J. B. Hastings as Mgr. War Eagle M. & D. Co., B. C.

F. HEURTEVANT, managing owner Red Hill mines, Trinity Co., Cal., has returned from Paris.

A. B. CALL is now superintendent of the S. Hardman gold mines at Goldenville, Nova Scotia.

D. E. BIGELOW of the Union Iron Works, San Francisco, has returned from a northern business visit.

FRED'K IRWIN will superintend the boring of the 6300-foot tunnel at War Eagle mountain, Idaho.

P. W. GATES of the Gates Iron Works Co., Chicago, Ill., has returned from a business trip to Europe.

B. I. WHEELER has arrived at Berkeley, Cal., from Cornell, and taken charge as president of the University of California.

R. N. TRUMAN will return from London on the 15th inst., to assume charge of the Ray Copper M. Co., Riverside, Arizona.

J. W. NEILL, Gen'l Supt. U. S. Mining Co., Utah, is in Boston conferring with officials of the company as to the building of a smelter.

GEO. T. RIVES, Supt. Golden Cache Con. M. Co., British Columbia, is in San Francisco buying machinery and a 50-ton cyanide plant.

A. W. ROBINSON, engineer Bucyrus Co., South Milwaukee, Wis., who recently returned from a trip to Europe, is visiting the Pacific coast.

W. S. KEYES, who has been in Montana and Utah as expert in law suits in progress or about to commence in those States, has returned to San Francisco.

S. W. DORSEY of Colorado has been in the Picacho district, San Diego county, Cal., with a party of mining men, investigating the mines of that district, in which he is interested.

W. G. DODD of the Union Iron Works of San Francisco, has returned from a four months trip through the Orient, visiting the American mines in the vicinity of Chemulpo, Korea.

JNO. HOWELL, formerly of California and Nevada, and later prominent in connection with the Broken Hill Proprietary, Australia, is now Supt. Bora Creek silver-lead mine, Inverell, Australia.

E. G. STOIBER of Silverton, Colo., is locally reported to have sold his interests in San Juan county, including the Silver Lake property, to New York and Boston men for $2,000,000.

R. C. TURNER, who for several months past has been operating a hydraulic mine in Plumas county, Cal., has gone to Sonora, Mexico, to take the superintendency of the Santa Rosalia mine, which is owned in San Francisco.

F. HAIGHT of Salt Lake City, from Anvil City, reports another "strike" at Cape Prince of Wales, 100 miles north of Cape Nome. He thinks there may be gold there—probably a stretch of gold beach from Cape Nome to Cape Prince of Wales.

S. H. LUCAS, who for several years has been operating the Garner mine on the Mokelumne river, Cal., near Big Bar bridge, has gone to Lower California to look into the mining situation in that section. Mr. Lucas was formerly interested in Lower California mines.

JNO. W. BURTON says of the Klondike that the reports of enormous fortunes secured in that country are either exaggerated or pure fabrications. He is personally acquainted with seven men who were helped out of the Copper river country by the Government, and the steamboat company sent off a report that each of them had with them fortunes of $20,000 to $30,000, when, as a matter of fact, they were sick and destitute. Mr. Burton did work for himself on some of the tributaries of the Yukon, but found it difficult to make enough during the open weather to keep soul and body together during the long and dreary winters.

Obituary.

D. B. GILLETT, a well-known mining man, recently in charge of reduction works at Silver City, N. M., died at Enfield, Mass., on the 23rd ult.

JOHN MELTON, a prominent El Dorado county, Cal., miner, died at Placerville, Cal., on the 30th ult.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BARK CUTTING AND REDUCING MACHINE.—J. C. Hagerty, Santa Cruz, Cal. No. 633,646. Dated Sept. 28, 1899. The object of this invention is to provide an improved machine for cutting, shaving or reducing bark to a fine condition in preparation for its further use for the purpose of tanning or other uses to which it may be put. The invention consists of an enclosing casing and a disk revolvable therein. Obliquely disposed collars are fixed to the disk and an obliquely disposed feed chute opens through the side of the casing. A correspondingly concaved shear plate has its edge beveled to coincide with the inclination of the chute and by this the cutting is effected. Pins or lugs are fixed to the disk and to the interior of the case so that they pass each other; they loosen up any bark which is inclined to lodge within the case.

OIL BURNER.—August Johnson, San Francisco, Cal., assignor to the Oil Fuel Saving Company, of same place. No. 633,761. Dated Sept. 28, 1899. The object of this invention is to provide an apparatus for the combustion of oil to be used in furnaces. It consists of a combination of a mixing and burner tubes with peculiarly fashioned discharge nozzles, and means for regulating the supply of air and oil thereto. The exterior tube has the front flattened to form a horizontally divergent opening and a segmental interior tube has its upper portion essentially coincident with the curvature of the corresponding part of the outer tube. It has a flat bottom whereby air passages of different areas may be formed in the upper and lower part of the outer tube. A compress flattened nozzle is formed at the front of the inner tube and discharges centrally through the opening of the outer tube and an upwardly inclined neck is formed so that the air discharged from the lower part of the outer tube is deflected upwardly to intersect and mingle with the vapor escaping from the inner tube. An oil supply pipe leads into the inner tube, and there is also an inclined divergent deflector upon which the oil is received. Through a suitable inlet air is supplied to both the inner and outer tubes, and, by means of a suitable damper, the passages may be connected or separated from each other at will to regulate the supply of air into the two parts of the burner.

SAIL RIG FOR SHIPS.—A. V. Smith, San Francisco, Cal. No. 633,705. Dated Sept. 28, 1899. The object of this invention is an improved arrangement of sails by which the pressure of the wind is better applied to the propulsion of the vessel and the pressure on certain portions of the sails may be relieved when tacking ship or going about in sailing on the wind. The sails can also be handled with much less force of men than in the ordinary arrangement. It consists of one or more rectangular frames with netting stretched thereon, these frames being turnable upon a vertically arranged spar in line with and at the rear of the mast. The sails which are carried upon these frames are an upper one having its upper horizontal edge seized or secured to the framework and the other edges convergent to a point below, and other triangular sails having their outer vertical edges similarly secured to outer portions of the framework, and they are so shaped that when the angular points are drawn toward the center they combine with the upper sail to form a complete sail. By means of suitable sheets the point of either of these sails can be relieved when the vessel is to go about, and at the proper time the lower point of the larger first-named sail can be allowed to move back upon a diagonal stay which extends between the masts, a ring or traveler being fixed to the lower point of this sail to allow it to thus move. Counterbalance weights are also used in conjunction with the sheets and may be carried below the deck, the lines therefrom passing over suitable direction pulleys.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING SEPTEMBER 26, 1899.

633,638.—TIRE CEMENT—Burr & Hendrickson, San Fernando, Cal.
633,804.—BURIAL VAULT—J. N. Chamberlain, Dallas, Or.
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633,671.—TOY TORPEDO—Z. Valdez, Los Angeles, Cal.
633,978.—HORSE POWER—G. D. Wilson, Pomeroy, Wash.
31,556.—DESIGN DRIP PAN—J. Mugford, Puyallup, Wash.

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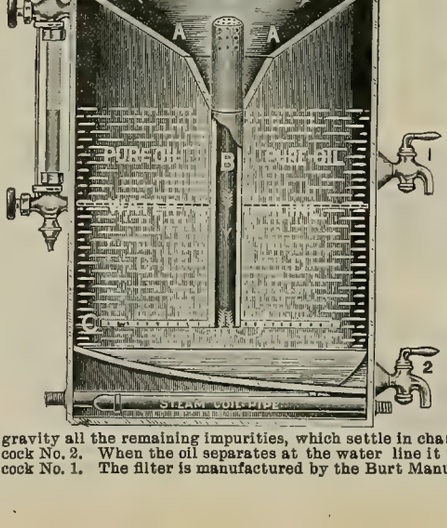
"Smooth On" Castings.

In ordinary foundry practice many iron castings are rejected which could as well be saved. Their strength is not affected by blemishes; the only reason for dumping them on the scrap heap is their appearance. "Smooth On" castings will make a leaky casting steam-tight, and the way it cures such defects as blowholes, shrinkholes and other common blemishes is a revelation. "Smooth On" is not a mere filling. It is a dry, metallic composition, which, upon being mixed with water, becomes a hard metallic iron that is insoluble in water, petroleum or oils; that will withstand an intense heat, and, the expansion being the same as iron, is why it is sometimes called magic iron. This material can be finished, polished and hammered, and when applied to a blemish in a casting by skilled mechanics the blemish is removed.

Hundreds of breaks or fractures in hydraulic machinery, leaks in connections on steam or water work, have been permanently and cheaply repaired. Difficult flange connections on cast iron and wrought iron piping can be made with this plastic material, as it adapts itself to the flange faces whether parallel or not. It takes care of the boltholes, as well as the patches on boiler work, in place of red and white lead and iron fillings, commonly used for such purposes.

The manufacturers of this material are practical chemists. All materials are carefully prepared and tested, to obtain the best results and maintain the highest standard of efficiency. "Smooth On" castings is manufactured by the Smooth On Mfg. Co. of Jersey City, N. J., and Messrs. Madison, Bruce & Sellers, 34-36 Steuart St., San Francisco, are the agents for Pacific coast. *

Warden Oil Filter.



Herewith is an illustration of the Warden Oil Filter.

The bottom chamber *D* is filled with pure warm water heated by a steam pipe passing through the filter under the false bottom; little steam is required, and if the filter is kept in a warm place it will not be necessary to make steam connection.

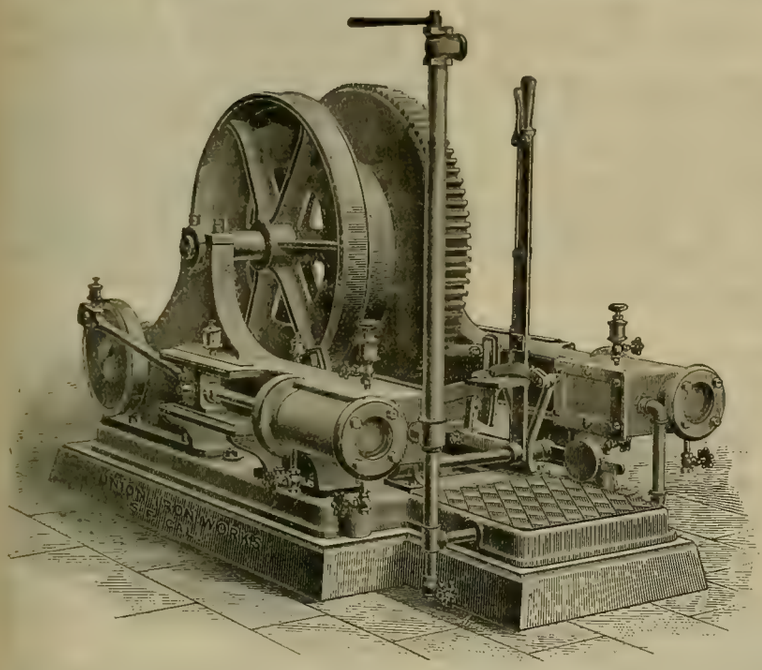
The waste oil is poured in at the top of filter, then passes through the pan of waste which collects nearly all the impurities. This pan extends to the nickel-plated rim, and the oil must pass through the waste before it flows into the tube *B*, thence into chamber *A* and through the perforated tube *B* down as shown by arrows, and on to perforated filter plate *C*, where the increased weight of the water has a tendency to keep the oil back in the tube *B*. The pressure of oil in chamber *A* forces it down and spreads it out over the plate *C*, in a THIN FILM which constantly changes surface and grows thinner as it travels from the center to the circumference of plate, thus exposing EVERY PARTICLE of waste oil to the action of the water. When the oil leaves the filter plate it is thoroughly mixed with the water which washes it out and separates by gravity all the remaining impurities, which settle in chamber *D* and can be removed through cock No. 2. When the oil separates at the water line it is pure and can be drawn off from cock No. 1. The filter is manufactured by the Burt Manufacturing Co., Akron, Ohio.

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DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

For Prospecting Purposes or Underground Work,

USING COMPRESSED AIR.

The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

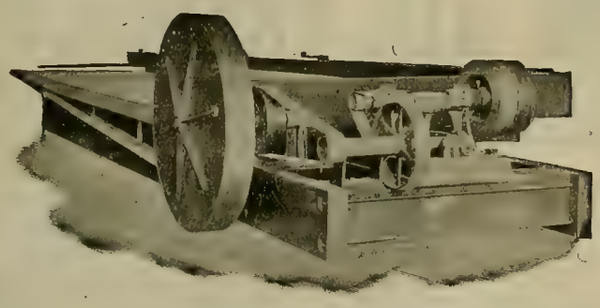
The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

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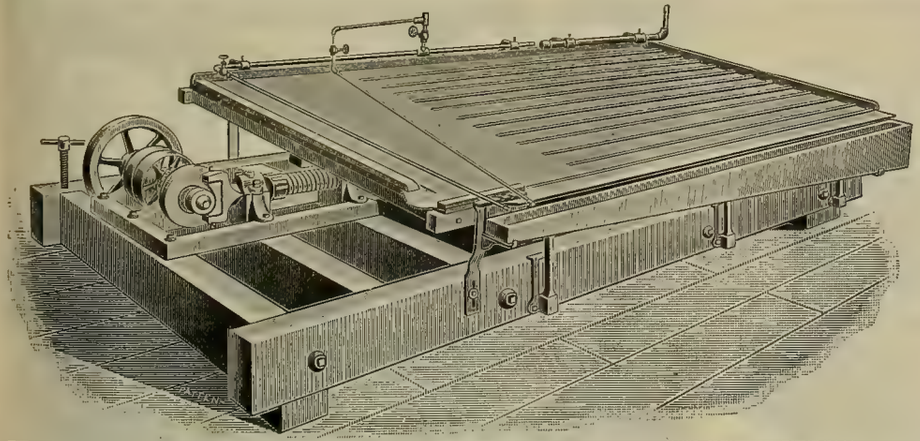
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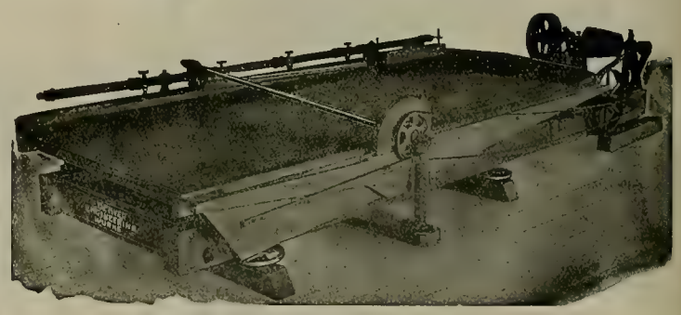
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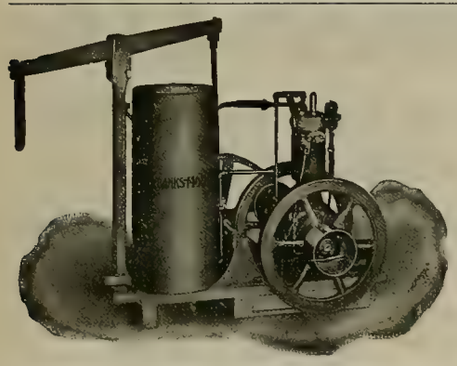
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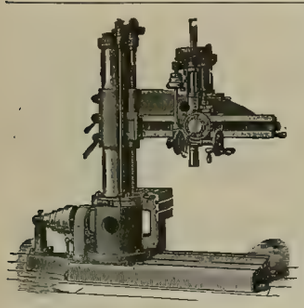
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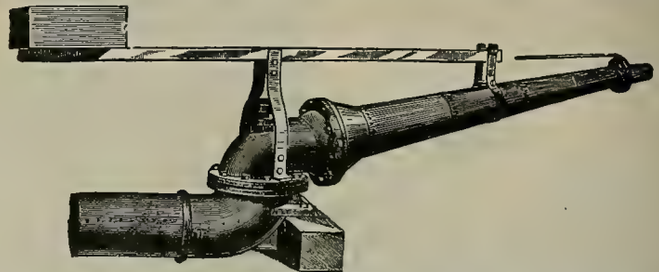
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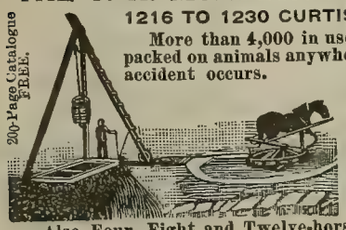
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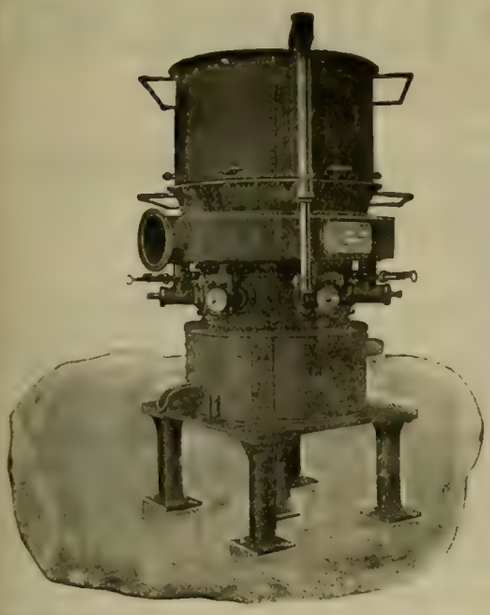
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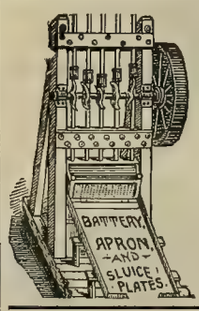
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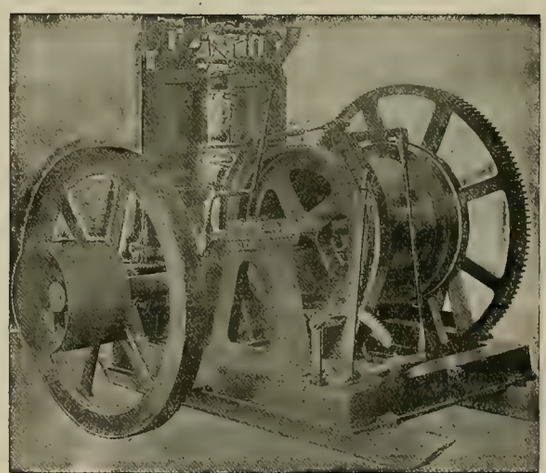
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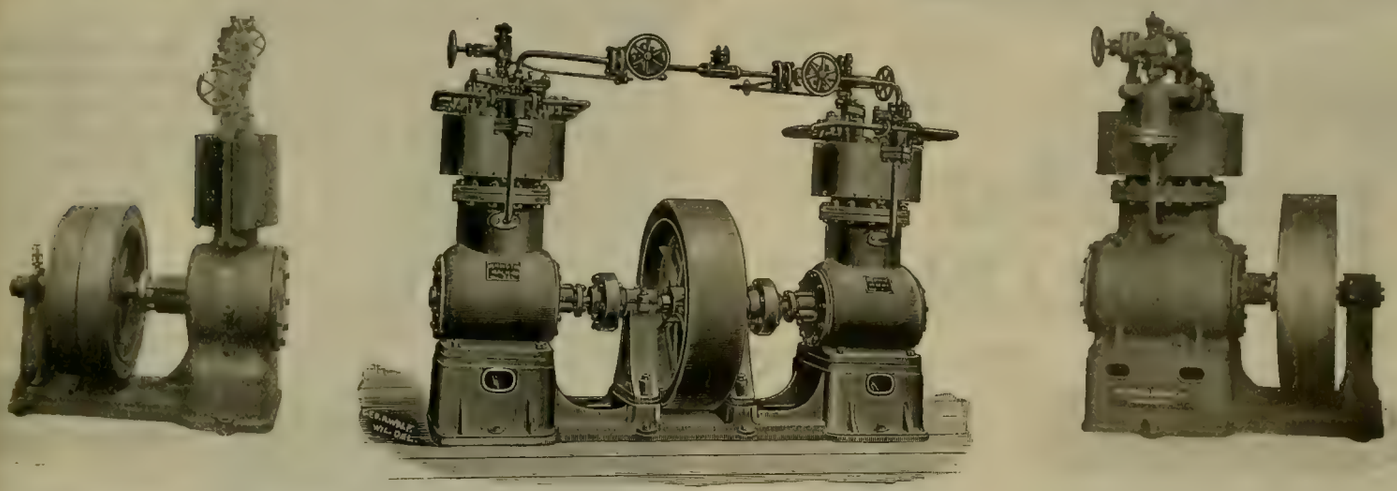
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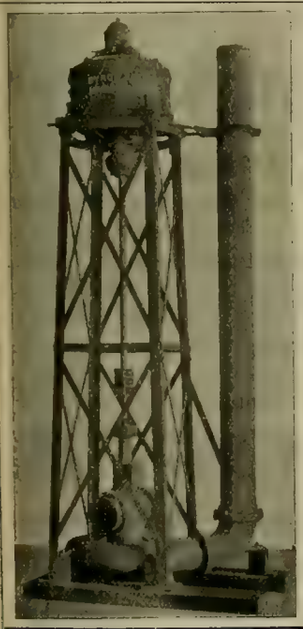


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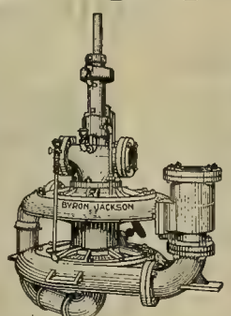
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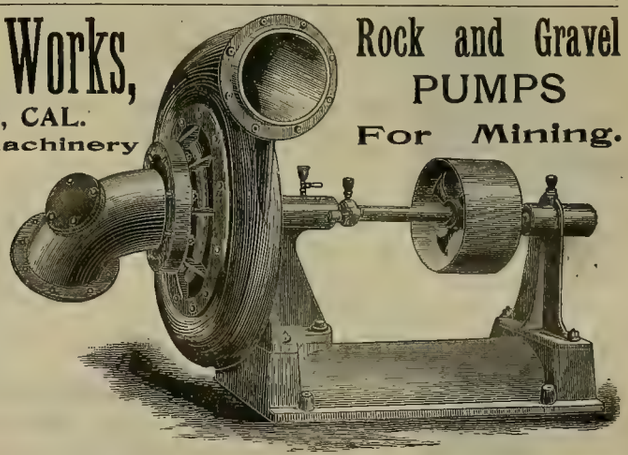
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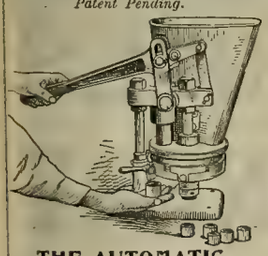


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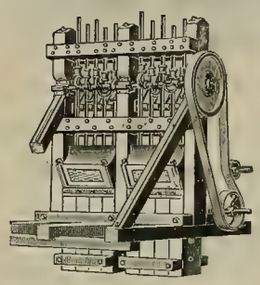
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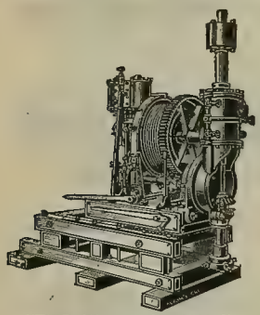
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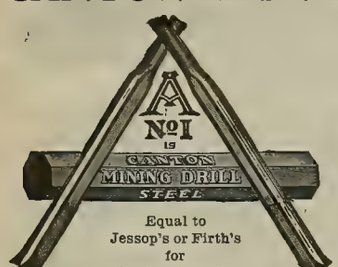
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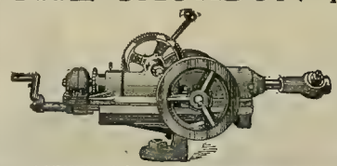
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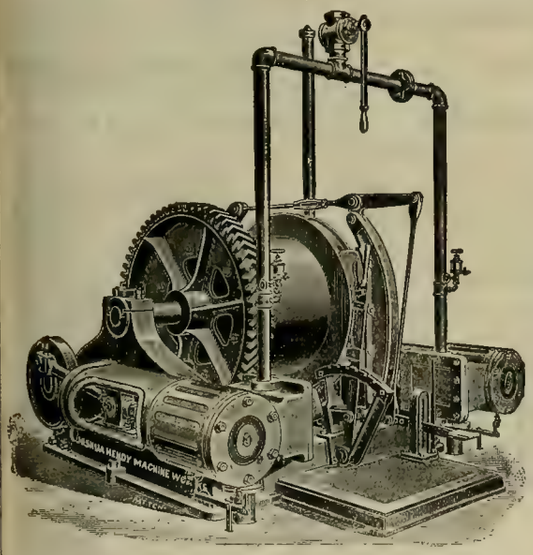
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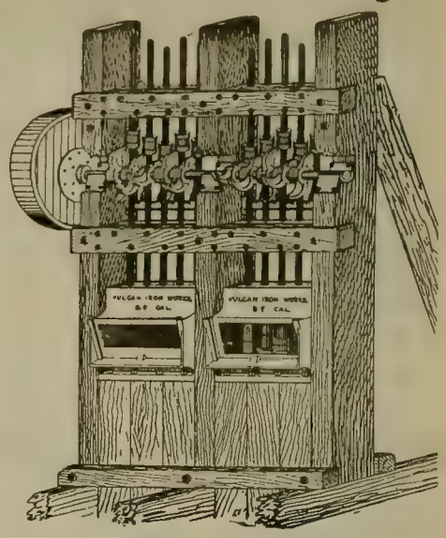
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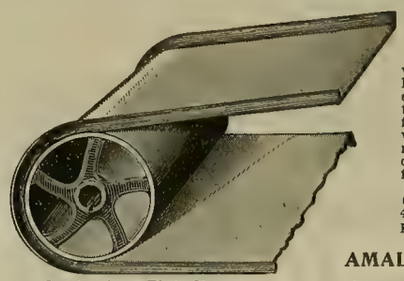
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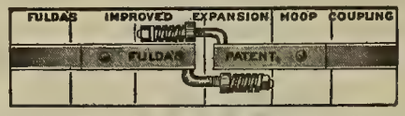
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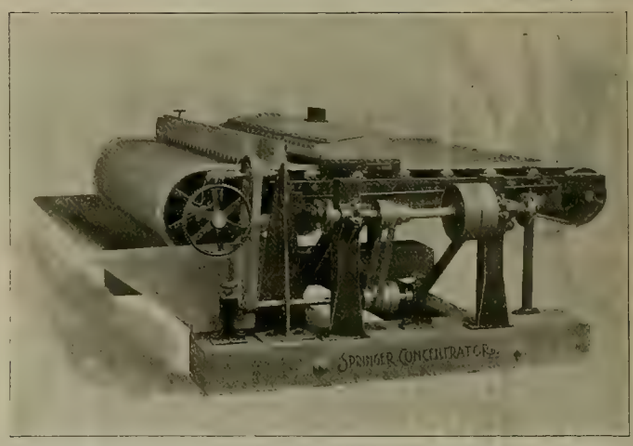
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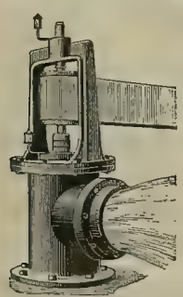
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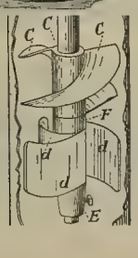


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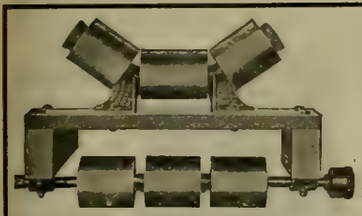
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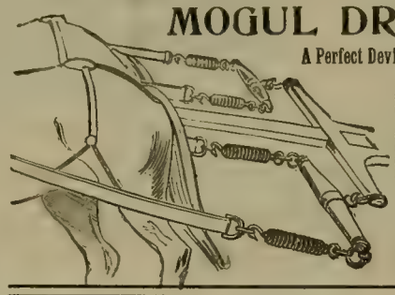
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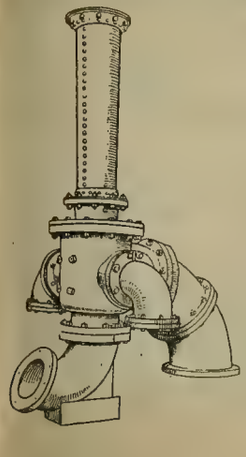
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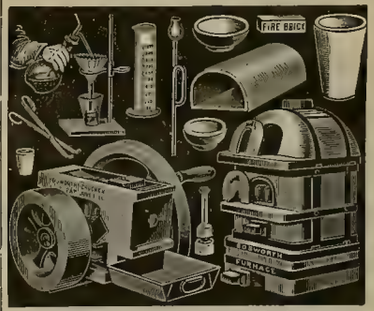
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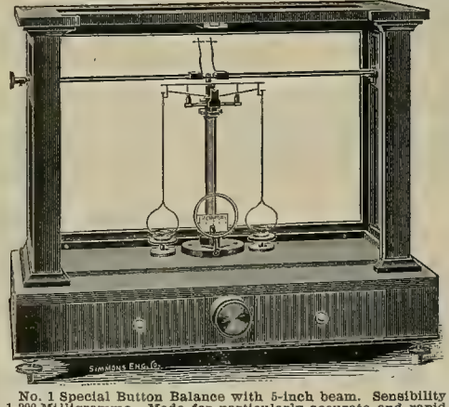
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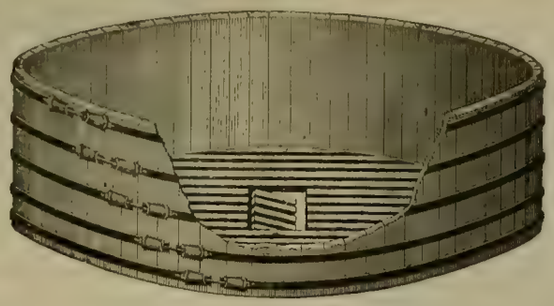


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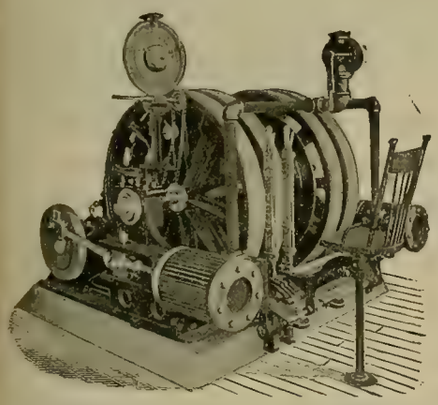
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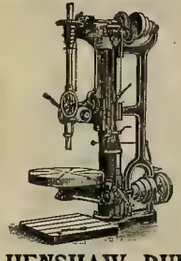
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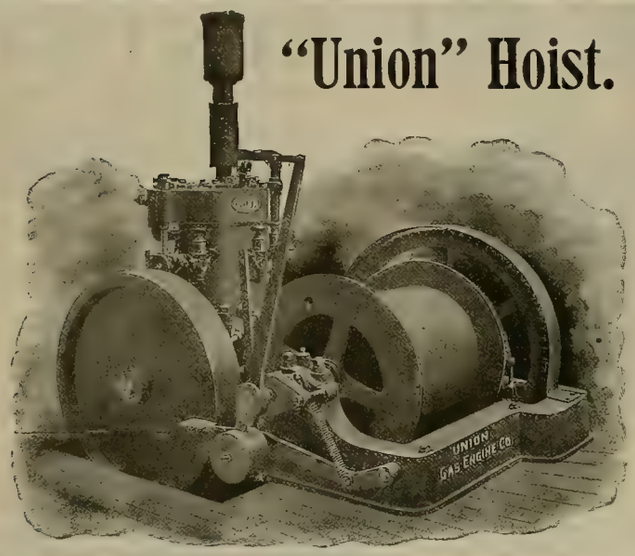
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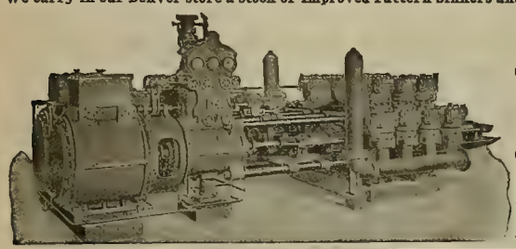
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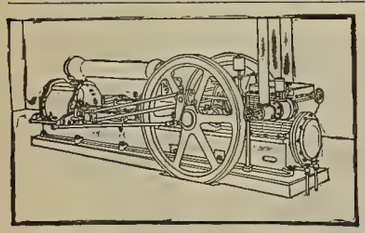
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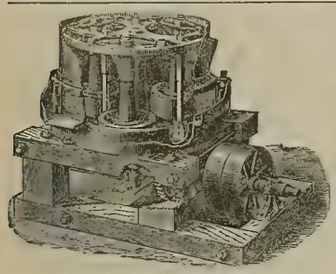
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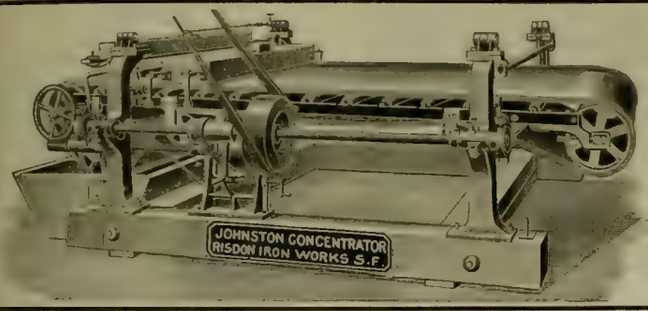
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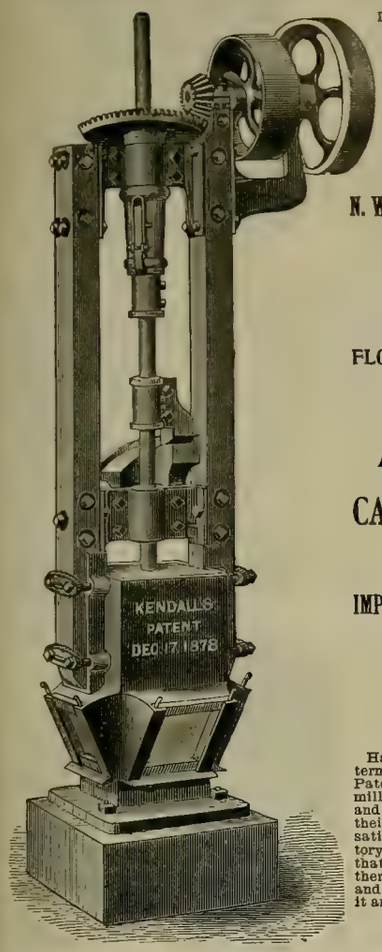
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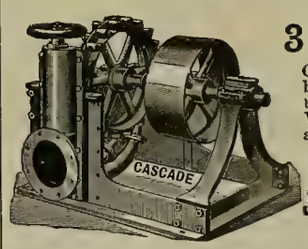
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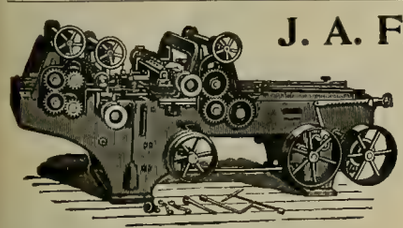
Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.



JAMES LEFFEL & CO.

SPRINGFIELD, OHIO, U. S. A.



Double Cylinder Planer and Matcher.

J. A. FAY and EGAN CO.,

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Wood Working Machinery

— FOR —

Box Factories, Planing Mills,

Sash Door and Blind Factories,

Carriage, Wagon and Agricultural Shops.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.



TUTTHILL Patent Water Wheels.

Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

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OAKLAND IRON WORKS,

330 Market Street,

Room No. 610. SAN FRANCISCO, CAL.

THE BUCYRUS COMPANY,

DESIGNERS AND BUILDERS OF

DREDGES, STEAM SHOVELS, EXCAVATING MACHINERY, WRECKING CARS, LOCOMOTIVE CRANES, PILE DRIVERS, CENTRIFUGAL PUMPS, WITH SIMPLE, COMPOUND OR TRIPLE EXPANSION ENGINES,

MACHINERY FOR PLACER MINING.

SOUTH MILWAUKEE, WISCONSIN.

ADAMANTINE SHOES AND DIES.

CHROME CAST STEEL.

CANDA Improved Self-Locking CAMS.

TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.



These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.



Canda Cam.

H. D. Morris Co.,

Room 42, Crocker Building, San Francisco, Cal.,

Pacific Coast Sales Agents.

All miners who have used the

TRUAX

Automatic Ore Cars

say they are the best cars on the market.

OVER THREE THOUSAND IN USE.

Manufactured in San Francisco, Cal., by

THE TRUAX MFG. CO.,

114 FIRST STREET.

IMPROVED 1898.



Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898.

In Canada: June 21, 1898.

Manufactured in Denver, Colorado, by

THE TRUAX MFG. CO.,

1717-1719 WAZEE ST.

We make all kinds of Cars, Skips and Charging Carts for the Mine, Mill and Smelter.

SEND FOR PAMPHLET.

Dealers Wanted in Mining Sections to Handle the Truax Ore Cars.

DEWEY, STRONG & CO., Patent Solicitors, 330 Market St., San Francisco, Cal.

Market Reports.

SAN FRANCISCO, Oct. 5, 1899.

SILVER.—London, 26⅝d; New York, 57¾; San Francisco, 57⅜@58⅝; Mexican Dollars, 47⅛@48¾; New York exchange, sight, 12½; telegraphic, 15 cents premium.

Silver is slowly falling, the past week having seen a further reduction in price of a small fraction. Eastern cities are still unable to obtain the necessary silver for daily use in trade.

LEAD.—New York reports quiet, $4.60 bid, $4.65 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake very quiet at $18.50; brokers' price, $18.37½@18.50. Local—Mill copper plates, 23¾c.

The consumption of copper continues large, and the mills are busy, but the market is quiet. The Calumet & Hecla and other producers are asking 18¼c. Buyers seem to entertain the idea that there is nothing to be lost by deferring purchases, and are therefore disposed to postpone buying. The arrival at Baltimore of an additional lot of over 500 tons of Chili bars from England is noted, where in pursuance of a contract recently made the Chili copper thus imported is to be remelted into other shapes of commercially refined copper.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Firmer, $32.30 bid; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $46; export, $41@41.50; carload lots, special rates.

Within the past week another small raise in the price of quicksilver for export is noted, while the price for domestic remains unchanged.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c per 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	13¼	16
12-thread (⅜ dia)	14	16½
6 and 9 thread (¼ and 5-16 dia.)	14½	17
Bale Rope (3 and 4 strand)	13½	16
Bale Rope (2, 6 and 8 strand)	14	16½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 5, 1899.

9:30 A. M. SESSION.

300 Best & Belcher	38c	100 Ophir	$1 00
100 Caledonia	72c	400 Overman	20c
100 Con. Cal. & Va.	$1 45	1000 Potosi	52c
50 Gould & Curry	36c		

2:30 P. M. SESSION.

400 Andes	11c	300 Overman	22c
200 Chollar	39c	1000 Potosi	52c
100	40c	500 Syndicate	06c
100 Crown Point	18c	100 Union Con	38c
100 Ophir	$1 00		

Mining Stocks and Securities for sale. Purchaser guaranteed against loss. Correspondence solicited from people wishing to buy Stocks and Securities, and also from brokers and others who are able to dispose of Stocks and Securities.

Address **E. N. BREITUNG,**
Marquette, Mich., U. S A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

S. O. Graham, J. H. Garrett. J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

A BIG SALE.
All the oil lands of the Union-Consolidated Oil & Transportation Company have been bought by us.
WE HAVE OIL LANDS
In Merced, Contra Costa, San Mateo, Santa Clara and Colusa counties. Oil in 60 days our experts claim. Shares now at 35 for a limited time only. Particulars on application. New York references.
AMERICAN OIL and REFINERY COMPANY,
Rooms 322–323 Parrott Building,
SAN FRANCISCO, U. S. A.

Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from A. B. Jacks, in the Badger Hill mine, near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek and Woods Ravine, and from John O. Smith et als., in the Smith's Blue Gravel Mine, near Ono, Shasta Co., to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 9, 1899, at 1:30 P. M.

Mines for Sale.
A specialty made of properties in Mexico and the Southwest. I have orders for *large, developed* and *producing* gold and copper mines. Must have good reports, maps, etc.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
California Gold and Copper Properties in Shasta and Trinity Counties.
Working bonds on undeveloped claims. Contract work superintended for absentee purchasers.
PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

FRED C. MILES,
CISCO, PLACER CO., CAL.
Gold and Copper Mines for Sale
AT VERY REASONABLE PRICES.

WANTED.—POSITION BY EXPERIENCED cyanide man and mining engineer, preferably in charge of a cyanide plant. Am a thorough chemist and assayer. Technical graduate. Salary moderate. Best of references. Address K. C. N., care this paper.

WANTED—For Eastern syndicate, developed and paying gold mine; no limit as to price. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

LOST. 500 SHARES SANTA ROSALIA Mining Company's stock, Certificate No. 210, in name of H. M. LARUE. All persons are cautioned against negotiating the same, as transfer has been stopped.

MARBLE QUARRY FOR SALE.
Group claims with beautiful tinted and variegated marbles for sale at low figure. Immense deposit. Fifteen miles from railroad. Interested parties address BOYER & HUBBELL, Dos Cabezos, Cochise County, Arizona.

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SUMPTER,
OREGON.
We can make you money on SUMPTER REAL ESTATE AND MINES.
Write for information as to prices of LOTS, BUSINESS INVESTMENTS and MINING PROPERTIES.
ERWIN & CO.,
Real Estate and Mining Investors,
SUMPTER,.....OREGON.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.
The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.
TRADE MARK.



(M'ARTHUR-FORREST PROCESS.)
Gold Medal, Columbian Exposition, 1893.
MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by
The MacArthur-Forrest Cyanide Process,
ALMARIN B. PAUL, Agent,
27 Crocker Building, San Francisco, Cal.,
for California north of and including Mono, Madera and Merced counties; also for State of Nevada.
Samples assayed and fully reported upon. Particulars upon application.
Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; William Russell, Chief Chemist.
OFFICE: McPHEE BUILDING, DENVER, COLORADO.

Trade Mark. Trade Mark.



Jena Normal Glass,
THE BEST LABORATORY WARE MADE.
Everything necessary for the
Assayer and Chemist
will be furnished of best quality at *reasonable prices.*
UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.
EIMER & AMEND,
205-211 Third Ave., NEW YORK.

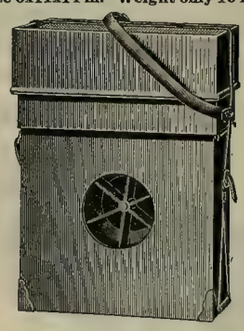


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A SPECIALTY.
Diagonal Slot,
Straight "
Burred "
Round Holes.
In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

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544A MISSION STREET, bet. First and Second Sts., SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

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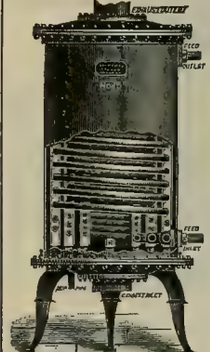
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—THE—
PNEUMATIC PROSPECTOR.
Size 6x11x14 in. Weight only 10 lbs.



PACKED FOR MOVING.
NO WATER NEEDED.
Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

THE PNEUMATIC SEPARATOR.
Weight 160 lbs.
Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.
SEND FOR DESCRIPTIVE CIRCULAR.
P. P. CUPLIN,
Inventor and Manufacturer.
WEST BEND, IOWA, U. S. A.

THE NATIONAL



Feed Water Heater.
800,000 Horse Power Sold.
Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the Best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY. Send for Catalogue.
HENSHAW, BULKLEY & CO., Agents,
SAN FRANCISCO, CAL.



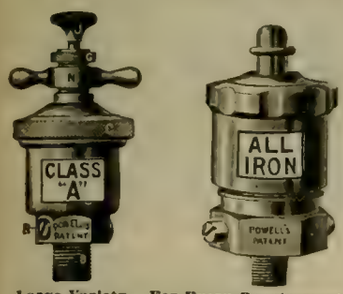
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A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St. S. F.



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SAN FRANCISCO Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices.
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
—MINING SCREENS A SPECIALTY.—
221 and 223 First Street, San Francisco, Cal.

Skeleton Mining Report.
NEEDED BY EVERY MINING MAN.
FIFTY CENTS POSTPAID.
Mining and Scientific Press, 330 Market St., S. F

POWELL'S GREASE CUPS.



Large Variety. For Every Requirement.
FEED adjustable the entire length of Cup.
CUT-OFF in base regulates the flow.
Any Supply House on the Pacific coast can furnish them.

The Wm. Powell Co., Cincinnati, O.
Manufacturers.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 8) levied on the 9th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
W. G. Loewe	122	500	$50 00
E. Hartmann	136	500	50 00
G. F. Schwarz	209	50	5 00
M. Ils-Baird	158	1000	100 00
J. H. Pein	200	500	50 00

And in accordance with law, and an order from the Board of Directors, made on the 9th day of August, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission St., San Francisco, California, on WEDNESDAY, the 11th day of October, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

GEO. W. FLEISSNER, Secretary.
Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

DELINQUENT SALE NOTICE.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Forest Hill Divide, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 10th day of August, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Guy C. Earl	73	800	$4 00
Guy C. Earl	161	320	1 60
D. M. Kent, Trustee	273	1,867	9 33½
Mrs. Elizabeth Weaver	315	500	2 50

And in accordance with law, and an order from the Board of Directors, made on the 12th day of September, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction at the office of the company, No. 1209 Claus Spreckels building, San Francisco, California, on SATURDAY, the 7th day of October 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. J. CRAWFORD, Secretary.
Office—1209 Claus Spreckels building, San Francisco, California.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each. JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

Established 1852. Incorporated 1895.

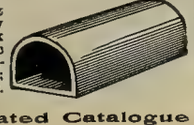
John Taylor & Co.,

63 First Street, San Francisco, Cal.
Manufacturers and Importers of

Assayers' Material,



FURNACES, SCALES, BALANCES, WEIGHTS, ETC.
ALSO, MINE AND MILL SUPPLIES, CHEMICALS AND CHEMICAL APPARATUS.



Agents for Baker & Adamson's Chemically Pure Acids. A full stock always on hand. Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.

New Illustrated Catalogue on Application.



REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO.
AKRON, OHIO.
Largest Manufacturers of Oil Filters in the World.

Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of September, 1899, an assessment (No. 20) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHARLES BOVONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1899, an assessment (No. 1) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of October, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 28th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
J. W. PEW, Secretary.
Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

CONSOLIDATED CALIFORNIA & VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of September, 1899, an assessment (No. 14) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 1st day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
A. W. HAVENS, Secretary.
Office—Room 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of September, 1899, an assessment (No. 13) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
JOSEPH H. MOOSER, Secretary.
Office—320 Sansome street, room 24, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1899, an assessment (No. 33) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHARLES E. ANDERSON, Secretary.
Office—Room 31, 10th floor Mills building, San Francisco, California.

ANDES SILVER MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

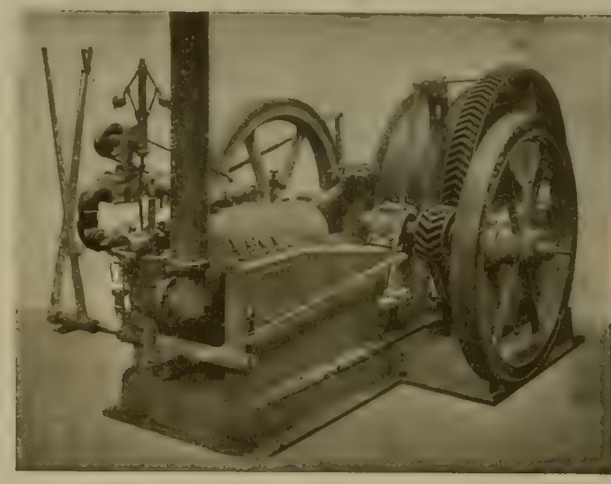
Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of October, 1899, an assessment (No. 49) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of November, 1899, at 1 o'clock P. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
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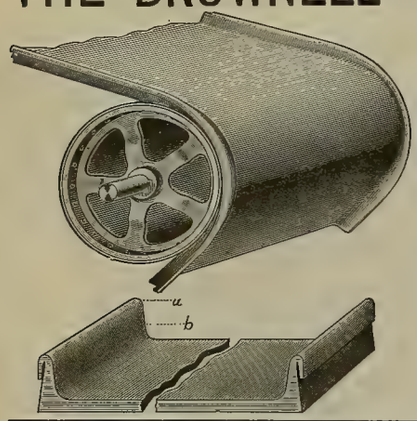
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AMADOR CITY, CAL., Feb. 18, 1897.

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By JOHN R. TREGLOAN, Superintendent.

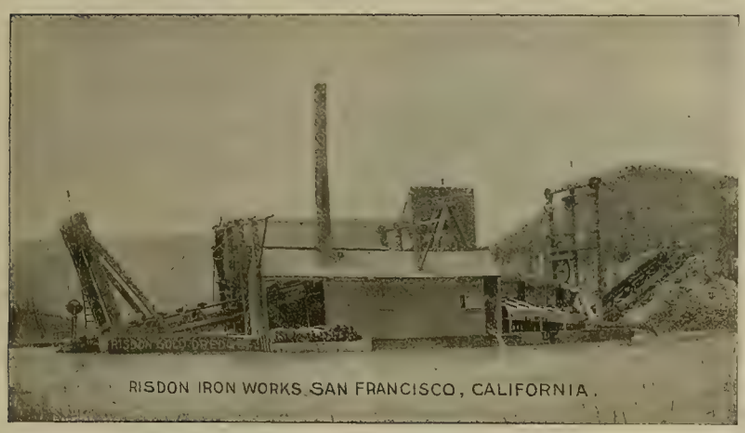
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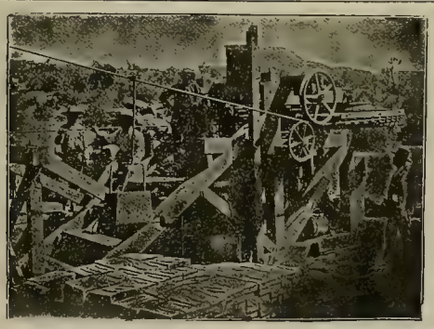
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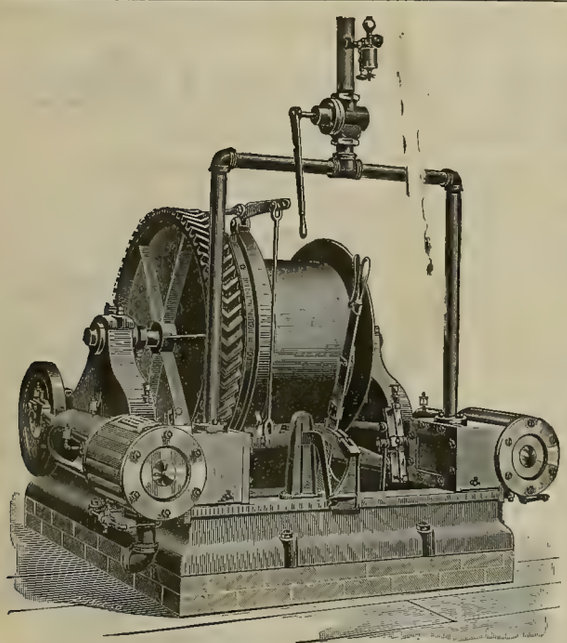
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The Resources of Nevada.

The Great Basin comprises a vast tract of country lying between the continental divide of the Rocky Mountain system on the east and the Sierra Nevada on the west. The greater portion of this territory is covered by the States of Utah and Nevada. So frequently are allusions made to the "sagebrush plains of Nevada" that many have conceived the idea that Nevada consists of broad, nearly level, plains of sand and alkali, dotted with a sparse growth of the hardy sagebrush. This conclusion is erroneous, for the topography of the State is rugged. It is ribbed with a series of mountain chains extending generally in a northerly and southerly direction, with deep and fertile valleys between. The soil is fertile and only requires irrigation to make it wonderfully productive.

Its mineral resources have been proven abundantly. They include gold, silver, lead, copper, iron and numerous other minerals of economic value. The great mines of the Comstock lode have never been equaled for richness and extent elsewhere. This one great vein is credited with a production of nearly half a billion dollars in gold and silver. In the Eureka district $125,000,000 in gold, silver and lead has been produced, adding to the wealth of the world and State and also to its fame. This enormous mineral wealth has been obtained chiefly from high-grade ores, the less valuable ores still remaining; but as this is an age of extensive operation on low-grade material, the large deposits of this character still in these mines may soon add largely to Nevada's already large production.

Austin in the early '60s was one of the most prosperous mining towns in the West. Not less than $26,000,000 was taken from the veins of Lander county. As is the case at Eureka, the rich ores have produced most of the output and the low grade remains for the present and future generations to make available.

There are also Tuscarora, White Pine and Pioche, all populous and prosperous mining towns in their time, with every probability that at no very distant day the activity of the past may be renewed and a prosperity more enduring than before established. In Esmeralda county new mining camps are springing into life and a stream of copper and gold is being sent out from newly discovered mines and from old ones now worked for the first time at an advantage.



FAMILIAR MINING SCENES IN NEVADA.

The idea has become prevalent that Nevada has mines of silver only. This is a mistake, for all the silver-producing mines are producers of gold also, and in some sections the gold largely predominates. Ten years ago there were but two or three gold mines operating, strictly speaking, in Arizona. To-day Arizona has gold mines in every county, and some of them large and rich. The same condition obtains in Nevada to-day as was found in Arizona in 1890. J. R. DeLamar has gone into Nevada, depending on his own judgment and not on hearsay or tradition, and has proven that a rich gold mine existed in Lincoln county where none was supposed to be found. There is a drawback to the more rapid advancement of the development of Nevada's resources and that is a lack of railways. The natural tendency is for railroads to build in an easterly and westerly direction through the great undeveloped West, but as previously stated the topography of the country renders this a hardship, as it necessitates climbing over one range of mountains after another, which is expensive. Railroads may readily be built in a northerly and southerly direction in the valleys, however, and in time this will be done, rendering more easily accessible Nevada's mineral resources. There are still to be found great veins of lead and zinc carrying silver, and prospectors are finding valuable copper deposits. But when the active search for gold begins, without doubt Nevada will produce gold mines as readily as Utah or Arizona. On this page are illustrations of some typical mining scenes in some of the most famous of Nevada's mining districts, and also an engraving of Austin in Lander county, surrounded by hills honeycombed in the progress of the industry that gave the State its fame.



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TABLE OF CONTENTS.

ILLUSTRATIONS.—Familiar Mining Scenes in Nevada; Austin, Lander County, Nevada, 429. Section Copper Queen, Arizona, Mine, Through Open Cut, 432. Stalactites in Cave, Copper Queen Mine, Arizona, 433. Baldwin-Westinghouse Mine Locomotive, Berwind-White Coal M. Co.: Operating End of Baldwin-Westinghouse Mine Locomotive; The 50 H. P. Westinghouse Direct Current Motors for Baldwin-Westinghouse Mine Locomotive; Armature for Motor of Baldwin-Westinghouse Electric Mine Locomotive, 434. Gold Hill Mill, Baker Co., Oregon; Pomeroy Dredger, Baker Co., Oregon; Old Jordan and Galena Mine and Mill, Bingham, Utah, 435. Entrance to Timber-Lined Tunnel on Merced, Cal., Canal; Scene on Merced, Cal., Canal near Head, Looking Down Stream, 436. Latest Mining and Metallurgical Patents, 437. Kaolin Mine near Webster, North Carolina, 441.

EDITORIAL.—The Resources of Nevada, 429. The Old Times and the New; A Test in Concentration; Miscellaneous, 430.

MINING SUMMARY.—438-439-440.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 454.

MISCELLANEOUS.—Concentrates, 431. The Copper Queen Mine, Arizona, 432-433. Electric Mine Haulage, 434. Quartz and River Mining in Eastern Oregon; A Typical Utah Mine; Zinc Mines of the Missouri-Kansas Field Closed, 435. The New Africa; Progress in Metallurgy; California Canal Construction; Steel at Liquid Air Temperature; The Kimberley Diamond Mines, 436. Latest Mining and Metallurgical Patents, 437. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents, 440. Dividends from the Transvaal; Kaolin in San Diego, Cal.; New Use for Scrap Tin; A New Armor Plate; Producing Gold-like Alloy from Copper and Antimony, 441. Commercial Paragraphs; Catalogues Received; Recently Declared California Dividends, 454.

LARGE production or large tonnage in the operation of a mine does not always imply large net profits.

IN the progress of the mining suits now pending at Butte, Mont., the usual discrepancies between the judicial and scientific understanding of geological occurrences are noticeable.

A DISCONTINUANCE of the gold production of the Witwatersrand mines, which is likely to result in the event of war, is likely to have a marked influence on the commercial world, and it will undoubtedly create a panic in the London mining share market.

RAINS have begun throughout California, notably in the mining counties. It is likely that the shut-down which has resulted from the dry season will not be of long duration, and the several hundred miners who have been temporarily out of employment will soon again be occupied.

MINING COMPANIES which declare dividends without earning them do so with but one purpose in view—to sell stock to the uninitiated investor, using a portion of his money in the payment of more dividends, gradually boosting the stock and working it off at a good profit to the manipulator. Beside this scheme a lottery business is an honest, legitimate enterprise.

AN innovation is being considered in the Lake Superior copper region in the establishment of a custom mill for stamping copper ores, it being contended that it can be established as successfully as a smelter in smelting districts, besides affording aid to the development of new mines. It must be viewed as an experiment, but one which should meet with encouragement and success if properly managed.

A LARGE number of oil companies are being incorporated in California, the greater number being on a purely speculative basis. The outcome will result in the average number of successes and a large percentage of failures. Prospecting for oil is not more certain in its results than mining for metals, and until oil lines have been established by geological investigation, some of these new ventures are "wildcats."

The Old Times and the New.

A revival of the mining industry in numerous old camps which, after a season of activity, had fallen into idleness and decay is a noticeable feature of the industrial conditions prevailing at the close of the nineteenth century. Mines which a few years ago were considered worked out, or which had reached a condition where the ores no longer offered an inducement for their extraction and reduction, are now being successfully operated under improved methods, advanced knowledge of the treatment of ores and more favorable economic conditions generally. A stimulus is given by the large demand for metals, it is true, but this demand has not cheapened labor, nor have processes been cheapened thereby, though the latter have been greatly improved through the application of scientific experiment, which has resulted in a constantly increasing knowledge of the proper application of method. In every part of the mining world marked advancement has been and is still being made in the metallurgical branch of the mining industry and the results of this experience of an army of practical workers is disseminated through the medium of the publications of engineering societies and the technical press. If the knowledge gained by an intelligent scientific experimenter were retained by him and held as a priceless secret, the advancement of metallurgy would be slow, and each worker would from necessity be obliged to learn by study and experiment what another had already learned. It is this universal dissemination of valuable knowledge that has so rapidly advanced the mining business and brought about its present unprecedented condition, making success possible where a short time since failure could only have resulted from lack of this necessary knowledge. Innovations are commonly introduced and often with complete success, proving that the old-time methods were not really the best, and showing that the continuance of antiquated practice may often be abandoned with advantage. In this connection some novel experiments in deep shaft sinking and exploitation may be looked for. The most important question now being debated is whether to carry on deep mining by relay or by a single winding. The idea of breaking the shaft and offsetting the second and third sections a proper distance is one having merit, but there are questions of great importance to be determined in this matter.

The size of the engines and reels for hoisting from great depths is so great and the underground chamber required for their installation and operation would be so extensive that it may not be practicable to operate by this system in many cases, owing to the character of the ground. The getting of such heavy machinery down shafts of ordinary size is also going to offer some objections to relay stations, but it will undoubtedly prove a question of expediency in each individual case. Stage winding has not yet been tried except in a small way, hoisting by auxiliary small engines, operated by compressed air or electricity from a few hundred feet. On the other hand, a direct vertical lift of 5000 feet is an accomplished fact, and it seems that this depth may be considerably and satisfactorily increased before stage winding becomes a necessity.

A DECISION recently rendered in the Circuit Court of Colorado, while in line with the strict and literal interpretation of the law, which requires that a notice of forfeiture be published in the paper nearest the mine, seems to work hardship. In this instance the defendant carried his notice over the only trail open or passable during winter and published it in a paper printed in the county in which the mine was located, but at a greater distance from the mine than another paper printed in a town in an adjoining county. This decision is likely to lead to some fine discrimination in distances in similar cases hereafter.

IN Tuolumne county, California, nearly all the leading mines, excepting those provided with steam plants, are closed down owing to the failure of water supply, and over 600 men are out of employment as a consequence. This state of affairs must continue for several months, or at least until the rainfall refills the reservoirs of the Tuolumne Water Company, from which most of the mines of the county are supplied with power. This situation is only a recurrence of that of former years and affords material for the serious consideration of energetic capitalists looking for a legitimate field in which to make investment. It is not unlikely that the inactivity on the part of the Tuolumne Water Company may prove their own undoing.

A Test in Concentration.

A valued correspondent writes from Gilpin county, Colorado, that a series of tests have been made there in concentrating the tailings of gold ores in a typical Gilpin county mill. The machines tested were a Colorado bumping table and a California concentrator—an endless belt machine.

The figures given indicate that the test was not what it could have been, from a metallurgical standpoint. In one test the product of twenty stamps was fed to two belt machines, and the product of five stamps was sent to one bumping table. Gilpin county mills crush on an average about one ton per stamp each twenty-four hours, and the ore contains usually from 10% to 20% of sulphides—a very large percentage for concentration after stamps. This indicates that twenty tons of ore containing from two to four tons of sulphides were daily sent over two belt machines and that five tons were in the same period sent over a bumping table, but no data is given as to the actual amount of concentrates saved. To make a test of this kind more valuable, it would be necessary to know the exact amount of ore crushed and the exact amount of concentrates saved by each machine, also the relative assay value of the concentrates from each type of machine.

The meager figures given indicate that the belt machines were greatly overloaded and the concentrates were in all probability far from being clean.

In California the auriferous sulphides are usually high grade, running from $40 to $1000 per ton or over, with an average of about $100 per ton. The percentage varies from a fraction of 1% to about 6%, probably averaging in most of the mines about 2%. This small percentage and its high value have made close concentration necessary; and while it is not claimed that the best methods are in vogue in California, the saving effected is certainly very close. Usually two 4-foot belt machines are set to each battery of five stamps, and in some mills having a normal crushing capacity of two and one-half tons per stamp three 4-foot machines are set to the battery, indicating that the need of additional concentrating surface is recognized. Since careful and successful practice in California has demonstrated the needs in this direction, it is not apparent how successful concentration can be done on the heavily sulphuretted ores of Gilpin county with but two machines to twenty stamps, when these stamps should have been provided with not less than twelve concentrators. Either a dirty concentrate would result from such practice or a large amount of sulphides still remain in the tailings passing the machines. The sulphides of Gilpin county ores are low grade, however, containing from $7 to $25 per ton, probably averaging $15, and the loss may not be considered material. The figures which represent the conditions and result of the so-called test are given on page 439; and, while interesting in themselves, do not appear to constitute sufficient test.

FOR several years past the political troubles between England and the Transvaal have been growing more and more difficult of solution. Within the past few months these difficulties have multiplied and have taken more definite shape. Recently rumors of war have been frequently circulated, but through it all there was a faint hope that some means of a peaceful settlement of these difficulties might be found, but the latest press dispatches indicate that war is inevitable and may have actually commenced. The general impression appears to be that England will overwhelm the Dutch Republic, though at a heavy sacrifice of life and money. An American mining engineer, recently discussing these troubles, said: "Morally, the Boers are in the right, but the existing situation isn't business." This appears to be the actuating sentiment on the part of Great Britain, and it is not improbable that, as an outcome of the trouble, Cecil Rhodes' idea—"from the Cape to Cairo"—may materialize.

Concentrates.

A LITRE of the metric system is equal to 1.0567 quarts.

THE world's annual production of manganese ore is about 680,000 tons.

SIZING before concentration is always advisable and should be practiced.

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WOLFRAMINIUM is an alloy of aluminum, tungsten and copper; in romanium the copper is replaced by nickel.

IN a pan amalgamating mill one and one-third H. P. per ton of ore treated is usually considered essential.

MILL CONCENTRATES should be clean—free from quartz, slaty material or other debris not containing high value.

AUSTRALIA is now producing quicksilver, the Jamieson Q. Co. of Victoria making a sale of their production in August.

NARROW crushing rolls of relatively large diamter, run at high speed, are replacing broad rolls of less diameter run at lower speed.

IN mines where large timbers are used, each station at the shaft should be provided with blocks and tackle or chain blocks for handling the timbers.

THE prospector should cast aside all preconceived idea of how he should find a valuable mineral deposit and search for minerals as he may find them.

EXPERIENCE has shown that the character of wall rocks is no indication of value in a mineral vein. The most "favorable" conditions may be found, but no pay.

IT is not the miner with the heaviest hammer who can drill a hole most quickly. There is much art in striking a drill, and it can only be accomplished by long practice.

AMONG the causes for the recent advance in the domestic price of quicksilver may be mentioned the increased consumption and demand and the discounted reports regarding Spanish production and shipments.

SAND is of three kinds: silicious, calcareous and argillaceous. The former two are suitable for making mortar, but the latter is unsuited to this use. Quartz mill tailings usually make good mortar, if not too fine.

THE so-called "mineral soap" found near Otay, in San Diego county, Cal., is an ordinary clay, though containing a higher percentage of water than clays usually do. It has a peculiar greasy feel, which led to its being called soap.

THE United States imposes a duty of $4 per long ton on imported pig iron. In '98 the United States exported 50,121 tons pig iron to Great Britain. A ton of pig iron made at Pittsburg, Pa., costs about $8.25; a similar amount made in England costs about $13.

THE "Stephens process" is said to have been given a successful trial in treating "refractory tailings" at National City, Cal. Details are not at hand, but Mr. Stephens says he will send his "formula" to any mining man who wants to make tests.

ONE of the most satisfactory and successful methods of recovering fine flaky gold from beach or river sands is by sluicing over burlap, blankets, canvas or other fabric. This gives better results than riffles. The gunny sack is generally the best.

FOR deep level mining where large tonnage has to be handled, large skips are superior to cages, having been proven more expeditious and economical than the latter. They should be loaded by chutes from ore pockets under the levels and dumped automatically.

THE statement that the copper ores found in this or that mine are like those at the Anaconda or United Verde is of no significance, as copper ores of particular kinds are similar wherever found. It is a question of quantity, as well as quality, that gives value to a mine.

THE Canadian Copper Co., Cleveland, O., the Emmens Metal Co., Youngwood, Pa., and the American Nickel Works, Constable, N. J., are among the principal nickel refining works in the United States. A sample of nickel ore sent to any one of them would, doubtless, receive intelligent attention.

NOT long since uranium ores were seldom seen and little known, but recently such large amounts of this mineral have been found in Colorado that the world could be supplied from these deposits alone, and unless new uses are found for uranium, other discoveries will probably have only nominal value.

TIN has reached the highest price ever known in modern times, being about 32 cents, and lots have recently been sold in the New York market at a still higher figure. The natural inference would be that these prices would so stimulate search that new tin deposits would be found in various places.

THERE is a great variety of mill screens; among them are diagonal slot, horizontal slot, round punched, burred and smooth and wire screens. With different ores screens of various kinds give differing results. Experiments should be made to determine what kind of screen will produce the best saving at least expense.

THE large copper mines of Arizona are nearly all associated with limestone; those of Butte, Montana, are in granite; those of Lake Superior in conglomerate, sandstone and diabase; those of Ducktown, Tenn., in mica schist; those of Iron Mountain, Shasta county, Cal., for most part, in quartz porphyry; those of Idaho mostly in diorite.

IN a California mine where electric haulage is employed it is not an uncommon thing for men walking along the gangway to accidentally touch the overhead live wire with their wet hats. When this occurs they are invariably knocked down by the shock, though not otherwise injured. The voltage is sufficiently high to kill a man if he can not immediately free himself from contact with the wire; but as upon contact the victim immediately breaks the circuit by falling, it simply becomes an incident and not an accident.

THE greatest width of channel developed in the Hidden Treasure mine on the Forest Hill divide, Placer county, Cal., is 1610 feet. The white quartz channel has a length of 18,000 feet in this property. The employment of electric haulage effects a saving over animal haulage of $4.25 daily. The electric installation cost $20,000.

THE description of the Copper Queen mine, at Bisbee, Ariz., which appears herein, indicates that that property has been successfully managed under extreme and unusual difficulties, both as to the erratic distribution of the ore bodies and also in the character of some of the material through which mining operations had to be carried on.

THE "extra solution" of the Russell process is a solution of cuperous-sodium hyposulphite added to the charge after the first lixiviation of the silver chloride in the ore has been effected by the ordinary hyposulphite solution. It is claimed that the extra solution extracts an additional amount of silver which otherwise would not have been obtained.

PROBABLY Thos. A. Edison or his agent didn't say the silly exaggerations recently wired from New Mexico regarding the Ortiz mine possibilities. Then, too, it is to be borne in mind that alleged "Associated Press" dispatches, prepared in advertisement agency offices, are now published in daily newspapers as genuine press dispatches at so much per line.

LONG TIMBERS, boards, pipes, etc., to be lowered into a mine should be secured beneath the skip or bucket, this method being much safer than placing them in the bucket, and makes them far easier to handle, either at the surface or at the level where they are to be used. Where a shaft is inclined, a slide may be built between the tracks by nailing in two planks.

IDLE in a yard in Yuma lies a large four-wheeler built to freight ore from Castle Dome to the Colorado river—long the largest wagon in the territory, but now exceeded by a California wagon used by the Fortuna M. Co. to freight from Blaisdell, of which the bed is 20 ft. long, 5 ft. deep; the wagon weighs 7300 lbs. and carries ten tons when drawn by twelve mules.

UNDER all ordinary conditions, a battery crushing two tons or more of rock per stamp in twenty-four hours, should have two 4-foot belt machines for concentrating the sulphides, amalgam, gold and other valuable material of high specific gravity passing over the plates, whether the ore contain a large percentage of such material or not. If large—above 5%—another machine is advisable.

THE development of a mine should always be planned in such a manner as will permit the most economical handling of ore and waste when the mine is thoroughly opened and operating on a working basis. The work of exploration should always be carried well in advance of stoping, in order that there may be no delays during the sinking of shafts or while other exploratory work is in progress.

WHEN providing power for mining operations, it is economy to allow a good factor for safety and to put in a plant affording 50% to 100% more power than actually required. This will usually result in obviating delays and expenses for repairs, such as often occur to small plants taxed to their fullest capacity, and the work may be conducted without stoppage and the plant is prepared for an emergency.

TO REMOVE pieces of a broken drill from a bore hole, Prof. J. E. Woodland of the University of Worcester, O., constructed in the University laboratory an electro-magnet and 600 feet of insulated wire was secured for the connection. The magnet was made of soft steel rod 1¼ inches in diameter and 3 feet long. It was wound with four layers of wire, leaving 4 inches of the end of the rod bare. The pieces of the broken drill were removed.

A MINER must always look for all the peculiarities and irregularities occurring in his vein or ore deposit. Sometimes a small seam, if followed, leads to a large and valuable ore body. The greatest and richest mass of ore known—the Big Bonanza of the Comstock lode—was found by persistently following a small seam containing a little ore. A seam leading out from an ore body of the Copper Queen mine, Bisbee, Ariz., was noticed but was not followed until years later, when it led to a much larger and richer deposit than that previously worked.

C. D. S., Bisbee, Arizona, is answered on page 311 of the issue of Sept. 16; R. H., Butte, Montana, page 143, Aug. 5; H. F. P., Ouray, Colo., page 115, July 29; F. V. O'B., Redding, Cal., page 371, Sept. 30; G. S., Bingham, Utah, page 171, Aug. 12, '99. It is again earnestly suggested that a regular file be kept in all cases practicable. Questions are often received that have been recently answered and the possession of a current file of the paper would obviate the necessity of repetition. Thousands of our readers do preserve such a file and the idea is commended to universal observance.

THE bricks used in building the city of Deadwood, South Dakota, are mostly made from clay obtained in the neighboring gulches, which is often gold bearing; the sand used in making mortar is from the tailings from the Homestake mills. There is not a brick nor a pound of mortar in these buildings which do not contain gold. Several years ago brick making at an establishment near the town was discontinued, for the reason that it was found that the clay was rich enough in gold to pay for puddling and sluicing; but hundreds of thousands of bricks had been burned at this yard before the fact of the gold value became known.

ON the Jamul grant in San Diego county, Cal., a mass of diorite, normally of dark green color and fine texture, has been crushed and by the infiltration of mineral solutions from below the rock has been completely altered into a deposit of unusual character, consisting of calcium carbonate, silica and kaolin, each nearly pure and occurring mostly in segregated deposits. This material, by mechanical admixture in the proper proportions, was found to make a superior hydraulic cement, and works were built near the deposit in 1891 and a large amount of cement manufactured, but for commercial reasons the enterprise was a failure.

WHEN silver-lead bullion is melted and then allowed to cool to near the melting point, crystals of lead will separate out which are much poorer in silver than the lead was before melting. This fact is the basis of the Pattinson process. The lead crystals are skimmed off and more silver-lead bullion added, the heat increased and the mixture stirred on cooling again; the additional newly formed crystals of lead are removed as before. By repeating this process the greater portion of the lead is removed poor in precious metals, and the gold and silver contents of a large amount of bullion are concentrated to a small amount of lead and then cupelled to effect a complete separation.

WHERE a man is hired "by the week" and paid "by the week," in the absence of any written contract, the connection can be severed by either employe or employer at a week's notice. In California a corporation is required by law to pay its employes at least once every month. The signing of a contract for labor or anything else in the presence of a notary or other public official gives no added validity to the agreement. The difference between a contract being signed in the presence of a notary, and not being so signed, lies largely in the assumption that where a contract is signed before a notary, etc., each party is prevented from claiming that he did not understand the terms of the agreement.

THE rich pay shoot of the Eureka-Idaho-Maryland mine, near Grass Valley, Cal., appeared at the surface in the Eureka claim. While the vein continued in the form of a clean quartz vein for some distance in a northwesterly direction, the pay stopped; but easterly from the limits of the pay zone, the fissure continued for several thousand feet uninterruptedly, but contained only a small amount of quartz. The dip of the fissure is to the northward, and along it the pay shoot had a downward and easterly trend at an angle of about 20° below the horizon. Vertically the shoot was 500 to 600 feet across—this might be considered its length, as it would be if it stood steeply in the fissure. In width the shoot ranged from 1 to several feet. It has been worked over 4000 feet and has produced more than $16,000,000.

AS THE mining laws become more commonly understood, there are more relocations of claims for non-performance of assessment work. Many claim holders have appeared to believe that they could relocate their claims at the end of each year and hold them as against any would-be "jumper," some even going so far as to post a notice on the claim warning others to keep off; but the law requires that assessment to the amount of $100 or improvements in like amount be made annually, and a failure to comply with this renders the claim subject to relocation. Where the assessment work has not been done, and the claim owner is on the ground at the expiration of the year, he must at once commence his work of assessment, and must actually complete it, exercising reasonable diligence in so doing, for the claim still remains open to relocation until the assessment work has been actually and fully performed.

COLEMANITE is a crystallized borate of lime. The colemanite mined in the east Calico district, San Bernardino county, Cal., occurs in the form of a vein, but contains no quartz. The walls are shale. It is simply the result of residual deposit or crystallization from saturated solution in a lake bed of Tertiary time, the deposit being subsequently covered by detritus washed into the lake from the surrounding hills until a thickness of several hundred feet had been attained. Later with the injection of the andesites and uplift of the region the bed was tilted, the edges eroded and the colemanite exposed. The so-called "cotton balls" are similar to colemanite in composition. It is known as pandermite and occurs as an efflorescence on the surface of the ground in regions where borax is found. The mud shales of the district also contain a considerable percentage of borax in the form of calcium borate.

BEFORE the parting of gold and silver in bullion bars the metals are granulated. The metals are first melted in a blacklead crucible, and when in a state of fusion are stirred with an iron rod to make the mixture uniform. A small quantity of the molten metal is dipped out with a ladle and poured into a copper tank filled with water, in which a stream of cold water is constantly running. By this means the metal is granulated into tabular or leaf-like grains. When dried the granulated metal was formerly placed in porcelain vessels, covered, and provided with an escape pipe for fumes of nitrous acid. Nitric acid was poured upon the metal and the vessels heated in a water bath till boiling hot. The boiling continued until the silver had been dissolved. The solution of silver and base metals was syphoned off and the gold collected, refined and melted. The silver was recovered from the nitrate solution by adding salt water, converting the silver to chloride, the sodium becoming nitrate. The chloride of silver was mixed with granulated zinc and treated with sulphuric acid, which reduced the silver to metallic state, the zinc and acid being lost. This method has been superseded by the sulphuric acid process, in which the metals are granulated and then subjected to the action of concentrated sulphuric acid at 65° Baume. The silver is converted into sulphate and the base metals become salts, the gold remaining on the bottom of the cast iron vessel in a nearly pure state. The sulphate of silver solution is syphoned into a tank containing copper plates, which reduce the silver to metallic state, it being deposited on the copper in thick layers.

IN the District Court of Gunnison county, Colorado, Judge Stevens has rendered an important decision in the Bull Domingo case, in which the Court has interpreted the law according to its exact wording. The Bull Domingo mine was recently sold to S. I. Hallett for $50,000 by W. Haynes and others under bond and lease, a portion of the amount being in cash. Haynes originally had as a partner in the claim, G. C. Briscoe, who for years assisted in the development of the property. In '96 it was alleged that Briscoe failed to contribute his proportion of the expenditure for annual labor, and in January, '97, Haynes caused a notice of forfeiture to be published in the *Miner*, a paper printed at Pitkin. The claim is on Italian mountain and is accessible only by trails for the last eight miles. From the mine on an air line Crested Butte is fourteen miles distant, Aspen eighteen miles, Crystal twenty-two miles and Pitkin twenty-seven miles. As all roads and trails were closed except that to Pitkin, Haynes took the notice of forfeiture to that place for publication, although newspapers were regularly printed in all of the other towns mentioned. The County Surveyor made a survey to ascertain the distances from the mine to points where papers were printed, and upon the showing that Pitkin was farther distant by air line than any other point, Judge Stevens held the publication of the forfeiture notice to be void. This decision is in accordance with the letter of the United States Statutes, Sec. 2324, which says the notice shall be published in the newspaper published nearest the claim, and makes no mention of ways or means of reaching such place. The case will be appealed.

The Copper Queen Mine, Arizona.*

By JAMES DOUGLAS, LL.D.

The Copper Queen mine was opened in 1880 by Messrs. Martin, Ballard & Reilly, and the first copper furnace was blown in on August 20th of that year. Prior to that summer nothing but prospect work had been done on the Copper Queen and a number of adjacent claims. In fact, it was a small deposit, not of copper ore but of cerussite, which still remains undeveloped, on the western slope of the Queen hill, which first tempted miners to the spot. To reduce this lead ore, a primitive furnace was erected near a spring, now dry. The development, just then, of this and other copper deposits in the southern Territories was due to the simultaneous arrival of the Southern Pacific and the Atchison, Topeka & Santa Fe railroads, though it was stimulated by the business revival of 1880, with the consequent rise in the value of copper.

The geology of the Dragoon and Mule Pass mountains, in which the Copper Queen mine is situated, has not been systematically studied. On the flanks of a granite core lie beds of Carboniferous limestone. Those to the west carry, either enclosed or as contact deposits, the silver-bearing minerals which in the early '80s made Tombstone one of the most famous mining districts of the West. The limestones on the eastern slope of the Mule Pass mountains carry the ores of the Copper Queen mine. The limestone masses appear to be broken and filled by extensive bodies of intrusive feldspathic rocks, which seem to have exerted a decisive influence on the genesis of the ore, though their relation to the ore masses, whether these lie on the contact or are completely and deeply imbedded in the limestones, is a matter upon which theorists will differ. The feldspathic rocks to the east of the copper-bearing mass of limestones of the Copper Queen group are deeply colored superficially by oxides of iron, and, as recent explorations made by other companies than the Copper Queen show, carry iron and copper pyrites disseminated in particles and in bunches, but whether in profitable quantities or not has not yet been determined. The colored band of these adjacent rocks (which are supposed to be rhyolites, though their decayed character renders any determination of their original mineralogical composition doubtful) is broadest in contact with the Copper Queen and the Atlanta claims, where the largest bodies of copper ore have been discovered in the limestones, and tapers towards the south, where the ore bodies as yet found in the limestones are smaller and deeper. The contact of the limestones and rhyolites appears to represent the line of a great fault, which is also indicated by a marked depression in the surface.

Beneath this depression lie ferruginous clays, locally called "ledge matter," enclosing masses of ore, both oxidized and unoxidized; but the rocks at this level are altered by decay to such a degree that it is difficult, if not impossible, to define the line between altered limestone and altered rhyolite. Where, however, the deep workings of the Copper Queen have penetrated the feldspathic rocks, the ground has proved to be barren. Nevertheless, since the wealth of other mining districts in Arizona resides almost exclusively in the so-called porphyries, exploration in the same class of rocks in the Warren district is a legitimate enterprise.

The successful development of the Copper Queen mine, however, has been confined to the limestone belt lying between what appear to be two prominent faults—the one already referred to, and another to the west of the Queen hill.

The outcrop of copper which was first attacked, and which was, in fact, the only extensive surface indication, was on the northern exposure of a limestone hill. In this place stripping revealed a solid body of oxidized copper, iron and manganese ore over 60x60 feet in area, and so rich in copper that the furnace, fed from the surface ores alone, yielded for a few months 23% of metal. Fig. 1 shows a section through the open cut made on this body. This large outcrop was enclosed in an almost circular unaltered limestone frame. Associated with the ore was an abundance of calcite; but the percentage of silica was so small that quartz had to be added to the furnace charge. This body, retaining its general dimensions and well defined limestone walls, dipped at an angle of about 30° southeasterly into the hill. Between the 100 and 200-foot levels the ore changed into a clay, with well marked bedding, too lean in copper carbonate to be profitably worked; but below this zone of clay the copper, as carbonates and oxides, increased to 12%, and was associated in a measure with limonite, imbedded in ferruginous clay. This ore body extended to a depth of 400 feet on the incline from the surface, and there terminated abruptly in hard limestone.

The enrichment of surface copper ores and their rapid impoverishment at a shallow depth is not an uncommon occurrence in the "arid region" of the United States. It probably takes place through the oxidation, in this dry, hot climate, of the copper solutions which rise to the surface during the decay of the ore. A lower layer of ore is thus necessarily depleted, in proportion as the surface layer is enriched. The insensible flow, through the apparently dry rocks of the region, of moisture charged with soluble salts, is often evinced by the thick efflorescence of copper alum, which rapidly covers the walls of drifts run through or near feldspathic or argillaceous rocks, even when the copper contents of these rocks are so low as to be barely appreciable. During the dry season a waste heap of such refuse will be completely covered with a green coating.

On the other had, in the wet Eastern climate, as in Tennessee, the surface ore, where it has not been denuded by glacial action, consists of insoluble ferric oxide deprived by lixiviation of the copper which, in Arizona, under favorable atmospheric conditions, would be fixed as oxides. The rapidity with which a soluble copper sulphate when exposed to the air is converted into insoluble basic sulphate, and this into more highly oxidized compounds, is illustrated in many copper regions of the Southwest, where copper solutions ooze from almost barren decaying feldspathic rocks, and, on reaching the surface and filtering through the gravels, form copper-bearing conglomerates.

The first ore body, above mentioned, was not exhausted until 1884, when it had yielded about 20,000 tons of ore and 20,000,000 pounds of copper. The earliest months of that year were the gloomiest which the district had known up to that (or, fortunately, up to the present) time. Simultaneously with the commencement of active operations on the Queen, a large group of claims on the southern slope of the Queen hill had been explored by the Neptune Co., and a furnace plant had been erected by it on the San Pedro river, some miles distant. The reason for building the reduction plant so far from the mine was the scarcity of water in Bisbee, which at that period was so serious that the Copper Queen had to damp its single furnace for lack of a sufficiency of water to cool the jacket. The Neptune Co., after expending its capital and bonded debt, suspended operations in 1882. Another corporation, the Atlanta Mining Co., owning claims adjacent to the Queen, had been searching in vain more than four years for an ore body by following, to no profit, surface indications. Other minor operations of a like kind had been equally unsuccessful. At that date, the Queen Co., having reached the bottom of its ore body and the 400-foot level of the incline, could count only some three months' ore in sight; and the Atlanta had decided to abandon the enterprise after one more effort had been made to discover ore. The foot of the Queen incline, which coincided with the bottom of the original Queen ore body, had nearly reached the side line of the claim, and therefore a a drift easterly along the side line in hard limestone was the exploratory work undertaken by the Queen—a long drift having been previously run to the west without encountering any ore.

Meanwhile the Atlanta Co. was sinking a shaft in barren limestone a little to the south of the point towards which the Queen drift was directed. Thus, final pieces of exploratory work were under way prior to the abandonment of their property by both companies, when, almost at the same time, each of them struck a new ore body which appeared to be dipping northwest, or in a direction the reverse of that of the body originally discovered. The two companies then wisely decided to consolidate on equitable terms, rather than waste their funds in obtaining a legal interpretation of an even more complicated problem than that involved in the Richmond-Eureka "apex" case. Since then the claims of the Neptune Co., the Holbrook & Cave Co., the Silver Bear Co., and a number of private owners have been acquired. Many of them have proved to be barren, but not a few contribute their quota of ore to the total of the consolidated company's product, which is drawn at present from what would be some twenty different unprofitable mines, if each were under separate management.

The first ore body extracted extended from the surface to the original 400-foot level of the old incline, which corresponds to the 200-foot level of the new Czar shaft. The second ore body, discovered about 600 feet east of the first, was covered at the surface by 200 feet of limestone, and abruptly terminated at a depth of 300 feet from its apex. A narrow seam of ore was known to extend into the limestone to the south of the original ore body, but it was not followed until years after its discovery. Then it was found to be the connecting link between the ore body from which it sprung and another, still larger, in the southwest of the Atlanta claim. This ore body extended in depth from above the 100-foot to below the 300-foot Czar level, and on the sill floor of the latter level the stope was 200x150 feet—by far the largest opening made in any ore body. As it was of such magnificent size, we thought ourselves safe in running a long drift for 1500 feet, through limestones, from the Czar shaft, to strike it on the 400-foot level. (See Fig. 1.) On reaching the position which the ore should have occupied, none was found, nor has the extension of the ore body in any direction been discovered by diamond drill holes bored radially for thousands of feet. A drill hole pointed upwards entered the ore at 30 feet below the 300-foot level, where the ore abruptly terminated.

Disappointments of a like character have beset operations in other sections of the mine. A large body in the southern section of the mine was traced downward to a point 40 feet below the 400-foot level. A search in all directions on the level below has failed to find it. Where ore bodies are so eccentric in their size and the direction of their curves, it is often well nigh impossible to trace their extension, or be sure of their extinction, until they are being actually extracted. In searching for ore in these limestones, it is extremely difficult to interpret the signs which point to its presence, or to distinguish accidental occurrences from actual laws of deposition. The presence of ore in more than one place on the 500-foot level, and elsewhere in the southern portion of the mine, was indicated as probable by the presence of ore on the 400-foot level and the intermediate level below; but in no single instance has the ore been found on the 500-foot level where expected. In fact, nearly a mile of drifts was run on that level before any copper was encountered.

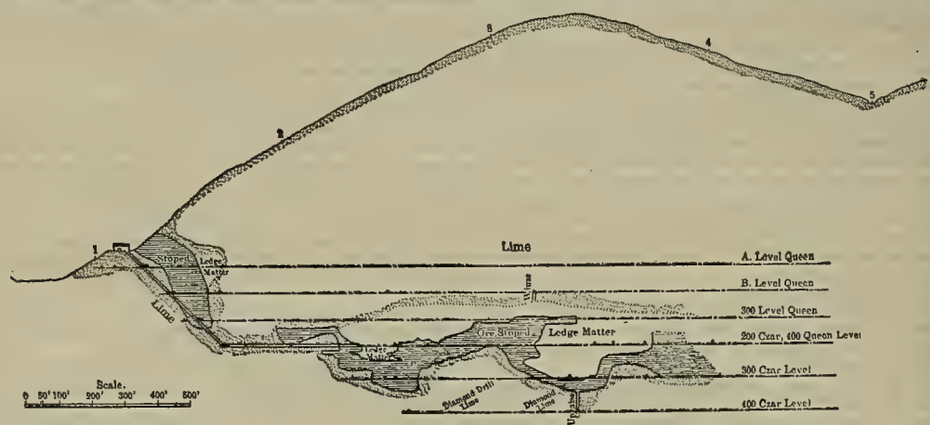


FIG. 1.—SECTION COPPER QUEEN, ARIZONA, MINE, THROUGH OPEN CUT.

Certain general conclusions have been provisionally reached. There seem to be two series of limestone beds, both of Carboniferous age: the upper bedding, recognized as the white; and the lower, as the blue—though this distinction of color is not always well marked. They dip conformably to the south, but at varying angles. At some places they lie almost flat, at others they attain an angle of over 30°. The large masses of copper, whether oxidized or unaltered, have as yet been discovered exclusively in the upper series, and only at the base of that series. Its total thickness is probably about 1100 feet, but only in the lower 300 feet has ore been found in profitable quantity. Where the series is thickest, under the apex of the Queen hill, no ore masses are known to exist. Large quantities of ore lie, as already described, under the valley where exists the obscure dividing line between the limestones and rhyolite, and where the former are probably shallow; but the largest isolated ore body yet extracted was separated by many hundreds of feet of barren limestone, and what is locally called "ledge matter," from this contact.

As we work to the southward, the ore bodies attain greater depth from the datum line of the collar of the Czar shaft. No ore has been discovered below the 400-foot level in the northerly section of the mine, whereas in the section to the south, reached by the Holbrook shaft, ore bodies have been found at 500 feet below that point, and still farther south the ore attains a greater depth. But the ore bodies hitherto encountered here are small in comparison with those explored and extracted in the northern sections.

The conclusion that the profitable ore is confined to the upper series of limestones is based on the ex-

* Condensed from Transactions American Institute Mining Engineers. Published for first time.

perience that large, compact ore bodies have not been found to extend below a certain horizon. Nevertheless, the limestones of the supposed lower series, as far as they have been explored, are more thoroughly impregnated with iron sulphides, associated with minute quantities of copper sulphide, than the upper limestones. But so little work has been done below the upper chain of ore bodies that no conclusive opinion can be formed as to the metalliferous value of the underlying limestones. There is slight probability of oxidized ore being encountered, but the general dissemination of pyrite and chalcopyrite in fine grains through the rock leads to the hope that areas of ground may be entered where the latter mineral may be abundant enough to render the limestone a "concentrating ore."

The Copper Queen mine has become famous for its beautiful specimens of carbonates, both malachite and azurite. The malachite is never found in such large and compact masses as to make it commercially valuable for decorative purposes; besides, occurring generally in thin botryoidal masses, it is usually streaked with manganese, which detracts from its purity. Its most striking mode of occurrence is in geodes, which are lined with velvetry crystals of the same mineral. These hollow spheres, the walls of which are composed of concentric layers, are rare, but, when found, are usually in nests embedded in soft, wet, ferruginous or manganiferous clays, such as constitute the gangue, or "ledge matter," of nearly all the ore; and they occur at no great distance from a limestone wall or partition. The slabs of azurite, also, usually occur near the limestone, but preferably in the manganiferous, clayey gangue. The oxidized copper ores, however, which are mined in economic quantities, consist usually of cuprite and carbonate, disseminated through limonite; or of carbonates, chiefly of the green variety, in streaks or crystals scattered through ferruginous or manganiferous clay; or of minute particles of metallic copper, with more or less cuprite crystals, disseminated through yellow clay. These yellow clays are generally more distinctly bedded than the masses of red and black clays which carry the highly oxidized copper compounds. Masses of any considerable size of native copper are found almost exclusively, not at the surface, where the oxidizing agencies have been most active, but in the deepest layers of the large ore bodies, where apparently some reducing agent has been more actively at work than elsewhere, and where the ore is furthest removed from atmospheric interference. On the sill floor of the 300-foot level (at the bottom of the great southwest ore body already referred to), native copper was abundant in masses, some of them of several hundred pounds in weight. The surface of the native copper lumps and masses is always more or less perfectly crystallized, as of course is the case in those mines where all the secondary copper ores were deposited slowly from the dissolved constituents of the original sulphides.

While selected specimens of the oxidized ores carry a very high percentage of copper, the percentage in the ore as actually mined is much lower, inasmuch as the particles of ore proper are, as explained, associated with clays or limonite; and these cupriferous clays or limonites are themselves embedded in vastly larger masses of clayey ledge matter, absolutely barren of copper. The approach to the so-called ledge matter, when drifting through limestone, is generally indicated by a softening of the rock and a gradual replacement of the lime by silicates of alumina. A series of analyses taken from a drift in the eastern section of the mine, as an ore body is approached, indicate the gradual change from unaltered limestone to clays, involving a decrease in lime from 24% to 0.33% and an increase in alumina from 2.20% to 16.9%.

The further passage from altered limestone to ledge matter is often less marked by change in composition than by change in color. The assays show the increase of iron with the increased depth of color. The altered limestone contains:

CaO.	MgO.	SiO_2.	Al_2O_3.	F_2O_3.	CO_2.
50.0	.....	8.04	3.04	1.6	38

The subjacent ledge matter:

CaO.	MgO.	SiO_2.	Al_2O_3.	F_2O_3.	CO_2.
1.62	5.98	53 9	14.0	14.4	6.85

The ferruginous clays, when entered, are regarded as hopeful indications of ore, but exploratory drifts are often made in them for many hundreds of feet before reaching a trace of copper. Suddenly, without any premonition, the clay carries copper; and as suddenly the drift runs again into barren ground. Large areas have been stoped from these sporadic masses, and the locality has been abandoned as exhausted, only to discover years afterwards that a mere partition of barren ledge matter separated the exhausted stopes from still larger reserves.

As at the surface in the open cut, so occasionally in depth, the ledge matter is in contact with unaltered limestone. In other places the ledge matter has parted abruptly from hard limestone. The ledge matter is often very much contorted.

The difficulty of extracting these comparatively small masses of soft ore from such large masses of plastic clay is very considerable. The whole hill is in a state of ceaseless movement. The comparatively shallow capping of limestone is fissured to the surface in all directions, and the lateral strains on the partitions of limestone which separate the masses of ledge matter, when large stopes are made in them, cause these partitions to yield. The slag dump in the valley east of the hill rests on detritus, beneath which is ledge matter, and is a source of considerable annoyance in the mine, as its pressure is continuously squeezing up the ledge matter in the eastern stopes of the mine. And so soft is the ledge matter which is under this valley, that cone-shaped caves extend to the surface from the stopes through 80 to 100 feet of barren clay,—but fortunately the movement of ground is slow, and ample warning is given. The tendency of the clays, under this pressure, is to rise, and therefore it is impossible to maintain a perfectly level track in the permanent ways. At the same time the walls of the drifts are either forced out of line by lateral pressure from one side or the other, or the drifts are contracted by the irresistible pressure, from all sides, of the swelling ground. Hence it is impossible to use underground the most economical modes of traction.

The stopes can be held up only by timbering in square sets, and the face of the stopes can never be safely broken down ahead of the timbering. The yield of this class of ore is about 7%, after rough selection in the stopes, where about one-half the total material broken is rejected. To supplement the deficiency in filling up the stopes, barren ledge matter from exploratory drifts is used. Though the timbering of worked-out portions of the stopes is thus enforced, so violent is the movement of the ground that, when an old stope is drifted through, the old timbers are found upset and dislocated or crushed into chips. The size of timbers usually employed in square sets is 10x10 inches and 12x12 inches, and the most available source of supply is Puget sound. About 30 feet, board measure, is buried in the mine to the ton of ore extracted.

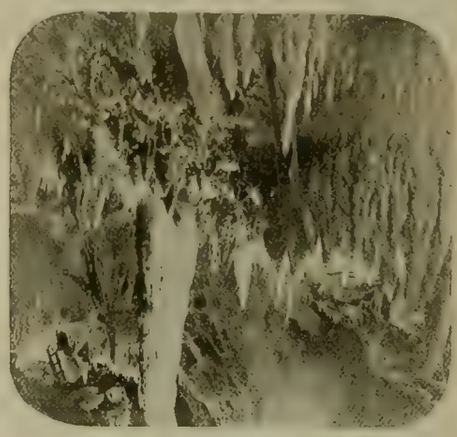
A notable quantity of oxidized ore is also obtained from narrow irregular deposits between limestone walls, or from still more undefined bodies, which cement together limestone boulders, large and small. These boulders are generally superficially gnarled and corroded, as well as decayed to a depth of several inches, and they and the ore entangled among them are never situated at any considerable distance from the solid confining limestones.

The depth to which decay of ore has extended from the surface is very variable. A very large body of sulphide ore was struck on the 200-foot level, and yet in other sections of the mines the ore is partially oxidized to the lowest depth at which ore has been encountered, namely, 570 feet below the collar of the Holbrook shaft. Yet below the 300-foot level, completely oxidized ores became scarce. The furnace mixture, for years before the company abandoned the making of bars direct, yielded a certain quantity of matte, and the copper bars were debased by a notable percentage of sulphur. The depth to which atmospheric agency reaches is, of course, determined by the permeability of certain rocks to the insensible flow of water through their pores.

The compact carboniferous limestones, however, in which the Copper Queen mine occurs, permit the passage of atmospheric agencies to considerable depth, rather through the fissures and joints (expanding occasionally into caves), by which they are reticulated than through the pores of the rock. An interesting phenomenon in the West, where the climate is so extremely dry, is the great depth to which roots will strike down through rock fissures in search of moisture.

The sulphurets in these limestones occur in layers of various thickness and solidity. When solid and thin, they are generally partially oxidized, and are rich. Two very large compact masses have been encountered, and in part explored. The largest apexes on the 200-foot level and has been traced to the 400-foot level, and a string of stopes nearly 500 feet in length has been opened upon it; but the profitable ore bears only a small proportion to the whole mass. Roughly speaking, the mass is enveloped in a shell of oxysulphide, and streaks of similar black copper ore of good grade intersect it; but the core consists of compact bisulphide of iron, very lean in copper. The same condition holds good of most of the large iron pyrites masses the world over, where oxidation is occurring; and, therefore, while estimates of quantity can generally be easily made, certainty as to value is more difficult to reach.

The genesis of these ore bodies, the progress of their decay, and the contemporaneous changes wrought in the surrounding rocks, are interesting subjects of study and speculation. During the early stages of the mine's development, the opinion was prevalent, based exclusively on the clean-cut outline of the great outcrop and the well-defined cavity of limestone in which the first ore body was enclosed, that the original unaltered ores, prior to their alteration, had filled caves previously formed in the limestone, and that this filling had been effected partly through infiltration and partly through mechanical action. The barren clays below the 100-foot level were distinctly stratified; and at still greater depths in these and other sections of the mine large, round, siliceous pebbles, isolated or in layers, are found. Further developments have shaken this hypothesis, though there is abundant evidence that, through cracks and fissures in the limestone, surface detritus has been carried to considerable depth, and that mechanical as well as atmospheric agencies have played their parts in creating and distributing the ore bodies in their present secondary altered condition. Large caves exist in the hill. It is therefore conceivable that into pre-existing caves copper solutions might have entered concurrently with mechanically transported clays and gravels, thus forming the aluminoferruginous copper ores which constitute the great mass of the oxidized bodies. But the almost total absence of lime in these oxidized ore bodies is in itself a strong argument against the supposition; for, had the copper been carried into them through infiltration from limestones and with lime, the ores would have possessed the composition of the cupriferous stalactites, which line the caves, and therefore would have contained a large proportion of lime as calcite. But this is not true either of the ledge matter or of the ores.



STALACTITES IN CAVE, COPPER QUEEN MINE, ARIZONA.

In framing a reasonable theory to account for the formation of the oxidized ore bodies, we may start with the assumption that the copper they contain existed originally as a sulphuretted compound. Another assumption, which cannot be made with so much certainty, but which, I think, may be fairly allowed, is that the composition and distribution of the unaltered masses of sulphurets, which are contiguous to the altered ores, are identical with the composition and distribution of the now oxidized ore bodies before decay had set in.

As I have already remarked, limestones contain more or less disseminated iron and copper pyrites, but these particles, protected from atmospheric action by the envelope of rock, are unaltered even at shallow depths. Not so, however, the large mass, for instance, of compact pyrites which extends from the 200 foot level to the 400-foot level. It exhibits every stage of decay, and the enclosing limestones are widely and completely altered. A section through this portion of the mine would exhibit the limestones becoming gradually softer and exchanging their lime for clay, while yet retaining the structure and color of the original rock. This altered limestone contains CaO, 7.1; MgO, 8 36; SiO_2, 27.1; Al_2O_3, 15 5; CO_2, 17%. Immediately on it lies ledge matter, the composition of which is CaO, trace; MgO, trace; SiO_2, 27.4; Al_2O_3, 15.1; F_2O_3, 33 9; CO_2, 10.6. The light, clayey, aluminous rock thus suddenly changes to a ferruginous clay, generally barren of copper. This envelope gives place to a black sulphuretted ore of very diverse composition. At places it runs very high in copper. At other places, though the same in appearance, it consists merely of an oxysulphide of iron. On the whole, however, this second shell contains the most profitable of the sulphuretted ores. It is not of uniform thickness, any more than of uniform composition, but thick enough to permit large stopes to be opened upon it. The kernel of the mass is very much leaner in copper than the shell, and consists of compact iron pyrites averaging about 45% sulphur.

On the same horizon as this particular body of both partially altered and wholly unaltered pyrites we have large quantities of ledge matter, in which occur, as already described, great masses of cupriferous limonite, while, elsewhere in the same ledge matter, we have areas of cupriferous clays. These differ from the barren ledge matter in little else than the percentage of copper. The limestones, as ledge matter is approached, have undergone substantially the same alteration as in the vicinity of the black oxysulphide.

(To be Continued.)

Electric Mine Haulage.

Written by MR. B. HARDING.

Electric mine haulage is largely adopted in the Pennsylvania and Ohio colliery districts. In these days of active competition and the imperative demand for decreased cost of production, improved appliances for cheapening the mining of coal have become absolutely essential to profitable operations. New colliery systems have felt the necessity of installing the most approved machinery for haulage, hoisting, pumping, and for general mining work. Mule haulage, traction cables, and hand labor have been largely displaced by electrical machinery.

Some engineers have questioned the economy of the electric motor, where the use of power is variable and intermittent; but herein lies one of the strongest motives for using electricity. The current can be generated at a central station, near the mouth of a mine, and be transmitted by wires to the points where power is required. Each of the mine machines uses current only during the time it is in actual operation; the electric mine locomotive when hauling cars; the coal cutters, drills and pumps while actively employed. No electric current is wasted, for when any machine suspends work it ceases to draw power from the central station.

The economy introduced by an electrical installation is well known to those who formerly used separate steam engines, and have supplanted them with



FIG. 1.—BALDWIN-WESTINGHOUSE MINE LOCOMOTIVE, BERWIND-WHITE COAL MINING CO.



FIG. 2.—OPERATING END OF BALDWIN-WESTINGHOUSE MINE LOCOMOTIVE.

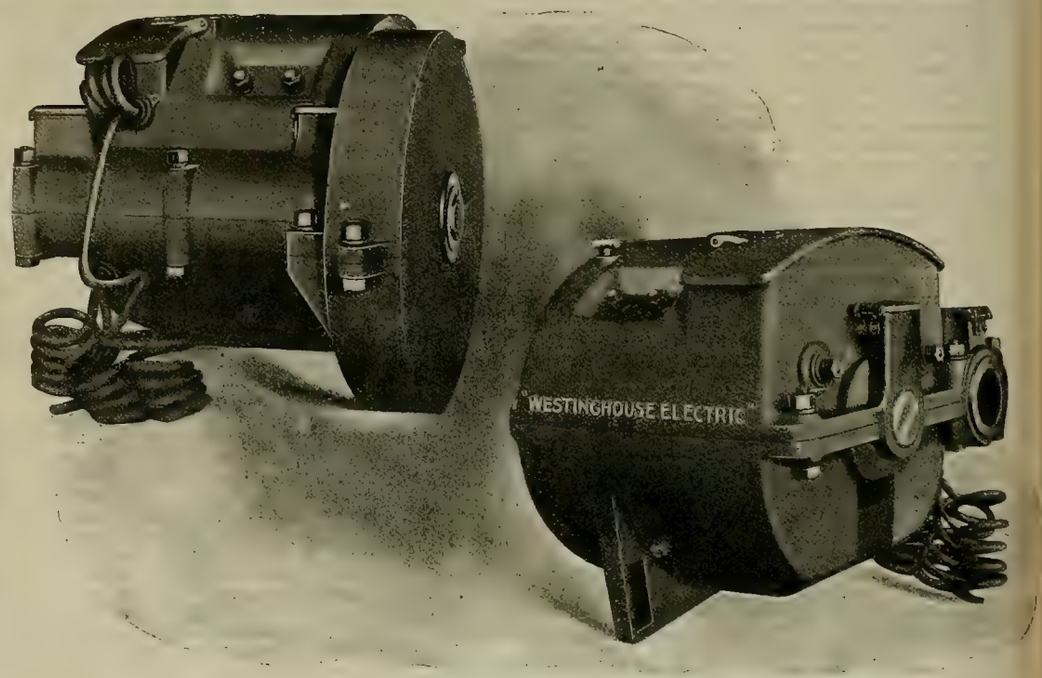


FIG. 3.—THE FIFTY H. P. WESTINGHOUSE DIRECT-CURRENT MOTORS FOR BALDWIN-WESTINGHOUSE MINE LOCOMOTIVE.

electrical apparatus. One of the largest Pennsylvania steel companies, using 7000 H. P. of Westinghouse electric motors, has recorded that the average load upon the central power station is but 15% of the amount of steam formerly used when separate steam engines performed the work. A similar economy has been found in other industries. The power used with electrical apparatus compared with steam engines is 25% to 35%, according to the nature of the employment.

In the majority of mines direct-current electricity is employed, but in fiery mines alternating current with Westinghouse type "C" motors may be used to drive mine machinery, as these motors are absolutely sparkless, having no commutator or moving contacts. Westinghouse type "C" motors are employed with perfect security in powder mills, grain elevators, and wherever there may be danger from explosion or conflagration.

Electric mine locomotives of a novel design have recently been introduced by the united efforts of the Baldwin Locomotive Works and the Westinghouse Electric & Manufacturing Co.; they are known as the Baldwin–Westinghouse electric mine locomotives. The economic use of electric locomotives in mines is admirably demonstrated in the collieries of the Berwind–White Coal M. Co., Pennsylvania. At Atlantic No. 1 mine, Houtzdale, Penna., a continuous rope haul was discarded, and a great saving effected by the introduction of Baldwin–Westinghouse electric mine locomotives. While the rope haulage was fairly satisfactory between fixed points and for short distances, yet as the headings were extended, and on account of the contour of the coal seam, the workings became crooked, the rope haulage had to be abandoned and the electric system substituted.

Atlantic No. 1 is a drift mine in the celebrated Mashannon seam. At the entrance there is an 1800-foot 3% grade against loads, and inside the mine the seam has a variable dip with a maximum of 9% against loads. The length of haul from tipple to face is two miles, divided into two haulings of one mile each. Two Baldwin–Westinghouse electric mine

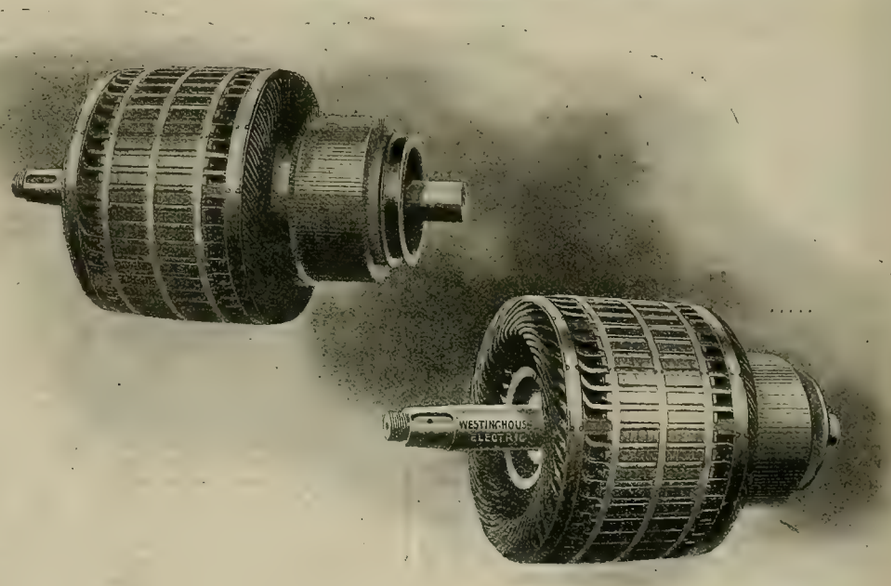


FIG. 4.—ARMATURE FOR MOTOR OF BALDWIN-WESTINGHOUSE ELECTRIC MINE LOCOMOTIVE.

locomotives—16,000 pounds each—operate the outer haul, which has a maximum of 3% against loads. Upon the inner haul, where there is a maximum of 9% against loads, there are two locomotives weighing 26,000 pounds each. Fig. 1 illustrates a 26,000-pound Baldwin-Westinghouse electric mine locomotive, class 4–2–50 C.

The heavy locomotives approach this grade under full speed—eight miles an hour—with a train of ten loaded cars, weighing gross twenty-five tons, and surmount the grade without difficulty.

The locomotives collect ten empty cars from the side tracks and distribute them to the entrances of the various rooms in the mine, returning with ten loaded cars, hauling them to the side track one mile distant. By this means one motorman and trip rider make twenty trips daily, delivering a total of 300 tons of coal at a cost of $3.75 per day. Were this work done by mules, it would require twelve mules and six drivers at a cost of $18 daily. Electric traction thus shows a daily saving in wages of $14.25 on each locomotive. The cost of feed for the mules and their care and depreciation are calculated to approximate the same sum as the operating expenses of power-house fuel, together with repairs to machinery. The coal seam in the Atlantic No. 1 mine varies from 4 to 7 feet in thickness, causing the workings to be somewhat irregular. In winter and early spring a good deal of water accumulates in the dip workings, but this has caused no interference with the regular operation of the haulage plant. The water has been removed by pumps, operated by Westinghouse electric motors, current being conveyed to the motors through the trolley wires of the haulage system. The use of steam for pumping would have greatly interfered with the ventilation of the mine.

Fig. 2 shows the operating end of a Balwin-Westinghouse electric mine machine. These locomotives are extremely compact in outline and suited to low and narrow mine entrances, the height running from 26 inches to 38 inches, and the length from 9 feet to 12 feet. The moving parts are covered and not exposed to dirt and external injury. The frame is of heavy iron, the sides and ends being firmly bolted together. The frame pieces are planed to assume perfect accuracy in fitting up and in the interchangeability of parts. The frame is placed either inside or outside the wheels, to adapt themselves to the width of the mine entrances. The driving wheels are of the best cast iron with chilled threads, pressed and keyed on the axles. Hammered iron or steel is used for the axles, which are accurately turned for the main journals and motor bearings, and key seated for gear. The journal boxes are ample in size, having bronze bearings with oil cellars for sponging, as in steam locomotive practice. Brake apparatus is fitted to all wheels; this is simple in design, and of sufficient power to utilize the track adhesion due to the weight of the locomotive. A platform for the operator is placed on either end, or on both ends. All the levers are within reach of the motorman when seated. A special feature has been made of the spring apparatus. The entire machine is supported in the journal boxes by helical springs, which avoids destructive pounding on the track, and relieves the machinery from shock, and the electric motors are separately spring-supported.

The motors of these locomotives were designed by the Westinghouse Electric & Manufacturing Co. specially for mine service. Two motors drive each machine: they are shown in Fig. 3, one geared to each axle by single reduction gearing, running in oil lubrication in tight cases. The Westinghouse motors are of the four-pole, steel clad, enclosed railway type. The armature is of the iron-clad type, the coils being held in slots below the surface, and secured from displacement in accordance with the most approved railway practice (see Fig. 4). The current controller, or starting device, is the latest rheostatic type, with magnetic blowout to prevent arcing at the contacts. It is operated by handles for starting and reversing, and is provided with various speed changes. The train is brought gradually to full speed by means of the controller. Special attention has been given to the capacity of the rheostat, to avoid overloading, as the working capacity of mine locomotives is often seriously impaired by failure to provide sufficient resistance to take care of the varying loads in switching, and light load hauling. The trolley pole is a special device, is reversible, and can be placed in a socket in either side of the frame. Baldwin-Westinghouse electric mine locomotives are built in six standard hauling capacities and to suit various track gauges, and frame arrangements. Each locomotive is equipped with two motors of ample capacity to exert the maximum draw-bar pull which can be obtained with the respective sizes of locomotives without incurring slipping of wheels. These locomotives are rated in terms of the weight of driving wheels, which is the factor determining their tractive power. The six standard sizes run from 4000 pounds to 26,000 pounds, exerting a draw-bar pull on the level, from 500 pounds for the smallest size to 4300 pounds for the largest size. The starting draw-bar pull in each case is limited only by the adhesion of the locomotive wheels to the rails, the motors being powerful enough to slip the wheels with any condition of track. The track guage varies from 22 inches for small locomotives to 35 inches for the largest size. The speed is from six to ten miles an hour.

Quartz and River Mining in Eastern Oregon.

In the issue of August 19th appeared an illustrated article from a staff correspondent on mining activity in eastern Oregon. Supplementary thereto is herewith noted the Gold Hill mill and mine, thirty-two miles from Baker City, Or., where six claims are being developed on average ore values of $16 per ton, 65% being saved on plates, the 10-stamp mill being kept in constant operation.

On Burnt river, thirty-five miles southeast of Baker City, is the Pomeroy dredger, costing $60,000, with a hull 34x100 feet, held in place by two spuds 61 feet long, each spud shod on the lower end with steel shoe weighing 3000 pounds. The thirty-nine buckets have each a capacity of 6¼ cubic feet. Seven engines operate it, there being two steam boilers. The capacity of the pump is 8000 gallons per minute. The dredger has a twenty-four-hour capacity of 2000 cubic yards, ten men operating in that time. The gravel averages from 20 to 25 cents per cubic yard; the cost of handling it is locally figured at 5 cents per cubic yard.

There is a large extent of similar placer ground, unworked, in that vicinity. The two accompanying engravings are furnished through the courtesy of Mr. O. L. Miller, of Baker City.



GOLD HILL MILL, BAKER COUNTY, OREGON.



POMEROY DREDGER, BAKER COUNTY, OREGON.

A Typical Utah Mine.

Herewith is an illustration of the Old Jordan and Galena mine and mill, Bingham, Utah, furnished through the courtesy of Mr. Higgins of the Salt Lake City *Mining Review*. The mine is a good example of the kind of properties that have put Utah in the front rank as a dividend producer. Though not worked or even explored below the 200-foot level, vertically, the past output is estimated at over $20,000,000, it producing gold, silver, lead and copper, new ore bodies now being blocked out and new development going on preparatory to resumption of ore extraction.

The Old Jordan is probably the oldest location in Bingham district. It was 200 feet wide, 5200 feet long, and was located in 1863 by a soldier in the command of Gen. Connor. It is said by some to have been the first mineral location in Utah, and proved immensely rich from the surface. The U. S. M. Co., represented by Capt. R. A. Parker of San Francisco and J. W. Neil of Salt Lake City, has recently secured and consolidated three leading properties in Bingham, one of which is the Old Jordan and Galena, which apart from its past and prospective value is of historic interest.



OLD JORDAN AND GALENA MINE AND MILL, BINGHAM, UTAH.

THE coast glaciers of Alaska appear to have lost their scenic attractions for the time being through the occurrence of the recent earthquake. The Foster glacier in Taku Inlet was fractured and the overhanging portion slid down into the water, so that instead of the bold projection on the seacoast, it now affords a gentle ascent. Other glaciers suffered to an equal degree.

ZINC miners of the Missouri–Kansas field have closed a number of their mines, as the smelting association refuses to pay the price demanded by the miners. The smelting companies want to pay dividends on their excessive capitalization, but are unable to do so while paying the miners' price for ore. The latter claim that a profit of $14 to $16 per ton, sought by the smelters, is exorbitant, while their price for blende is reasonable, and to maintain it they have curtailed production.

The New Africa.

Much additional information has recently been brought to the surface regarding Africa through the opportunities which are now afforded for access to the interior. Physically, the African continent is in many respects unique. Five thousand miles in extreme length, and over 4000 in breadth, its area is greater than that of any other continent except Asia, the latest estimates being 11,874,000 square miles. Its coast formation is peculiar in the absence of deep indentations, bays or harbors, and the small number of waterways which offer entrance to the interior. The fact that the greater part of the interior is an elevated table-land, extending on all sides to within a short distance of the coast, renders access to the interior by the few large streams difficult. At the point where the rivers pass from the elevated plateau of the interior to the lowlands of coast the falls or rapids which there exist prevent navigation, and, as a result, travel to the interior in Africa developed more slowly than in any other continent. Indeed it was not until the explorations of Livingstone, Stanley, Spoke and others developed the true conditions and made known the fact that vast navigable water stretches were to be found in the interior that it occurred to man to transport steam vessels around these falls and put them afloat in the waterways of the interior. When these conditions were clearly established, however, modern ingenuity and energy soon found a means of transporting steamers in small pieces upon backs of men through the forests, around the falls and rapids for scores and even hundreds of miles, and putting them together, set afloat the steamers which penetrate thousands of miles into the interior and develop facts never before known and which could not have been developed by land exploration in tropical climates and jungles for many generations.

Already railroads run northwardly from Cape Colony about 1400 miles and southward from Cairo about 1100 miles, thus making 2500 miles of the Cape to Cairo railroad complete, the intermediate distance being about 3000 miles.

Progress in Metallurgy.

W. R. Austen notes that there are blast furnaces which will produce 690 tons of pig iron in twenty-four hours, with a consumption of little over 154 cwt. of coke per ton of iron, and the gases of blast furnaces are used not only as sources of heat, but directly in gas engines. There are Bessemer converters which can hold fifty tons, while 100 ton furnaces are projected. The open-hearth furnaces are fed with one ton of material in a minute, by the aid of a large spoon worked by an electro-motor There are gigantic "mixers" capable of holding 300 tons of pig iron, in which, moreover, a certain amount of preliminary purification is effected. Steel plates are rolled of over 300 feet in area and 2 inches thick, and there are girders which justify the belief of Sir Benjamin Baker, that a bridge connecting England and France could be built over the channel in half-mile spans. There are ship-plates which buckle up during a collision, but remain water-tight. There are steel armor-piercing shot which will penetrate a thickness of steel equivalent to over 37 inches of wrought iron. The points of the shot remain intact, although the striking velocities are nearly 2800 feet a second. There are wires which sustain a load of 170 tons per square inch without fracture. Hadfield, whose labors he hoped to see continued far into the twentieth century, has given us manganese steel that will not soften by annealing; while Guillaume has studied the properties of certain nickel-steels that will not expand by heat, and others that contract when heated and expand when cooled. Nickel, chromium, titanium and tungsten are freely alloyed with iron, and the use of vanadium, uranium, molybdenum, and even glucinum is suggested. Huge ingots are placed in soaking pits and forged direct by 120-ton hammers, or pressed into shape by 14,000-ton presses, and there are steel castings that weigh over thirty-five tons.

THE Pikes Peak Power Company is at work on the installation of a 3200 H. P. plant on Middle Beaver creek in Colorado, which will supply current to the Cripple Creek district electric railway and also certain mines in the neighborhood. About 150,000,000 cubic feet of water will be impounded at a height of 2300 feet above the impulse wheels in the plant. It is expected that current will be turned on in about six months.—Electrical Review.

JOHN F. QUINN, foreman of the railroad section crew at Corning, Cal., received a shock of 10,000 volts of electricity last week from the wires of the Tehama Electric Company. He was lifted from his feet and left in a paralyzed condition. His body was badly burned and he is still in a demoralized nervous condition, but will recover.

California Canal Construction.

Recently were given some illustrations of the headworks of the Merced, Cal., canal and some facts of the history of the enterprise. As one of the large enterprises for water distribution, a few more details from the report of C. E. Grunsky to the U. S. Geological Survey may be of interest. One of the features of the work is a large tunnel which, owing to the nature of the soil traversed, had to be turned into a subterranean flume. When the canal reached a point eight miles north of Merced it was taken through a spur of the foothills in a timber-lined tunnel 20 feet wide, 13 feet high and 2100 feet long, with a total fall of about 5 feet. Tunnel frames are constructed of timbers, 12x14 inches, 4 feet apart. Lagging and flooring are 3 inches thick, all redwood. Tunnel lining required over 1,000,000 feet of timber, and it alone is said to have cost about $30,000. Mr. Grunsky thinks it is extremely doubtful whether the reduction of a few miles in the length of the canal could justify its construction, even if it had been found to require no lining. The total cost of the tunnel was about $70,000. It was completed in about six months. The other engraving shows a scene on the main canal near its exit from the diversion works at the dam. It shows one thing which is characteristic of the canal through portions of its course and that it traversed much distance through a soft sandstone or a cemented gravel which allows a nearly vertical bank. At the place shown the canal is about 60 feet wide and it has a fall of about 1 foot to the mile, except at the tunnels. One of the rock tunnels has a fall of 10 feet to the mile and the lined tunnel shown in the upper engraving has half that fall.



ENTRANCE TO TIMBER-LINED TUNNEL ON MERCED, CAL., CANAL.



SCENE ON MERCED, CAL., CANAL NEAR HEAD, LOOKING DOWN STREAM.

Steel at Liquid Air Temperature.

M. F. Osmond recently contributed to the *Academie des Sciences* the results of some experiments made on steel at the very low temperature produced by the evaporation of liquid air. In 1890 the late Dr. Hopkinson discovered that steel containing 25% of nickel, which was non-magnetic at ordinary temperatures, became magnetic at the temperature of solid carbonic acid. M. Osmond also found out that this property is inherent in other alloys of nickel when carried to the lower temperature of liquid air, and concludes that the hypothesis of Hopkinson, which assumes the existence of a definite alloy—Fe_3Ni—is not correct.

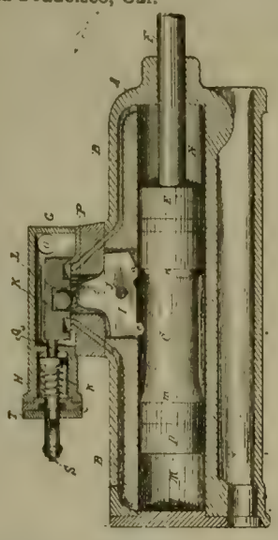
THE Kimberley diamond mines, which are located in British territory just outside the boundaries of the Orange Free State and about 600 miles from Cape Town, now supply about 98% of the diamonds of commerce, although their existence was unknown prior to 1867 and the mines have thus been in operation but about thirty years. It is estimated that $350,000,000 worth of rough diamonds, worth double that sum after cutting, have been produced from the Kimberley mines since their opening in 1868-69, and this enormous production would have been greatly increased but for the fact that the owners of the various mines in this vicinity formed an agreement by which the annual output was so limited as to meet, but not materially exceed, the annual consumption of the world's diamond markets. Diamond digging in other parts of the world has almost ceased.

Latest Mining and Metallurgical Patents.

Patents Issued Oct. 3, 1899.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROCK DRILLING MACHINERY.—No. 633,692; W. Gleeson, San Francisco, Cal.



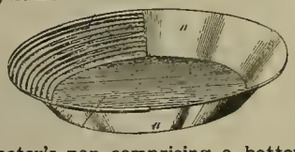
In a rock drilling machine, a main cylinder, a piston, a distributing valve for air or steam, a tappet to move the slide valve each way, and a stem pressed elastically against one end of the slide valve by means of a spring, whereby the valve will move in one direction in advance of the tappet's action, and produce short strokes of the piston and of the drills attached thereto, a spring to move the slide valve in one direction in advance of the tappet's action, and means to apply and remove the pressure of the spring, whereby the operation can be instantly changed from a long to a short stroke, and the reverse.

MINE CAR CHECK HOLDER.—No. 634,049; C. R. Williams, Georgel, Va.



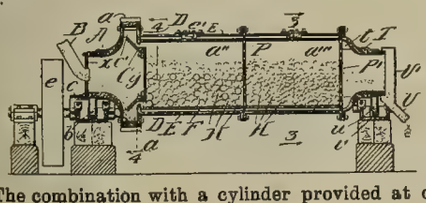
A mine car having an attached check holder provided with a check seat, from which a check may be dislodged by the movement of the car to a discharging position, and having means for preventing dislodgment when the car is in its normal position. A tally check holder for tilting receptacles, having a depressed check seat accessible to a check when the holder is in its normal position, and from which a check may be dislodged when the holder is in a tilted position, and having means for preventing removal of the check when the holder is in its normal position.

PROSPECTOR'S PAN.—No. 634,120; W. H. Moore, Deadwood, S. D.



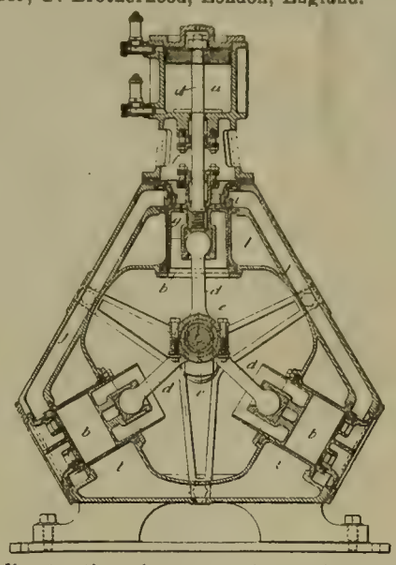
A prospector's pan comprising a bottom and an outwardly flared rim rising from the bottom, approximately one-half the circumference of the rim having a smooth inner face from the bottom to the top thereof, the other half or portion of the rim having a series of horizontally disposed corrugations on its inner face, the corrugations extending from the bottom of the pan to the outer edge of the rim, forming a riffled surface.

PULVERIZER.—No. 634,254; R. Yates, St. Louis, Mo.



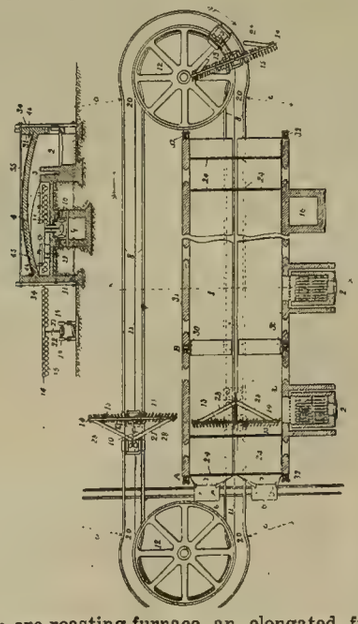
The combination with a cylinder provided at one end with a securing flange, of a hollow head *A* having a bearing portion by which it is supported and a flat clamping portion, a flaring ring *C* arranged in head and having plates *c'* projecting beyond the same and between clamping portion and securing ring, means for clamping securing flange and head together for holding the ring *C* in position, external means engaging bearing portion of the head for rotatively supporting the same, and means for rotating the head and cylinder.

DIRECT-ACTING AIR COMPRESSING ENGINE.—No. 634,389; P. Brotherhood, London, England.



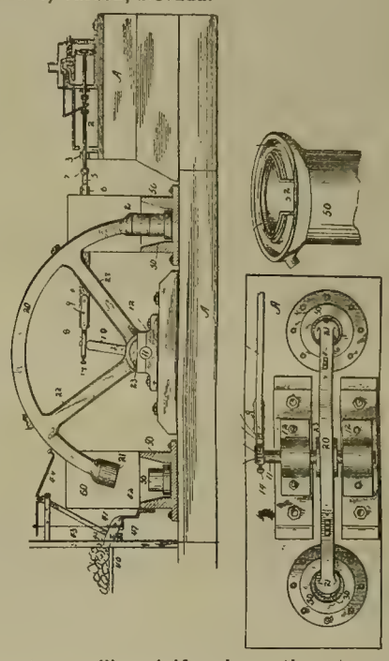
A direct-acting air compressing engine comprising a double acting steam cylinder having its piston connected to the piston of an air compressing cylinder in line with the steam cylinder, and two other air compressing cylinders having their pistons connected to the same crank with the other and the air cylinders being provided on their outer ends with apertures furnished with suitable suction and discharge valves. The combination with a shaft, and a plurality of radially arranged air compressing cylinders having their pistons connected with the the shaft, of a double acting steam cylinder having its piston rigidly connected by a piston rod with the piston of one of air compressing cylinders.

ROASTING AND OXIDIZING FURNACE.—No. 634,247; A. Ropp, Selby, Cal.



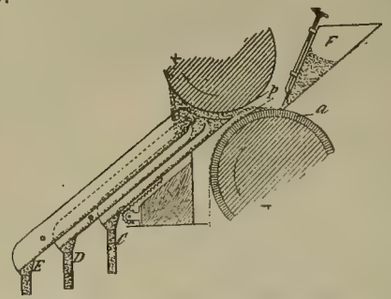
In an ore roasting furnace, an elongated furnace chamber provided with a roasting hearth and conduit beneath; a series of rakes or rabbles connected by an endless rope, located in the conduit, and impelled by wheels or pulleys at the ends of the furnace, rakes or rabbles being supported and guided by cars or trucks mounted on ways beneath and outside the furnace, each of the ways having a double or reverse curve and increased radius around the wheels or pulleys, so that the impelling rope will enter upon and leave the guiding and driving pulleys without lateral strain. A main hearth and fire boxes communicating therewith; a series of mechanically impelled rakes or rabbles to stir and move the ore, rails or ways in a conduit beneath the hearth of the furnace and extending beyond the ends thereof and having reverse curves in the extended portions, and cars or trucks carrying the rakes or rabbles, the car or truck wheels being provided with swiveling axles to accommodate the curves at the ends of the furnace. A hearth, reverberatory top and side walls, the hearth, reverberatory top and side walls being divided into separate sections, each of which is braced by through rods or bolts and metallic bars 30 that will telescope or slide one upon the other, permitting longitudinal expansion and contraction of the walls of each section. A hearth, reverberatory top and side walls in divisions, and plates 30, 38 and 45, to cover the spaces between the divisions of the hearth, side walls and top, the plates being attached to one division of the furnace and adapted to slide on the other division, whereby the hearth, top and side walls may expand and contract together. A plurality of separate ore-roasting furnaces, each provided with doors at its ends, the furnaces being arranged in alignment and each provided with a way; in combination with an endless carrier passing through and common to all the furnaces of the plurality; a stirring mechanism operated by the carrier, and suitable supports for the carrier. A plurality of separate ore-roasting furnaces, each of which has its hearth slotted from end to end; closing doors at each end of each hearth arranged to be actuated by the stirring mechanism; a carrier supported below the slot and common to and passing through the slot of each furnace; stirring mechanism operated by the carrier, and supports at the ends of the plurality of furnaces and at suitable intermediate points for supporting said carrier.

STAMP MILL.—No 634,417; A. C. Pratt and C. A. La Grave, Carson, Nevada.



In a stamp mill, a rigid reciprocating stamp supported on a journaled shaft and provided with shoes at each end, a mortar and die on which the stamp may strike a blow at each end of the reciprocating movement, and means for starting the stamp bar, then releasing the stamp bar and permitting the momentum of both stamps and bar to become available in the blow at either end of the bar.

ELECTROMAGNETIC APPARATUS FOR SEPARATING ORES.—No. 634 356; E. Kreuser, Mechernich, Germany.



An electromagnetic ore separator, consisting of two revolving, cylindrical electromagnets arranged one above the other and having cylindrical polar surfaces, the rotation of which produces a magnetic field bulged in the direction of rotation, a cylindrical, non-magnetizable covering tightly fitting the lower cylindrical polar surface to weaken its magnetic attraction relative to that of the upper cylindrical polar surface which raises the ore particles consecutively through polar fields of gradually decreasing strength, and inclined chutes arranged to correspond accurately with the several zones of the separated falling ore particles; and conveying away the different grades of ore as they are separated from each other by the magnetic attraction of the upper cylindrical polar surface.

Mining Summary.

ALASKA.

Juneau *Mining Record*: Late arrivals from George creek report a rich quartz strike in that district; the quartz shows free gold. George creek is near Windham bay and is one of the latest discoveries.

ARIZONA.

GILA COUNTY.

The Old Dominion M. Co. are reported making arrangements to float enough treasury stock to build ten miles of railroad and to pay for a converter and concentrator.

GRAHAM COUNTY.

The Arizona Copper Co. at Clifton have recently installed a 54 H. P. gasoline engine, and are making other additions to the plant.

Recent development on the property of the Morenci Copper Co. has exposed a body of ore 7 feet wide, averaging 24% copper, $20 gold and sixty ounces silver to the ton.

MOJAVE COUNTY.

While cutting into the foot wall of the De la Fontain mine last week for the purpose of putting in wall plates upon which to hang ladders, a 3-foot streak of solid lead ore was opened up. The contractors in sinking the shaft had gone over the hanging wall and failed to catch the ore where it formed on the foot wall.

The Tennessee mine is shipping twenty-five tons of concentrates daily. Large bodies of ore have lately been encountered. The ore in the Tennessee has nearly doubled its silver value with depth.

At Chloride in the Minnesota shaft at a depth of 250 feet the vein has opened out into a body of ore that assays twenty ounces gold and 300 ounces silver per ton.

Kingman *Miner*: H. J. West, F. L. Smith and G. W. Koster, while prospecting in the Boundary Cone country, located several claims. They found indications of water in a vein near the camp, and sunk outside the ledge. Water was encountered and the discovery made that the ground was held by others. The ground was bought for a nominal sum and the shaft sunk 40 feet, where a supply of water was obtained. Cutting into the ledge to increase the water supply discovered 18 inches of eleven-ounce gold. The former owners had a small stringer of rich ore on the surface, but it had pinched out, and they quit. The ledge is 4 feet wide, and everything between the walls will pay to mill. The owners contemplate putting in a cyanide plant, and are now developing water on the mines.

PIMA COUNTY.

Globe *Silver Belt*: A strike is reported from the Helvetia mines, thirty miles south of Tucson.

PINAL COUNTY.

(Special Correspondence.)—L. C. Ferree of Denver and L. H. Hollister of Boston are developing the Catalina group in the Santa Catalina mountains, near Oracle. It is asserted that they have a ledge of copper ore whose outcrop has an extent of 8000 feet. It is being operated through a crosscut tunnel 208 feet long. The ledge is 30 feet wide, with carbonates near the surface and sulphides below. The values are given as 6% to 10% copper, $2 gold, with small silver values. It is ultimately their intention to erect a small matte smelter there.

Oracle, Oct. 9th, '99.

YAVAPAI COUNTY.

The shaft on the Zonia mine, in Kirkland valley, is down 170 feet, and the showing of ore is encouraging.

Prescott *Courier*: The first carload of matte from the Big Bug smelter carried 55% to 65% copper and the last 73% copper. In addition to the copper there are gold and silver values.

CALIFORNIA.

Alpine.

Folsom *Telegraph*: J. E. Meylett, who prospected in this county during the summer, found a deposit of copper, the extent of which is not yet known, but croppings indicate a large body of ore. Specimens of the croppings are rich in copper.

Butte.

Marysville *Democrat*: The Yuba River Gold Dredging Co. have bought $1400 worth of lumber with which to build a new dredging boat for work on the Yuba river near Smartsville. The company has leased the claim of the Marysville Tunnel & Quartz M. Co.

Calaveras.

The shut down of the Utica and Stickle mills at Angels will last for about five weeks during which time the ditch will be cleaned out and the electric motors installed. The mine will be kept free from water in the meantime.

Stockton *Independent*: At the Lightner mine in Angels the second twenty stamps have been started. So far the mine has developed well with depth. Twenty concentrators are running in the mill.——Good reports come from the Harris or Bonanza mine, south of Angels, largely owned by Stockton men. A rich shoot of rock was recently struck, and the vein matter is 40 feet wide at a depth of 200 feet.

San Andreas *Citizen*: The Commodore shaft is down 240 feet and Supt. Clary is sinking on the incline on the foot wall. It is his intention to go 200 feet more before crosscutting. Crosscuts at 80 and 200 feet encountered the vein on both levels. The vein is 6 to 8 feet wide and shows an average value in free gold of $5 to $6 and 10% sulphurets, averaging $60 to the ton. Mr. Clary bonded this mine six months ago, making the last payment on Saturday. He is working three shifts. The workings are in serpentine and black slate, in ore similar to that of the Utica-Stickle mines. ——Near Middle Bar, on the Vorlander mine, they are sinking 100 feet and contracting for 200 feet more. The Kramer mine, recently bonded by C. M. Burlson, on a six months bond, for $8500, to Eastern parties, is being worked. A tunnel has been run 1200 feet and work is progressing. J. K. Carpenter, of Cleveland, Ohio, is Supt. The Empire's tunnel is in 900 feet, and on the Boston they are keeping the mine free from water, by steam power, and will resume sinking when the supply of water permits.——The new furnace of the Penn Chemical Works, at Campo Seco, is at work and giving satisfaction. After being first blown in it chilled, but on retrial it worked to perfection. Ten men are employed by the company.——The Chili Hill gravel mine, near North Branch, will be started up as soon as a supply of water is assured. A bedrock tunnel has been run to connect with the incline, and the incline has been sunk 250 feet. D. McM. Palmer is Supt.

Mokelumne Hill *Chronicle*: D. Grant, formerly Supt. of the Con. Virginia, of Virginia City, will act as Supt. of the Melbra quartz mine at Chili Junction. It was recently sold by Mrs. P. B. Whitfield to a company of San Francisco capitalists. The preliminary work is now being rushed and sinking on the property is to begin.

Del Norte.

(Special Correspondence.)—A ledge of fine copper ore has been discovered on the old Occidental, near the Low Divide.

L. W. Musick is developing copper prospects on Myrtle Creek hill, a favorite locality for prospectors.

W. L. Higgins and J. White have sold their copper claims near Preston's Peak to parties who are now in that vicinity looking for a site for a smelter.

Crawford, Baily & McGowan have struck a ledge of copper ore on the Copper King claim on Myrtle creek. At last reports they have crosscut 14 feet and were not yet across the ledge.

Lewis & Jenkins are preparing to work their ledge. A test run on tailings showed good results.

The Jones Creek M. Co., it is reported, have sold out to a Chinese company.

F. Lind is preparing for extensive operations on French hill this winter, also B. Humiche on Craigs creek. Both are laying in supplies for winter.

Crescent City, Oct. 5th, '99.

El Dorado.

El Dorado *Republican*: A miner prospecting near the Union and Crown Point mines recently found specimens of native copper and copper ore. He has a shaft down 30 feet, where the deposit is 14 feet wide. The copper ores are found in the same locality. The mine has been bonded by El Dorado county mining men.

Fresno.

Marion Childers & Co. are preparing to put in an hydraulic elevator on their placer claim on Sycamore creek. They have completed ten miles of ditch and have 130 feet head, with at present 50 inches of water, which will be increased by the winter rains.

The Copper King mine, fourteen miles from Sanger, has 20,000 tons of ore on the dump, which contains gold and silver. The ore is chalcopyrite, with an admixture of pyrite. Stoping and drifting have been discontinued while sinking the shaft deeper—now down 400 feet. The mine is equipped with a 100 H. P. hoisting plant. The workings have proven some portions of the vein to be 12 to 14 feet wide, but little crosscutting has been done. The ore runs $12 to $50 per ton.

In Fresno county are ancient river channels which come from the high Sierra in a southwesterly direction. They are covered with a heavy deposit of tufa and augite andesite. The gravel of the river beds is from a few inches to 300 feet in thickness, and contains fine gold throughout. This gold is high-grade, being worth $20 an ounce. No extensive exploration on the bedrock of these old channels has ever been undertaken and little is known of their value, from a commercial standpoint. These channels with the lava cap form long, high, nearly level-topped ridges, and are known as the table mountains. They are intersected by the San Joaquin and Kings rivers.

M. J. Donahoe has built an 18-foot overshot wheel at the Vincent Moore mine, sixteen from Sanger. The wheel runs two arrastras having 10-foot basins, the power being applied by belt to a shaft on which are keyed two pinion wheels engaging spurs on the arrastra posts. The arrastra drags make five revolutions per minute and their combined capacity is 1600 pounds of hard quartz daily. The quartz is broken to suitable size by hand hammers.

The Barnes M. Co. are preparing to work a mine on Big creek, a tributary of Kings river. The company own 3000 feet on a vein having an average width of 14 inches. The development consists of a tunnel on the vein in 320 feet, with 200 feet back at the face. The ore is oxidized and contains gold in a very fine state of division. Masses of solid sulphide ore (marcasite) occurring from time to time indicate the character of the ore in depth. The mine has a 5-stamp mill and a cyanide plant is to be built. M. J. Donahoe is Supt.

Kern.

A discovery of petroleum is reported north of Garlock and west of Searles marsh.

Randsburg *Miner*: The Kinyon mine shipped 216 ounces of bullion, about $3600, from a run of nine and a half tons of ore from the Good Hope, milled at the Kinyon mill in Randsburg. This averages nearly $380 per ton.

Mariposa.

(Special Correspondence).—About seventy-five men are working on the Mariposa Grant, divided between the Mariposa, Princeton, Josephine and Pine Tree mines. New machinery for the Mariposa mine, at Mariposa, is on the ground.

The Quail M. & M. Co. are dropping four stamps on their recently purchased property in Indian gulch, northeast of Coulterville.

H. H. Clark has sold a controlling interest in the Alice Clark mine to local and Stockton mining people. A new hoist and mill have been shipped to the mine.

Capt. A. H. Ward and associates have a bond on the Hite property, at Hite's Cove, and a strong combination has been formed to reopen the property, which many years ago was one of the richest gold producers in the State.

W. Jones, representing Tuolumne people, has secured an interest in the Kirchoff mine, on Maxwell creek, and is erecting there the old Red Cloud mill.

The Columbus M. Co. has cut a 4-foot vein in its lower tunnel and is drifting on it with three shifts. Work is progressing on the upper tunnel, which is now in 300 feet. A mill is to be erected this fall.

M. McCrosson has transferred his bond on the Siegelsteyl property to A. H. Ward.

The Merced mill is still running the full forty stamps, with enough water in the reservoir to last thirty days longer. In Tuolumne county about twenty men with a sawmill are getting out lumber to rebuild the flumes on the Oak Flat ditch, where the Merced people expect to install an electric plant next year.

A few men are still working at the Big Betsey. The management hope to yet pull out even by securing additional claims. The stock has recently been pushed in Philadelphia with a prospectus similar to the one which was circulated in the farming districts of California last year.

There are more prospectors in the hills of Mariposa county now than at any time in the last five years.

A report is current that a strong Scotch combination has an option on the McCrellish properties, now the largest idle property in the county.

The Mariposa Con. G. M. & El. P. Co. has been incorporated in Colorado by Pennsylvania and California people to operate a group of mines near Coulterville and erect an electric plant on the Merced.

Coulterville, Oct. 9th, '99.

Nevada.

The Boston Stock Exchange has admitted to the regular list 250,000 shares, par $10, of the North Star Mines Co., incorporated under New Jersey laws with an authorized capital of 500,000 shares. The company paid its last dividend in April and will shortly pay another. It is the intention to pay 5% dividends until the deeper workings are reached. The company has large quantities of gold ore which averages $18 per ton. The mines are in the vicinity of Grass Valley.

This company was organized to succeed a gold mining company organized under the laws of California and known as the North Star M. Co., which has paid $550,000 in dividends—the last of $50,000 in April, 1899. The new company gave 200,000 shares of their stock for the property and assets of the old company and sold 50,000 shares for cash at par to provide capital for improvements and operating. The three principal mines are the North Star, New York Hill and Massachusetts Hill. The North Star mine has been operated for many years and has produced $5,000,000—the ore in general averaging $17 per ton. The New York Hill has produced several million, and is now producing $30,000 to $35,000 monthly, at a profit of $10,000 to $15,000 from the deeper workings. The mines are well equipped and have a capacity of 2000 to 3000 tons per month. The new company will develop the property at a greater depth, and are sinking a new vertical shaft called the Central, which is expected to cut the North Star vein at a depth of about 1000 feet, and the New York Hill at about 600 feet.

Grass Valley *Union*: After a shut down of nearly a year the pump at the Gold Hill mine was started last week. At the same time the 350 H. P. motor was put to work.

Placer.

(Special Correspondence).—The pocket of Messrs. Clark & Brown, on the old California, still continues to yield the precious metal.

Mr. Cook will send out some ore for reduction, as well as Mr. Henderson. They have some fine ore.

Copper properties are being looked after and find ready sale, provided owners do not want too much for them.

Bruner & Hirsh are making improvements in the road between Cisco and Old Man mountain—Carlisle—having had a force of men on nearly the entire season.

Cisco, Oct. 5th, '99.

Placer.

Colfax *Sentinel*: The extension of the main tunnel at the Eureka Consolidated drift mine near Michigan Bluff, on the Forest Hill divide, was recently commenced at the 3000 foot mark. On Oct. 4th, 66 feet of new tunnel had been driven. The rock is of average hardness and they are making 5 feet per day. The tunnel is being run to tap the lower gravel channel. Felix Chappellet, Jr., is Supt.

Plumas.

Quincy *Independent*: The Thistle mine is being opened by a third hole, which, when down to bedrock, should determine the level at which a tunnel may be driven into the gravel. The boring machine is employed to locate the different levels of the bedrock, and not in prospecting for gold.——The Little Onion Valley shaft is down 125 feet. When a depth of 150 feet is reached a drift will be run to the ledge, and from that level a shaft will be sunk 50 feet.

San Diego.

Wilhite and Hill, ranchers, recently found a vein of ore near Valley Center and have opened an ore deposit 12 feet wide between walls of granite and mica schist. The ore is galena, carrying gold and silver. A large number of claims have been located in the neighborhood. The ore would have to be crushed and concentrated, as the lead sulphide is disseminated through the gangue.

The deposits of kaolin discovered a few months ago by C. E. Stream are said to be as valuable as any other kaolin beds in the United States. Stream sold the deposits a few days ago to Earle & Morgan and Fuller & Riall of San Diego and Holcomb & McCarroll of Yuma, Ariz. The kaolin owned by these parties is embraced in sixteen claims, and other claims are owned by individuals in the immediate vicinity. Some months ago Mr. Morgan took samples of the kaolin to Japan, where pottery manufacturers made a test, and he was asked to quote prices on 1000 tons a month delivered in Japan. Large quantities have been given a fire test, after pulverization, and the clay has come out as white as snow and with all the valuable qualities desired. The owners are stripping 100 feet square and will build a chute down the north side of El Cajon mountain, a distance of 1600 feet, and from the chute it is four and a half miles to the railroad at Lakeside.

The Golden Cross mines, twenty miles northwest of Yuma, Ariz., are the largest producers of gold bullion in southern California. There are thirty claims in the group, which is owned by the Free Gold M. Co., a Nevada corporation, which succeeded the Golden Cross M. & M. Co. The mines were sold to the former company for something near $1,300,000, and there is yet due on the mines about $1,050,000. The stock of the Golden Cross M. & M. Co. is owned by G. G. Mullins, Pres., and T. S. Fuller, Sec. and Gen. Mgr., of Los Angeles, and W. V. and C. L. Hedges of Omaha. The Free Gold M. Co. is owned by Isaac Trumbo, formerly of Salt Lake, Utah, but now a resident of San Francisco. The property is now in the possession of Mr. Trumbo, as receiver, and the representative of a board of control, consisting of D. M. Delmas, J. Chandler, Isaac Trumbo, T. S. Fuller and D. T. Hedges, which board represents the owners, and which will control the operation of the property. There is a mill of 100 stamps that has been running over three years. There is also a 40-stamp mill on the property that is run part of the time. Water for the mines is pumped from the Colorado river, twelve miles away. The pumping plant cost $70,000. The mines are paying about $150,000 a year. A cyanide plant is to be put in to treat the tailings, of which there is a large amount. There are three mines now being operated, development work having reached a depth of 700 feet. At one place the ore is quarried from the side of the mountain. About 150 men are employed by the company, the payroll being $10,000 a month.

San Diego *Union*: The Dulzura mining district is thirty-two miles southeast of San Diego and twenty-two miles west of Campo, and has some promising prospects. The ore is found in felsite, the dyke being from 100 to 300 feet wide on the surface. The deepest work is down 160 feet, on the Golden Chief mine, owned by the Donahoe Bros. The pay shoot averages $6 to $9 to the ton. The mine has been bonded.

Shasta.

(Special Correspondence).—Near Muletown Banter & Herzinger are doing extensive development work on three claims known as the Emma Mable group. In a tunnel 200 feet long, on the vein, the ore body is 30 inches wide and assays $35. In a shaft 30 feet deep the ore body is 4 feet wide and assays $115. In another shaft the vein is 5 feet wide and yields $12 a ton. Each piece of work is on a different claim.

The D. D. & K. mine, near Shasta, is yielding good ore in the prospecting work. From local and Selby assays, ten in all, an average of $62 per ton was obtained. A tunnel 380 feet runs on a 5-foot ledge. The formation is diorite and talcose schist.

On the Beeson group of three claims, near Middle Creek, work continues on a ledge varying from 2 to 4 feet; the ore mills $7.50 and the sulphurets assay $12 a ton. The formation is locally known as slate and porphyry.

Kahny & Burgbacher have bonded to H. C. Woodrow of St. Louis, Mo., the Bowry Belle group, comprising seven claims, with mill site and water rights, for $40,000. The option runs to Jan. 1st, 1900. The owners continue development and shipments of ore. Ten men are employed. The tunnels aggregate 600 feet. The ore body averages 30 inches in width, is low grade and free milling.

The Balaklala group of copper mines, near Copley, comprising fourteen claims, which has been in litigation for a long time, has been taken from the market. The property has been bonded to W. A. Temple for $200,000. Development will be resumed and a large force employed.

Redding, Oct. 10th, '99.

The title to the Balaklala mining property in the Flat Creek district was cleared on Monday and the sale of the property is now probable. The Balaklava is a group of copper claims ten miles northwest of Redding. A corporation known as the Balaklava M. Co has bought out all the dissatisfied owners. The three last plaintiffs to the action were bought out for $12,000.

Redding *Free Press*: H. C. McClure bonded the Recorder mine, at Copper City, recently, to H. C. Woodrow and C. C. Bush, Jr., for $10,000.——A strike has been made at Iler Bros.' mine, north of Shasta. From the 1000-foot tunnel, the face of which shows an 11-foot ledge, a shaft has been sunk into a body of sulphuret ore showing free gold. —— F. and G. Iler recently disposed of a half interest in all their mining claims included under the name of the Iler Bros.' mine to the Elizabeth G. M. Co.——The Uncle Sam G. M. Co., at Kennet, has delivered to the Pacific Development Co. at Redding, for shipment to the California Paris Commission, two handsome specimens of ore.——C. H. Woodrow, operating the Trinity group of quartz mines on Dog creek, states that the Advance M. Co. is preparing to run an 800-foot tunnel on their property. A quantity of good ore is already on the dump and the cyanide plant has started work.——The Misses May and Clara Fowler have donned miners' garb and are working a rocker on one of the Van Ness claims, near Redding, and are said to be making $4 per day.——The air drills which have been used at the LaGrange mine, owned by the French Co., have been

moved to the Black Diamond mine, on Stillwater, and will operate there in the mile tunnel which is to open on Pit river.——Since the opening of a vein of rich sulphurets at the time of the purchase of the Oro Fino by Behrens & Leivsay in the summer, the 60-foot shaft has been extended on the 2-foot ledge to 110 feet, where the ledge has widened to 3 feet and the value of the ore improved. It is a vein of almost pure sulphurets. Eleven tons of Oro Fino Ore, mined in the course of development, were shipped to Keswick.

Siskiyou.

Yreka *Journal*: The Wheeler M. Co., working the claim at the Nehrbass place, adjoining the Greenhorn blue gravel mine, have an immense quantity of water to contend with, but the two pumps are able to handle it. The shaft is down in the deepest place, and it is believed an old deep channel has been found. ——At Quartz valley the miners are getting out good quartz from three or four mines, and prospecting is going on in other claims. The work of getting out gravel for sluicing when the winter rains commence is also carried on in Quartz valley, Oro Fino, Mugginsville, Pinery, Patterson creek and other districts on west side of Scott valley. The ditches and pipes of the several hydraulic claims are undergoing repairs.

Trinity.

(Special Correspondence).—G. L. Carr of Carrville and A. Miller, a Cuban war correspondent of Washington, D. C., have organized a Chicago company to operate the Boulders mines, fifteen miles from Castella. They are erecting hoisting works and placing pumps preparatory to further sinking. The ore body, so far as known, is said to be 20 feet wide and of high grade.

Carrville, Oct. 10th, '99.

Redding *Free Press*: A. Hill's half interest in the Yellow Rose of Texas mine has been bought by G. L. Carr of Carrville and A. Miller of Washington, D. C. The deal was for cash. The owners have put a cannon-ball mill on the mine for sampling. The ore carries rich sulphurets and tellurium.——It is reported that the Trinity River Gravel Bars is to be sold. The property includes twenty-six mineral claims and 360 acres of timber and other land. The claims lie along the river from Comstock to Crooked Bend.——Captain Roberts has spent several days inspecting a mine located one and a half miles east of Doeblin's ranch, near Bragdon. It is owned by Mr. Van Ness, though under bond to other parties. The name of the claim is the Five Pines. The gold is found in black manganese which is very rich.——The Maple Creek M. Co. of San Francisco, some months ago bought hydraulic property of J. Birgen and his partners on Maple creek, eight miles south of Junction City, for $40,000. The entire holding includes 1600 acres. A pipe line 3580 feet in length is to be constructed. No. 8 steel will be used at the bottom of the syphon.

Yolo.

The bank of the Sacramento river, beginning at the railroad bridge at Woodland and running south 60,000 feet, covering an area of 400 acres, is to be mined. The directors of the Tolman mining district, consisting of W. H. Wickham, G. B. Tolman, C. H. Jackson, A. M. Brunkhorst, A. D. Jackson, C. M. Tolman, A. W. Dunlap. M. L. Jackson, E. Dunlap and E. Wenk, have filed notice of location and declare their intention of holding and working the same as placer claims. The area is divided into two claims, to be known as the Golden Sand and Golden Hunter.

COLORADO.

The Salt Lake copper smelter, which was built at Denver four years ago, at a cost of $250,000, was bought Oct. 2nd at sheriff's sale by Lewisohn Bros.

BOULDER COUNTY.

Ward *Miner*: The Comstock-Sullivan mine at Quigleyville is to resume. T. Williams, who, with J. Gaynor and others, owns the Comstock-Sullivan, reports that a bond and lease have been given to an Eastern syndicate, who will work the property. The consideration is $25,000, to be paid in installments. The property consists of two patented claims and a millsite, with steam plant and a 10-stamp mill. The development is a 240-foot shaft and 500 feet of levels. Mr. Seaman is to have charge.——J. Wright has bought the Trade Dollar, owned by Barr & Orme, for $5000, one-fifth of which was paid down. The Trade Dollar is located within half a mile of Ward and adjoins the Telegraph group. It has been opened up with several shafts. At surface the vein yielded free gold, and in the deepest shaft some of the iron ran eleven ounces in gold. The paystreak in the bottom of one shaft is 18 inches in width and streaked with iron. The vein is wide and lies between porphyry and granite walls.

EL PASO COUNTY.

Woodland Park *Times*: The North Star G. M. Co. have purchased the machinery of the Southern Cross Co. and are having the plans drawn for a 50-ton cyanide plant.

GILPIN COUNTY.

(Special Correspondence).—In the Black Hawk mill there are ten Gilpin county bumping tables and three Woodburys, all in charge of W. R. Johnson, who gives the following as the result of two tests made: First, 210 loads of ore passed through the batteries over three bumping tables and 208 loads over one Woodbury table, the result being ten tons more of concentrates from the latter than from the former. In the second test two Woodburys received the material from twenty stamps and one bumping table received the material from five stamps, and at the end of fourteen days the concentrates from each were weighed, showing that four times the output of the bumping table was 12¾ tons less than the output of the Woodbury tables, the relative stamp capacity and speed being the same.

H. B. Kenyon & Co. are operating a canvas tailings plant below Black Hawk, making a saving of $6 to $12 per ton.

Owners of the Traverse Gulch mine, near Perigo, are erecting a 20-stamp mill on their property. They will put in concentrators

W. H. Simons and Nichols Bros. have a long-time lease on the Little Fortune and Mingo, which they are preparing to work through the Drake tunnel by running a crosscut from the latter to their ore body.

The Boston & Denver M. & M. Co., operating the old Gregory-Bobtail group, are pumping 300 gallons of water per minute from the crosscut at the foot of the 1700-foot incline, by means of which the Cook and Fisk on Gregory hill are drained.

The Whitney, on Gunnell hill, has a force of nineteen men and is shipping at the rate of fifty tons per day. The ores average about $39 per ton, carrying considerable copper and lead, as well as gold. F. H Clark is Supt.

The Kansas-Burroughs Con. M. Co. operates a group of ten claims on Quartz hill, shipments from which for September amounted to 4105 tons of ore.

The general tendency of Gilpin county operatives is in the direction of consolidation of smaller interests, making cost of production smaller and the tonnage larger.

At the California mine the work of unwatering is going on, with the calculation of cleaning out the 1700-foot level and beginning work through it. The Cook shaft has reached 900 feet depth and sinking will be continued 300 or 400 feet deeper, from which point a connection will be made with the Gregory-Bobtail workings. September shipments from the Cook were 3350 tons, all but seventy-five tons of which went to the mill.

W. H. Coffin, Supt. of the New York mill, to illustrate the benefits of double concentration, recently ran eight cords of ore, first over Gilpin county bumpers, then through Soper sizers, and afterwards over a second set of bumping tables. The result was 35,000 pounds of concentrates from the first set of tables and 6000 pounds from the second set.

Central City, Oct. 4th, '99. WASCOTT.

GUNNISON COUNTY.

The Hoffman smelter at Marble is making a successful run.

LAKE COUNTY.

A discovery of rich gold ore is reported made in Echo canyon, eight miles from Twin Lakes. The new find is a vein 2 feet wide and the assays of ores go 9.18 and 52 ounces gold per ton. The vein was discovered two weeks ago and four tons of ore have been sacked. The Last Dollar lies above the New Discovery, in which a strike was made a month ago, and below the Grand Prize, which has been a shipper of $75 lead ore. Case Bros. & Knapp have twelve men opening up these mines. Three mills—two of ten stamps and one of five stamps—are now running in the Twin Lakes-Red Mountains country.

Leadville *Miner*: The Yak tunnel is getting close to the west end line and steadily approaching the Golden Eagle claim. On the Florence claim a shaft sunk in '79 is to be retimbered and sunk farther. Recent new data from Breece hill discoveries give encouragement for this contemplated development. The large shoot of copper-iron sulphides followed in from the No. 3 workings of the Ibex mines shows great strength. The ore nets $15 per ton, smelter returns. The Legal Tender or Vinnie shaft will be sunk to develop the large ore bodies worked at the 700-foot level of the Ibex. The Golden Eagle Co. owns thirty-two acres of land.——W. S. Copeland and associates of Aspen have bought from G. Englebach the lease of the Big Six M. Co., twenty-one acres, inclusive of the Nettie Morgan mine. Mr. Copeland developed the Fanny Rawlings. The Big Six has produced a large quantity of medium grade ore with comparatively small development. It is proposed to open both the oxide and sulphide ore bodies.

OURAY COUNTY.

Ouray *Herald*: A strike of high-grade silver ore has been made in the tunnel of the South Dakota, above Ironton. The ore is encountered in kidneys. It is of the same character as that found in the Yankee Girl and Guston mines. An assay of the ore returned 400 ounces in silver and $3 in gold. The property is owned by Snarr, Smith & Wheeler of Ouray.

PARK COUNTY.

J. Parriott and miners are working at the Brownlow. The machinery is to be overhauled and men put to work in the main workings. Mr. Van Baalen will direct affairs in Denver.

The London mill has pulverized 3000 tons of ore this summer, and is still pounding away.

The Gold Ore M. Co. has been running the Black Flag mill steadily this summer, and a good product is being saved. A new mill is talked of.

SAN MIGUEL COUNTY.

The Rare Metals Mining & Manufacturing Co., a French concern, has bought forty-four uranium claims in the west end of the county. A portion of the purchase money has been paid.

The sale of the Carribeau mine at Ophir is being negotiated and is reported about to pass into the hands of a new eastern company, which will inaugurate a larger plan of operation. The Carribeau is shipping an average of five cars per week, the Silver Bell two, and the Butterfly two, with six or eight cars from smaller propositions every week.

SAN JUAN COUNTY.

In Arrastra basin the Iowa mine employs 110 men, the Tiger 40, and the Silver Lake 220.

TELLER COUNTY.

Cripple Creek *Times*: On the No. 4 shaft of the Nickel Plate on Copper mountain, at 175 feet from the surface, there is a 7-foot vein, 18 inches of which will run from $20 to $30. The remainder of the vein is good for $10.——The Woods people are putting in a hoist on the Queen Bess on Carbonate hill. The shaft is down 125 feet, with a body of pay mineral in sight.——Down the hill from the Queen Bess the Woods people on the Mollie Kathleen ground have a 500-foot hole. Stations in this shaft have been cut at each 100 feet. They have abundance of low-grade ore, but they want the El Paso chute as it drives north and expect to get it.

Victor *Record*: The first ore hoisted from the Gold Coin since the fire was brought to the surface Sept. 29th. The company will ship thirty tons of ore daily. The smelters and mills are unable to contract for a greater output at the present time, so that the production of the mine will be curtailed until the Economic mill is in active operation.

NEVADA.

ELKO COUNTY.

Silver State: The mill at the Dexter mine at Tuscarora has been running steadily for forty-five days, and during that time has not been shut down fifteen minutes, except for a short period caused by the breaking of a water pipe. It is treating on an average 120 tons daily. The gross production for the month of September was over $1000 a day. The mine has produced in the last three months $75,000. The extraction is high, the value of the tailings seldom exceeding 60 cents to the ton.

ELY COUNTY.

John Nichols of Salt Lake, Utah, is successfully treating tailings in Cherry Creek canyon by the cyanide process.

LINCOLN COUNTY.

Owners of the Horseshoe mine at Deerlodge expect to employ 150 men next winter.

STOREY COUNTY.

At the C. & C. shaft the water has been lowered to within a few feet of the 2050-foot station. The latest official telegram is as follows:

VIRGINIA, Nev., Oct. 12th, '99.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 85 feet 8 inches below the 1950-foot level station. No. 2 elevator has been running continuously. JOS. R. RYAN.

The Zadig drift on the Occidental lode is being driven at the rate of 2 feet daily.

The Hale & Norcross M. Co. having signed the contract between the Comstock mining companies and the Truckee River General Electric Co., that document is now complete, and the first payment of the $100,000 has been made.

NEW MEXICO.

Governor Otero has appointed the following delegates to the California Miners' Association, which will meet at San Francisco on the 23rd inst.: J. E. Sheridan, Grant county; A. B. Fitch, Socorro county; J. T. McLaughlin, Santa Fe county; W. H. H. Llewellyn, Dona Ana county; W. S. Hopewell, Sierra county; H. S. Church, Otero county; T. A. Schomberg, Colfax county; G. W. Prichard, Lincoln county; A. W. Tennant, Taos county; T. J. Curran, Albuquerque county.

OREGON.

BAKER COUNTY.

A ledge of gold quartz has been located one mile east of Baker City which continues for five miles. The surface ore runs $5 per ton in gold. The locators have purchased 1100 acres of land on which the ledge is located and have commenced development.

A. Geiser, president of the Citizens' Bank, has purchased 160 acres of land west of the city, on which a large ledge of gold quartz has been located and men will be put at work to drive a 200-foot tunnel.

The Copper Queen mine has been sold to Spokane parties for $30,000, first payment of $5000 made on October 3rd. The property is located twenty miles northeast of Baker City, and has been worked for twenty years. Several tons of ore shipped to smelters in July of this year run $40 per ton.

The Carpenter Hill mine, located ten miles west of Baker City, has been sold. It is a free gold mine and averages $10 per ton.

M. C. Tobin of Chicago who recently bought a mine on Olive creek, near the Bonanza, has gone to the property. His intention is to erect a 10-stamp mill.

The Thornburg brothers have sold their thirty acres of placer ground on the north fork of the John Day, eight miles from Granite, for $23,500. E. E. Thornburg, in charge of the property, has taken out $50,000 in gold during the past few years.

The new machinery put in by the various mines in the Baker City gold field, during the past five months, will crush 600 tons of ore per day.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Since quartzite was struck in the Dacy shaft on the limestone plateau, between Squaw creek and Spearfish canyon, the American M. Co. are reported bonding claims about their property, and it is stated the ground will be developed by a tunnel run in from Spearfish canyon.

Pioneer-Times: Fifteen hundred feet south of where Otto Grantz is sacking ore, on the Poorman divide, and but a short distance from the Highland hoist, the Homestake Co. have men engaged sacking ore, on the Big Missouri. The company are taking out phenominally rich ore, practically on the surface, and there is a guard on the ground constantly, to keep specimen hunters from carrying it away. The Big Missouri was originally owned by a company of engineers and conductors of the Chicago, Milwaukee & St. Paul Railroad. The Homestake Co. at one time offered a large price for it which was refused. Several years later they bought it for a nominal sum.

UTAH.

The Utah Exchange has been bought out by the Salt Lake Exchange.

BEAVER COUNTY.

P. A. H. Franklin, who is at the head of the Franklin syndicate, by which veins of Copper gulch, near Frisco, are being opened, has verified the report that a strike had been made in the crosscut at 175 feet, and says that the presence of sulphides at water-level having been demonstrated, the sinking of the shaft to 550 feet is to be resumed. The sampling of the ore body gave 5% copper, ten ounces silver and $2 in gold, and if at 500 feet the proposition is still favorable, a concentrator of 1000 tons capacity will be built.

JUAB COUNTY.

E. L. Giraeux has an option on the property of the Watts M. Co., near the Keystone group, in Tintic, and has decided to take up the proposition on a basis of $55,000 for the entire property. In the articles of agreement he has secured the entire capital stock of the corporation. The mine is developed by tunnels to the extent of 300 feet.

W. F. Smith says that at the Midnight, near Diamond, he has cut the vein off the 260-foot level and is now following up a mineralized stratum of talc with which the ores of that part of Tintic are usually associated.

At the West Morning Glory the shaft has reached a depth of 100 feet and crosscutting to the vein will begin.

SALT LAKE COUNTY.

Bingham *Bulletin*: The Fortune group consists of twenty-one claims containing five mineral veins. Nearly all the developments to date are on one of the smallest veins, it having been easy to open. It has enough milling ore in sight to run the mill a year. The dumps would pay for building a mill, as much of their contents is said to be good enough for shipment. The mill site will be graded, and Mgr. Hill hopes the mill will start in December. It will have 100 tons capacity, the machinery to include a rock breaker, two sets Cornish rolls, two double or four single Wilfley tables, jigs and devices for saving float copper and lead.——The air compressor at the United States mines has worked perfectly since machinery was adjusted, operating seven drills at Old Jordan and Niagara and several at Old Telegraph. Its capacity is taxed to the limit and will soon be reinforced. There are 150 men working at the Old Jordan, 12 at Niagara and 42 at Old Telegraph. Last Tuesday in No. 2 west drift from Delia tunnel of Old Jordan, at 300 feet from surface, a flow of water of fifty gallons per minute was tapped. The drift is running into a body of ore in virgin ground. Since the United States Co. began developments in Old Jordan five important ore bodies have been passed through in No. 2 level. The most important one is 40 feet wide, and a shaft has been sunk 50 feet in ore of shipping quality. One of the ore bodies shows a streak 12 inches wide carrying 20% copper. The drain tunnel of the Old Jordan is to be straightened and will be used as the main outlet of the mine.

WASHINGTON.

FERRY COUNTY.

E. M. Kelly is reported to have found a new copper zone fifteen miles north of Republic. The only exploration work done consists of a crosscut on the Kelly group of claims, four in number, known as the Cache. The crosscut, through an iron capping from 6 to 10 feet thick, strikes a copper ledge 35 feet wide, between granite and limestone walls. Six feet of ore shoot sampled $38 in copper, gold and silver; copper percentage 7.8. Throughout the crosscut chalcopyrite prevails. Its smallest return was $28. Peacock ore is found throughout the loose materials.

STEVENS COUNTY.

Bossburg *Journal*: The Pomeroy, owned by the Sulphide Mountain M. Co., has struck its ore shoot in the 200-foot level after drifting for several feet from the bottom of the shaft. D. Harrington is Supt. The ore is white quartz impregnated with copper sulphide, galena and gray copper. The Pomeroy has considerable stoping ground and the mine can commence shipping as soon as the wagon road, now being built, is completed.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence.)—The Miners' Contract & Investigation Co. of Toronto, Ltd., have been granted a sixty days' extension on their bond on the Chieftan group.

Boillet Bros. of Paris, France, have purchased the Wheel Tamer at Jacko lake and the Hill Top on the west side of the Thompson river, and have a number of men at work on each property.

The ledge on the Evening Star group has been traced over the length of three claims. It is over 50 feet in width. J. H. Morrison is the owner.

It is reported that the Kimberley mine has been bonded to the Minneapolis S. M. Co.

The tunnel on the Copper King is now in about 300 feet, and the face of it is in solid high-grade ore. A concentrator will be erected at this mine during the coming winter.

The cinnabar claims on Hardie mountain have been surveyed and the owners have applied for a Crown grant. Mr. Broomhead, of London, England, is here looking over this property with a view to purchasing.

The citizens of Kamloops have sent a fine exhibit of ores to the Spokane fair. J. Donaldson, of the Pothook, is in charge of this exhibit.

Kamloops, B. C., Oct. 2, '99.

The lowest grade of ore shipped by the Le Roi M. Co. in August was $13.55 per ton, and on this it is asserted a profit of $4 75 per ton was made. The total cost of mining and treatment, it is said, is about $8 per ton.

NORTHWEST TERRITORY.

Another gold and silver strike is reported at Great Slave lake. W. Clark made the discovery, and two parties headed by McLean and Dr. Hallwright, Englishmen, traveling

from Edmonton toward Dawson, headed to the lake and made many locations. Assays put the value of the ore at from $800 to $2300 a ton.

The gold locations are at Pont du Las, northeast of Great Slave, and the silver leads are on the south side of the lake. These leads are traceable for miles. When the news reached Dawson a stampede was started. Inspector Rutledge of the mounted police and the Hudson Bay Co. at Great Slave lake are among the owners of the new fields.

Atlin *Globe*: A. Moorehouse, owner of No. 6 below, on Wright creek, Atlin district, last week found the biggest nugget yet discovered in the district. It weighed three pounds two ounces, is flat in form, and the value is over $600.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING OCTOBER 3, 1899.

634,128.—SWIMMING APPARATUS—F. H. B. Babbe, Sanger, Cal.
634 162.—WEIGHING SCALE—W. S. Bracktle, Oakland, Cal.
634,392.—BOLT HOLDER—E. T. Clowe, Woodland, Cal.
634,230.—CONDUIT PIPE—A. S. Dixon, Escondido, Cal.
634,056.—BUTTON — A. Ducommun, Bakersfield, Cal.
634,134.—CIGAR—B. Fanta, Los Angeles, Cal.
634.333.—WRAPPING MACHINE—G. L. Gay, Spokane, Wash.
634,334.—SACK HOLDER—F. H. Gilbert, Ridgefield, Wash.
634,132.—LUNCH BUCKET—Minnie Gilmore, Garden Valley, Cal.
634,339.—BOILER FEEDER—Hanthorn & Welch, Astoria, Or.
634,113.—WATER FILTER—A. Kenney, S. F.
634,414.—STOVE GRATE—J. E. Keyt, S. F.
634,358.—PLOW—J. T. Lucas, Wasco, Or.
634,119.—ELEVATOR—R. S. Moore, Oakland, Cal.
634,270 —BOILER TUBE CLEANER—A. A. Patton, S. F.
634,182.—BRAKE SHOE—A. H. Peterson, San Simeon, Cal.
634,185.—CONFECTIONERY MACHINE — H. B. Pinney, Oakland, Cal.
634,417.—STAMP MILL—Pratt & La Grave, Carson, Nev.
634,123.—BURIAL VAULT—H. Root, S. F.
634,247.—ROASTING FURNACE — A. Ropp, Selby, Cal.
634,124.—FINGERING DEVICE—Scott & Brown, S. F.
634,373.—STORE STOOL—J. W. Smith, Portland, Or.
634,249.—EGG TESTER—A. Thomass, Los Angeles, Cal.
634,192.—TRICYCLE—S. Vaughn, Bakersfield, Cal.
634,194.—GEAR—W. C. Woodward, Los Angeles, Cal.
31,618.—DESIGN, PUZZLE BOARD — G. Schultze, Berkeley, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SWIMMING APPARATUS.—F. H. B. Babbe, Sanger, Cal. No. 634,128. Dated Oct. 3, 1899. This invention relates to an improved apparatus to aid in swimming. It consists of a palm piece having an essentially straight inner edge and a semi-circular outer periphery. A channel is formed in the outer periphery and radial bars are pivoted in said channel. A flexible covering is fixed to the bars, leaving a space between it and the palm piece for the insertion of the fingers. The device is pulled through the water by the hands, a flat surface of the flexible covering serving as a paddle. As soon as the hands are returned for a new stroke, the projection of the angular side of the paddle, being greater than the inner or straight side, tends to turn or feather the paddle so that it returns easily through the water to the starting point. It can be easily closed and dropped from the hand if it is required to use the hand for any other purpose, the device being connected by a strap with a wrist band which prevents its being lost.

AUTOMATIC FINGERING DEVICE FOR STRINGED INSTRUMENTS.—J. H. Scott and S. H. Brown, San Francisco, Cal. No. 634,124. Dated Oct. 3, 1899. The object of this invention is to provide a mechanical device by which all the chords in major or minor keys can be produced and all the strings can be held down at once instead of only a few, as in the case of the ordinary fingering of the guitar. It consists of a base or support and a means for attaching it to the finger bar of the instrument. Sets of arms are arranged—one set substantially at right angles with the other and adapted to turn about an axis common to both. Each arm of one set is connected with the corresponding arm of the other set and one set of arms lying substantially parallel with the finger board. In connection with this is a mechanism by which one set of arms is actuated to cause the other set to hold down the strings of the instrument. Spiral spring connections with the keys serve to return them to their normal position after they have been depressed, and by the use of the levers upon one side or the other of the device any set of keys can be operated to produce the chords which may be desired.

BURIAL VAULT.—Henry Root, San Francisco, Cal. No. 634,123. Dated Oct. 3, 1899. The object of this invention is to furnish a means for the disposition of the bodies of the dead without danger of annoyance to the living and without shock to the feelings of friends, caused by the usual method of enclosing the body in a close box or casket and burying it in the ground. The vault consists of a chamber with masonry walls, double doors with a space intermediate and a means for filling this space after the doors have been closed. The interior chamber has a horizontal diaphragm or partition terminating short of one end of the chamber and leaving a passage through which the gases and vapors from the decomposing body can pass. Through the passage and the return thus created, and through a vertically disposed flue filled with deodorizing material, these vapors pass, and are eventually allowed to escape into the open air in a harmless condition.

VENTILATED LUNCH BUCKET.—Minnie Gilmore, Garden Valley, Cal. No. 634,132. Dated Oct. 3, 1899. The object of this invention is to provide a means for ventilating a bucket containing different kinds of food so as to prevent the disagreeable mixing of the odors which would render the food unpalatable. The bucket consists of superposed compartments with substantially uniform diameter and provided at points above their bottoms with flanges or fillets so that the compartments may be supported one above the other to prevent continuous and substantially unbroken sides throughout the height of the bucket. These compartments have perforations above the flanges or fillets, the portions below being imperforate and fitting within the open end of the next lower compartment. A cover is provided with lugs and a bail secured to the lower compartment extends upupwardly along the sides of the bucket so as to spring into notches formed in the lugs of the cover and thus retain the bucket in an upright position.

CONFECTIONERY MACHINE.—H. B. Pinney, Oakland, Cal. No. 634,185. Dated Oct. 3, 1899. This machine is designed to press substances of various kinds into compact from or shape, and it is especially designed for use in making confectionery such as popcorn, nuts or other substances which are mixed with the boiled sugar, syrup and afterward made into disks or other forms. The apparatus consists of a base having guide posts and plate vertically movable and guided by said posts, plungers projecting from the lower face of the plate and molds coincident with the plungers having an enclosing frame with outwardly projecting flanges while other frames guided by the posts have inwardly turned flanges which engage those of the molds from below. A lever has the inner end fulcrumed and connections are made between it and the plunger plate so as to raise or depress the latter. An arrangement is fulcrumed to and movable with the frames or carriers and has a hook adapted to engage the plunger-moving lever at a greater distance from its fulcrum than that of the plunger plate, so that the frames or carriers and the mold are first raised above the material which has been molded, while the plungers act to force the material within the molds and clear therefrom.

BOILER TUBE CLEANER AND DRIVER.—A. A. Patton, San Francisco, Cal., assignor of one-half to G. H. Larkin, of same place. No. 634,270. Dated Oct. 3, 1899. This invention relates to a device for cleaning the interior of steam boiler tubes. These tubes become coated in a short time with deposits which it is necessary to clean off in order to make them effective. The apparatus consists of a head having teeth or cutters formed thereon, the head being made smaller than the tube which it is to clean and so connected with the driver that it is given a wobbling gyratory motion within the tube, so that the cutting edges are caused to constantly strike against the coating and break it away from the tube, the gyratory motion being particularly effective for this purpose. The head is preferably formed with independent removable disks of successively small diameter from one end toward the other and having the teeth made upon the peripheries of the disks so as to break joints when they are fixed together. The driver consists of a head having a flat disk forming its front end with perforations for the discharge of water and a pipe through which water is supplied under pressure. The wall has diagonally disposed holes made through it on the line of the supply passages of the head and a spindle by which the wheel is connected with the head. Ball bearings are interposed between the face of the wheel and the contiguous face of the head, and a disk or collar exterior to the wheel with corresponding ball bearings and lock nuts fitting the spindle serves to hold and adjust the wheel with relation to the head. The cleaner has a stem which forms one member of a universal coupling and a yoke extension from the face of the wheel forms the other member of this coupling through which the peculiar motion previously described is given to the cleaning head.

WATER FILTER.—A. Kenney, San Francisco, Cal., assignor to H. Zadig, R. C. Reed and Wm. Brady, of same place. No. 634,113. Dated Oct. 3, 1899. This invention relates to an improved automatically cleaning filter for water and the like. It consists of a filtering chamber, an exterior chamber within which it is contained and into which the water is admitted so as to pass through the sides of the filter to the interior, with means for discharging the water from the interior of the filter. In connection with this is a revoluble jet mechanism by which the exterior of the filter may be cleansed at will. The filter portion is fitted around a vertical central discharge pipe which has perforations interior to the filter so that water passing from the outer casing to the interior through the sides of the filter will be admitted into the central pipe and discharged through a hole at the bottom. Vertical pipes are carried in a step surrounding the lower discharge portion of the apparatus and these pipes are revoluble around the filter by means of diagonally disposed jets which revolve the tubes by reactionary force, and at the same time discharge against the exterior of the filter so as to clean off any accumulations which may be thereon.

Personal.

C. D. LANE has returned from Cape Nome, Alaska.

PROF. ARTHUR LAKES of Denver, Colo., is at Rossland, B. C.

J. H. TIBBITS is returning from Nova Scotia to Redding, Cal.

GEO. C. MUNSON of Denver now spends part of his time in Omaha.

CHAS. JACOBS is now Supt. Rawhide mine, Tuolumne county, Cal.

OSCAR SZONTAGH has returned to Salt Lake City, Utah, from Arizona.

GILBERT MCM. ROSS is about to resume operations at Copperopolis, Cal.

J. H. SNEDAKER of Denver, Colo., has gone to Mexico on mining business.

J. L. PARKER is now Supt. North Star mine, Ft. Steele district, B. C.

O. O. HOWARD JR. has returned to San Francisco from Inyo county, Cal.

H. L. WOODBURN is now Gen. Mgr. Twin Springs and Boise, Idaho, placers.

ALEX. FAIR is the new Gen. Mgr. Braidwood Gold Dredging Co., N. S. W.

MR. JUDSON of the Trenton Iron Co., Trenton, N. J., is visiting the Pacific coast.

NIKOLA TESLA is still experimenting with wireless telegraphy at Colorado City, Colo.

S. O. GRAHAM has withdrawn from the firm of Graham, Garrett & Co., Spokane, Wash.

WALLACE MACGREGOR will remove from Johnsville, Cal., to San Francisco, Nov. 1st.

SAMUEL NEWHOUSE of Utah has returned from Europe and is at present in New York City.

W. A. FARISH of Denver, Colo., is in Calaveras county, Cal., and goes thence to Arizona.

P. ELY, Mgr. Esperanza mine, Calaveras county, Cal., is visiting Salt Lake City, Utah.

E. L. GIROUX of Denver, Colo., is now associated with Byron E. Shear in the mining business.

ROB'T. CANNING succeeds C. G. W. Lock as Gen. Mgr. Proprietary Gold Mines, Lucknow, N. S. W.

C. H. TAYLOR has been promoted to the position of Gen. Mgr. New Zealand & Talisman G. M. Co.

MR. PITKEN of Webster, Camp & Lane, Akron, Ohio, recently spent some time in Colorado.

D. H. JACKSON, largely interested in El Dorado, Cal., mining properties, is visiting San Francisco.

W. PELLEW HARVEY has returned to Vancouver, B. C., from an itinerary through northeast Kootenay.

S. S. TAYLOR is collecting mineral specimens for a display at Paris in Plumas and Sierra counties, Cal.

CHAS. S. BUSH, assistant Western Mgr. Canton Steel Co., is out on a business trip over the Northwest.

FRANK E. WILSON is now managing the Lion Consolidated at Stockton, Utah, vice J. J. Trenham, resigned.

J. F. COLEMAN has gone to New York City with a $100,000 bond on the Mammoth, Shasta county, Cal., copper property.

R. H. POSTLETHWAITE has returned to San Francisco and reports the Risdon dredgers a success at Breckenridge, Colo.

J. A. YERRINGTON, Nevada State Commissioner to the Paris Exposition, is touring the State, collecting mineral specimens.

J. W. DEAN, who recently went to Denver from Arizona, has gone to Boston. He is interested in the United Verde Jr. property.

D. E. HUGHES has charge of the government work at Humboldt Bay, Cal.; Fred'k Turner has similar charge at Wilmington, Cal.

WM. A. HEWITT of the Compressed Air Machinery Co., San Francisco, has returned from a business trip through Mariposa county, Cal.

THOS. EWING is now Mgr. Arizona & New England Con. M. Co. and Nevada & New England M. Co., with headquarters at Needles, Cal.

W. B. EWER of Oakland, Cal., on the 9th inst., celebrated the 50th anniversary of his arrival in California, being then in his 36th year.

SIDNEY SPROUT, who for several months past has been superintending operations at the Rawhide mine, near Jamestown, Cal., has resigned.

WM. MAGENAU, for the past year Supt. Geyser-Marion cyanide mill at Mercur, Utah, accepts a position with Arizona & New England Con. M. Co. of Kingman, Ariz.

GOV. BRADY of Alaska reports "large chunks of float platinum," found near Enchantment bay. The recent earthquake is credited with having made further work thereon difficult.

F. L. BROWN of the American Steel & Wire Co. has returned to San Francisco from the Northwest, where, with others, he induced co-operation in organizing the Pacific Coast Jobbers' and Manufacturers' Association.

G. FITZGERALD, of El Paso, Texas, says he has received an offer from representatives of British interests in British Guiana of £150,000 for 15,000,000 acres of mineral lands in the Essequibo concession and also a part of the delta of the Orinoco, in Venezula.

OSCAR G. ROGERS, hitherto Supt. Mt. Shasta, Cal., Gold Mines, has been appointed Asst. Supt. Ratcliff Con. G. M., Ltd., Ballarat, Inyo county, Cal. A. P. Rogers, formerly Asst. Supt. Mt. Shasta mine, has been appointed Asst. Supt. of that property.

DR. FRANKLIN R. CARPENTER, who originated the idea and built the pyritic smelter at Deadwood, South Dakota, has terminated his connection with that enterprise, which was recently purchased by the Golden Reward M. Co. of Deadwood. Dr. Carpenter has built the smelters from a small experimental plant up to one of the most important metallurgical plants in the West.

WALDEMAR LINDGREN is at present investigating a 120-acre tract in the city of Spokane, Wash., which has been located as mineral land. A recent ruling of the Department is that fireclay is "mineral" and ordinary clay is not. Upon the determination of whether the deposit in this case is fireclay or not depend considerable values. Mr. Lindgren has had charge of a party this summer making extensive Government reconnoissance in the Bitter Root mountains, between Montana and Idaho, and an almost wholly unexplored region between the Clearwater and Salmon rivers.

Industrial Notes.

—Utah's first State Fair is in progress.

—There is a general advance in price) ! coal—bituminous and anthracite.

—Colorado and California report a continued scarcity of all kinds of required labor.

—Raw rubber is now worth $1 per lb. at Para, and the demand exceeds the supply.

—Everything that enters into construction work of any kind has advanced from 25% to 80% in the past year.

—In the nine months ending Sept. 30th a total of 2700 miles of new railroad were laid in the United States.

—The Canadian Government has granted a bounty of $2 per ton on iron smelted in Canada and $5 per ton on steel.

—The California State Association for the storage of flood waters will have a convention in San Francisco on Nov. 14th.

—During the first six months of '99, 125 vessels, aggregating 234,877 tons, were launched on the Clyde, beating all records.

—In his December message President McKinley will urge a Government cable across the Pacific to the Phillippines via Honolulu and Guam.

—The British Columbia Electric Railway Co., Vancouver, B. C., proposes to expend half a million dollars in extending and improving its local lines.

—The U. P. R. R. has increased its preferred capital stock by $25 000,000. The company now has control of the Oregon Short Line and the O. R. &. N. Co.

—Nevada proposes to ship gypsum to San Francisco from Mound House, Lyon county, 50 cents per ton cheaper than it can be imported from Mexico.

—Rebuilding Victor, Colo., has been checked by a hod carriers' strike; they demand an advance of 50 cents per day of eight hours over the present $3.50 rate.

—The Gonzales, Cal., Water Co. will dam the Salinas river and run the water ten miles in a ditch 20 feet wide at the bottom and 40 feet at the top, for irrigation.

—California miners who went to Pleasant Valley, Utah, coal mines, rejected the proffered contract, which would average, per month, $2.65 per day of ten hours.

—The Japanese Government will introduce at the next meeting of the Diet a law freeing foreigners from all restrictions in locating mining claims. The existing law prohibits them from becoming shareholders or partners in any mining company.

—A European syndicate has been organized, capital $50,000,000, to raise hogs in Siberia and transport them to English and German markets in competition with American pork. The report does not frighten Chicago packers. "They never can raise good hogs in that country," says John Cudahy.

—Robertson, builder of the log raft floated from the Sound to San Francisco with such menace to coast shipping, says hereafter he will follow such log raft with a tug carrying rear lights and that he proposes floating such rafts to Hawaii and Japan. He sailed for Tokio on the 9th in reference to the latter scheme.

—Consul McCook of Dawson City reports to the State Department that the mining outlook for the Yukon country is improving, and that it would be a paying venture for machinists to go there with material to make machinery, which is in great demand. Consul McCook appears to have a chronic tendency to exaggerate.

—In New South Wales there are 7300 more men employed in the mining industry than in 1894: Gold mining, 2700 men; silver, 2000; copper, 1300; coal, 1100; the production of gold in New South Wales has quadrupled since 1888, and has doubled since 1898; in the latter year the production of gold was valued at £1,250,000; the value of the copper product increased from $315,000 in 1894 to $1,405,000 in 1898. In 1898 the coal production was 4,275,000 tons.

—The annual report of the Northern Pacific Railroad Co. shows increase in the gross earnings over the preceding year, and decrease in the net earnings. The report covers the fiscal year ending June 30, '99, showing gross earnings, freight, $19,485,960; against $17,432,755 last year; passengers, $5,050,365, against $4,853,799 last year; mail, express and miscellaneous, $1,512,358, against $1,393,165 last year; operating expenses comprise $3,584,793 for maintenance of way and structures, against $3,137,505 last year; $1,914,597 for maintenance of equipment, against $1,721,765 last year; $8,060,033 for conducting transportation, against $5,573,635 last year, and $826,028 general expenses, against $663,457 last year.

Dividends From the Transvaal.

When one realizes fully the dividends which are received by the shareholders of stock in the mines of the Whitwatersrand, it is easier to appreciate the value placed upon these mines by the owners, and explains why the political situation is disturbed in the Transvaal. Following is a list of some of the leading companies and the percentage of their earnings on the capital stock:

Mines.	Per Cent.
City & Suburban	15
May Consolidated	15
Windsor	20
Rietfontein	22½
Driefontein	25
Glencairn	25
Knights	30
Rose Deep	40
Griesberg	40
Roodeport United	40
Langlaagte Estate	45
Angelo	50
Crown Deep	50
Primrose	55
Village Main Reef	60
Meyer & Carlton	60
Worcester	60
Glendennuis Deep	75
Durban Roodeport	80
Jumpers	80
Bonanza	100
Jubilee	100
Heriot	100
Henry Nourse	125
Geldenhuis Estate	147½
Wemmer	150
Crown Reef	240
Ferreira	300
Johannesburg Pioneer	675

The total amount paid in dividends by the gold-producing mines was in 1896, $7,450,000; in 1897, $13,500,000, and in 1898, $24,450,000.

After reading these figures, it becomes easy to understand the remark attributed to Sir Alfred Millner the day he left England to return to South Africa, when asked by a reporter what would be his policy with regard to the Transvaal. "If," he said, "you saw a solid pile of gold worth £500,000,000 over there, with 20,000 Boers armed to the teeth sitting upon it, what would you do?" Less enigmatic was a statement made by Lionel Phillips, one of the Rand millionaires: "We don't care about the franchise; we want the mines."

POLARIS, the north star, and its unseen companion make a complete revolution in three days. Both together are moving toward the earth with a velocity of nine miles per second. Though coming at such speed, there is no danger that in the immediate future Polaris will collide with the earth. There has been no appreciable difference in the appearance of the star, in spite of its rapid approach, during the past thousand years. The star is 300,000,000 times as far away as the sun.

Kaolin in San Diego, Cal.

The recent sale of the kaolin deposits on El Cajon mountain, twenty miles east of San Diego, Cal., has attracted attention to the commercial value and uses of this article. The San Diego deposit is said to be inexhaustible: in one place a shaft was sunk 80 feet through the clay, which in quality is said to be superior to that imported from China.

Kaolin is of value in domestic industries, the white clay being used in the manufacture of china, earthenware, pottery, wall paper, ornamental brick, cloth, etc. Kaolin deposits are extensive throughout the United States, more especially in the South, in nearly every section of which are found valuable kaolin deposits. With this appears an illustration of a kaolin mine owned and worked by the Harris Clay Co., near Webster, North Carolina, reached by the Southern Railway, of which M. V. Richards of Washington, D. C., is the land and industrial agent.



KAOLIN MINE NEAR WEBSTER, NORTH CAROLINA.

New Use for Scrap Tin.

A number of Illinois gentlemen interested in the utilization of scrap tin, of which large quantities have been annually going to waste, are about to equip a refining plant, which will probably be located at Streator. The company will be known as the Vulcan Western Co. The line of work will be to purchase scrap tin, separate the tin from the sheet of steel and sell the product as raw material. Tin forms only about 2%, the steel in a sheet of tinplate forming 98%. The company has already contracted for a supply of waste tin to give employment to 140 hands, and say that the entire quantity of waste tin to be accumulated in their territory will give employment eventually to the entire capacity of the factory, namely, 175 men. The solder when separated from old tinware returns a profitable revenue. Numerous branches of the iron industry throw off enormous quantities of scrap material annually, which heretofore has been going to waste, but is now being turned to an item of profit.

A New Armor Plate.

Some experiments have been carried out at the Government School of Gunnery, Shoeburyness, England, with a new kind of armor plate, 6 inches of which is of ordinary steel and 3 inches of a special composition, the nature of which has not been made public. These plates have been fired at with 350-pound projectiles at a distance of 200 yards. When black powder was used, the plate was practically uninjured after several shots, and in some cases the projectile was reduced to dust by the force of the impact. With cordite it was found that the plate could be penetrated for about 3 inches, or even pierced; but the severest tests failed to cause the plate to crack, a circumstance that will make it useful in naval warfare, for a hole beneath the waterline can always be plugged with matting. Two shots were then fired at the plate simultaneously, hitting the plate 1 foot apart, but still the composition was not fractured. The plate was then fired at obliquely, when it was found that the special facing split from the steel backing, although the welding was previously invisible to the eye.—American Manufacturer.

AN invention for producing gold-like alloy from copper and antimony, patented in Germany, covers a metallic alloy to take the place of gold, which, even if exposed for some time to the action of ammoniacal and acid vapors, does not oxidize or lose its gold color. It can be rolled and worked like gold. The alloy consists of copper and antimony in the approximate ratio of 100 to 6, and is produced by adding to molten copper, as soon as it has reached a certain degree of heat, the said percentage of antimony. When the antimony has likewise melted and entered into intimate union with the copper, some charcoal ashes, magnesium and lime spar are added to the mass when the latter is still in the crucible.

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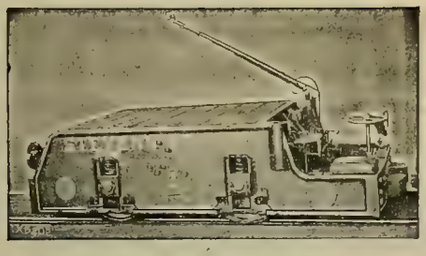
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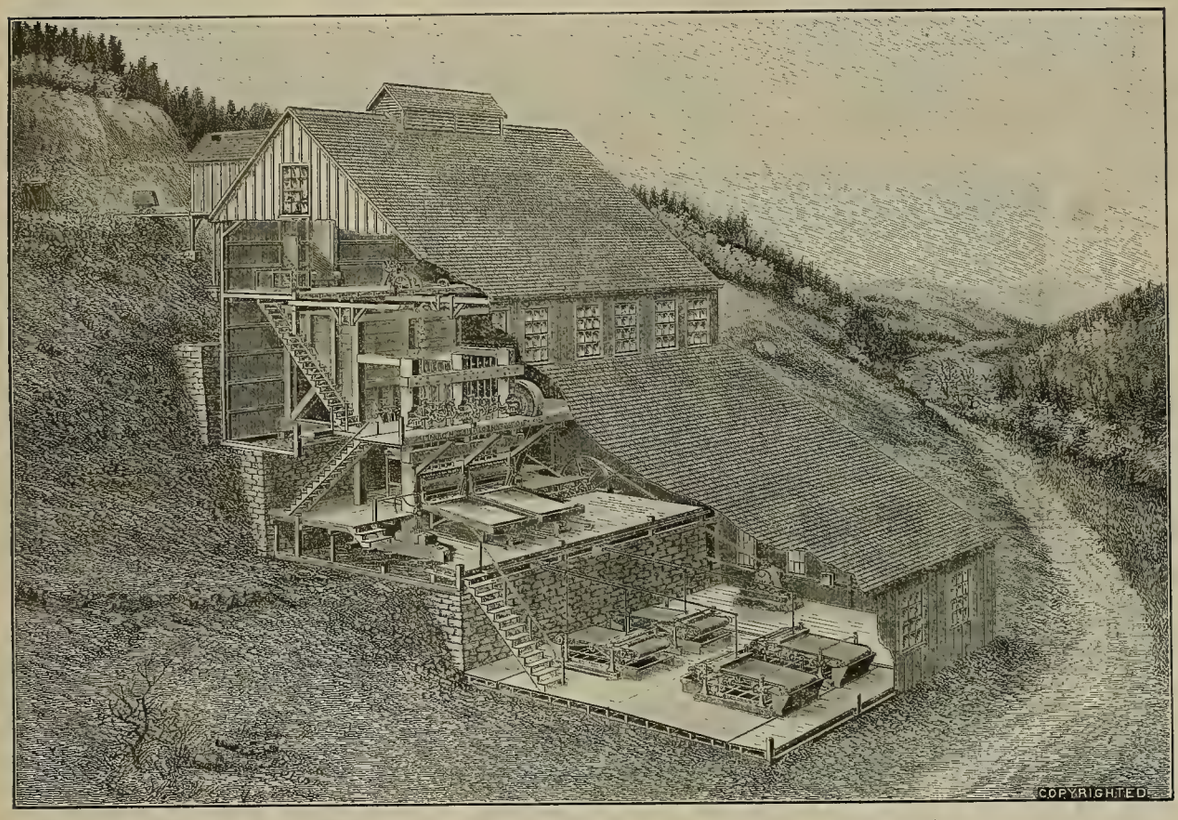
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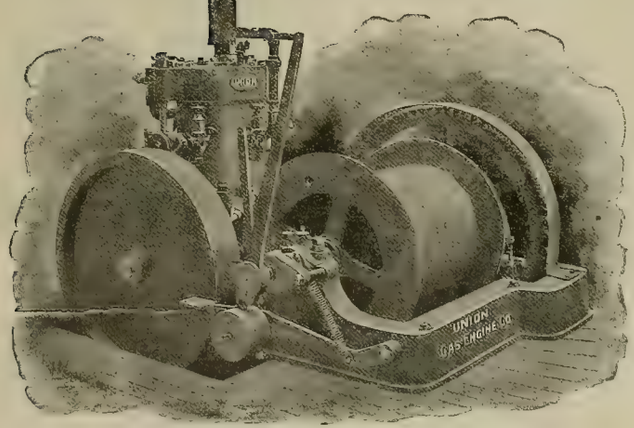
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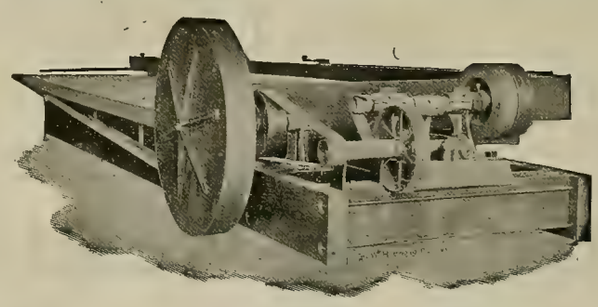
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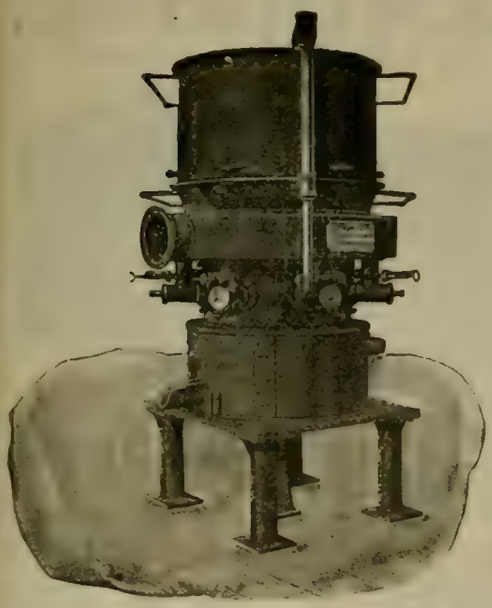
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(SEE PAGE 444.)

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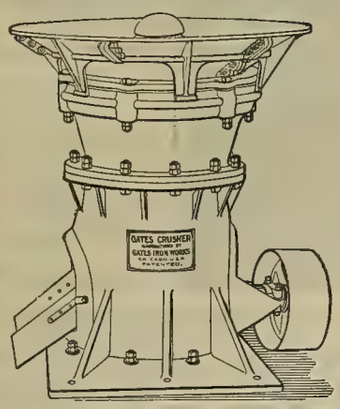
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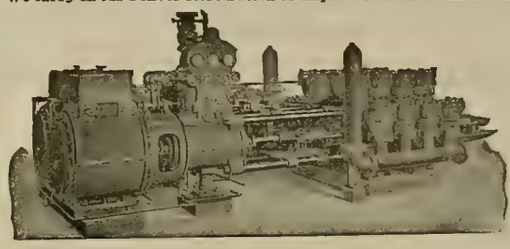
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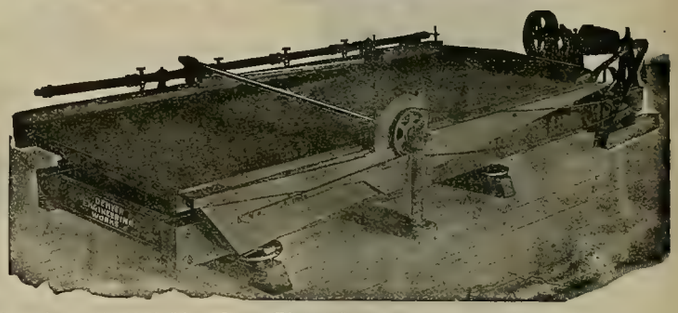
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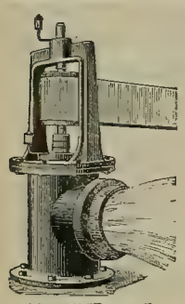
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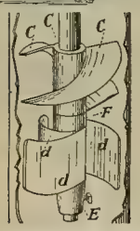
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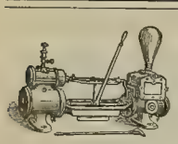
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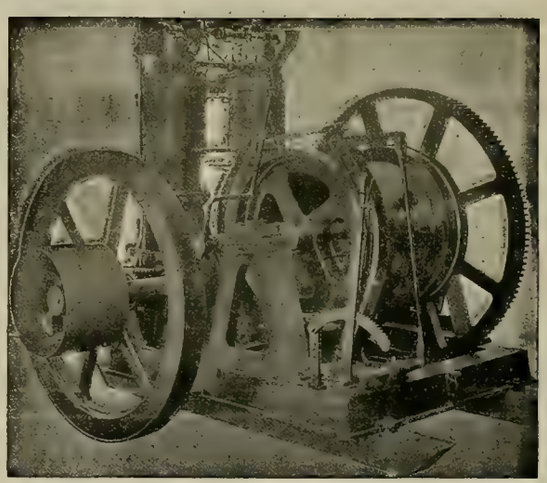
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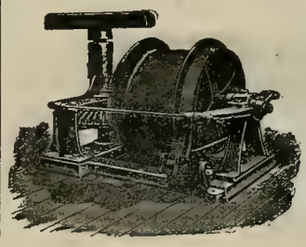
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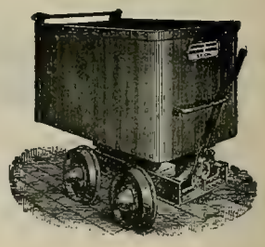
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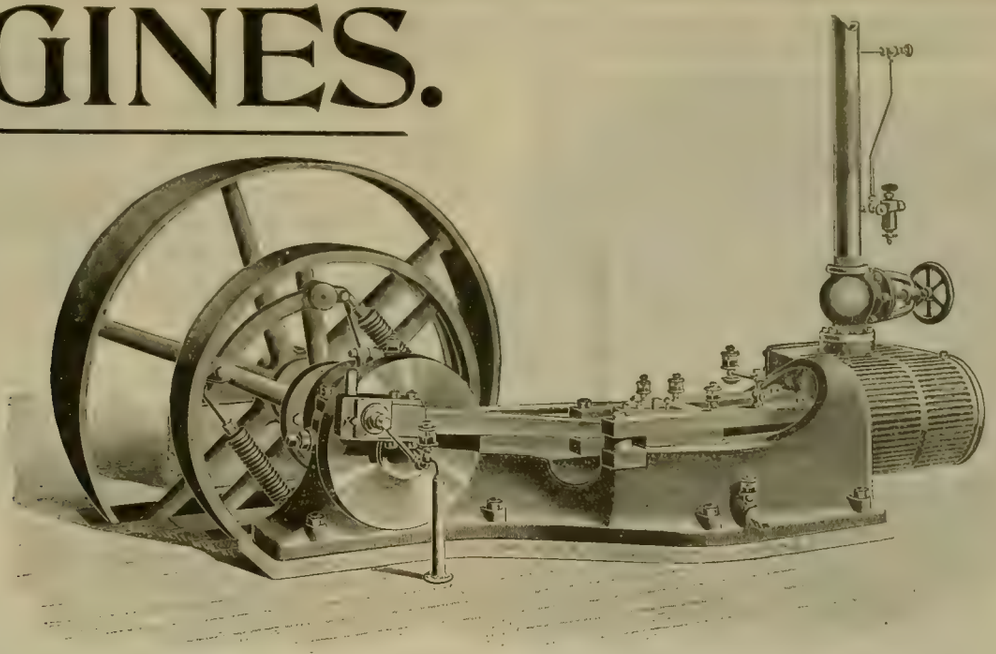
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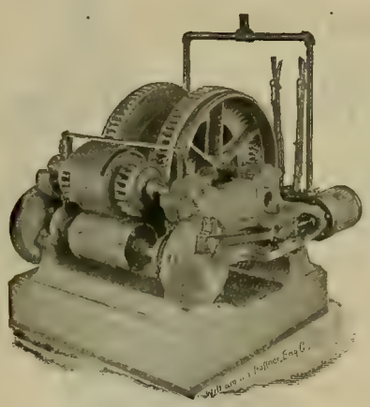
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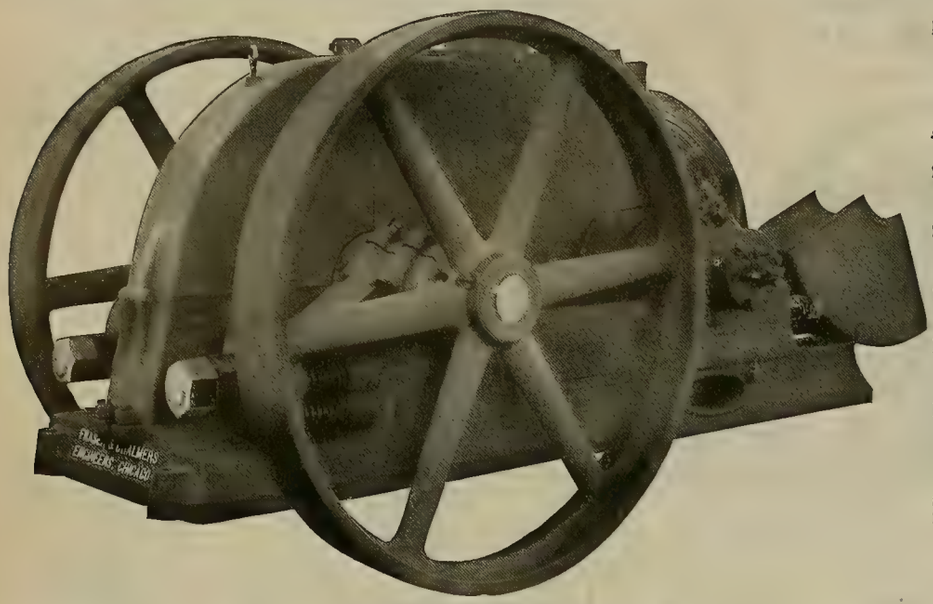


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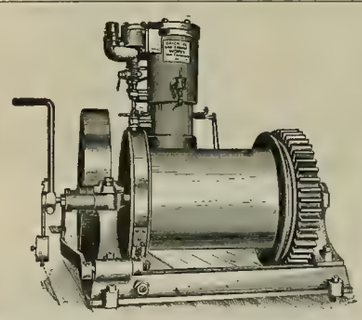


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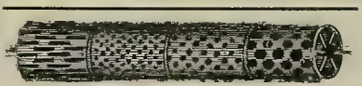


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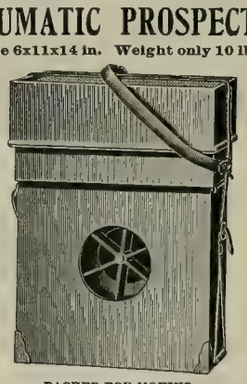
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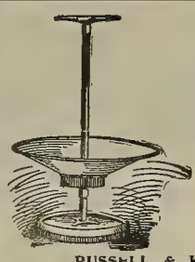


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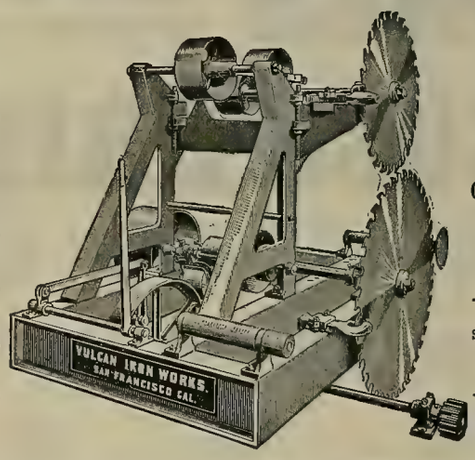
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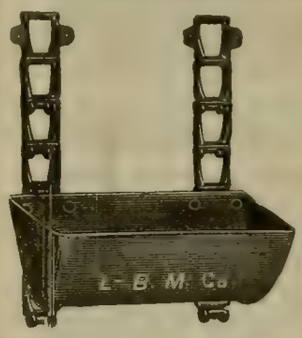
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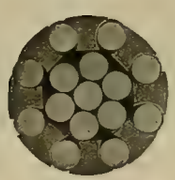
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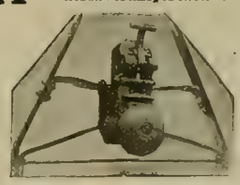
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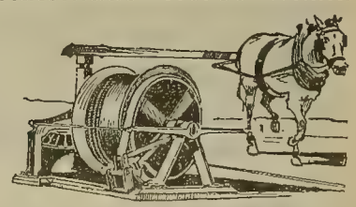
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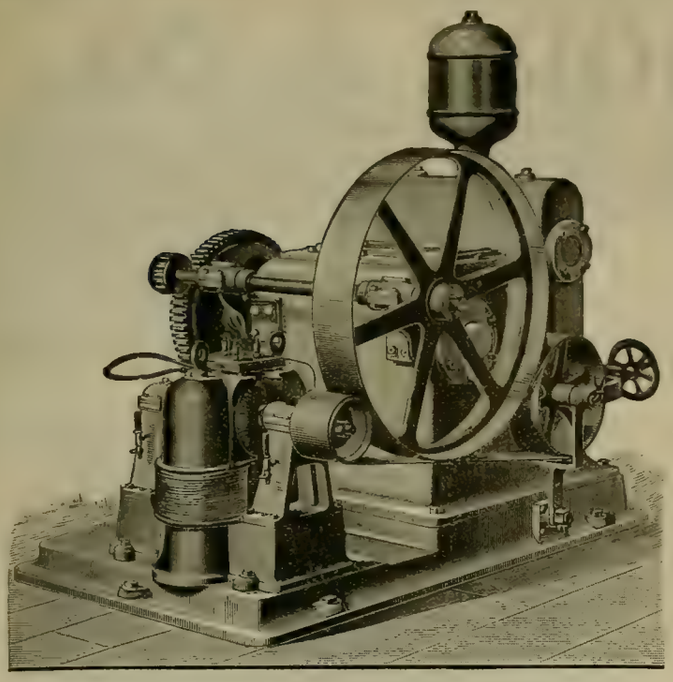
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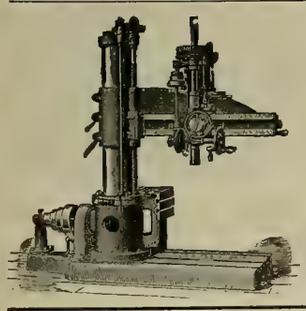
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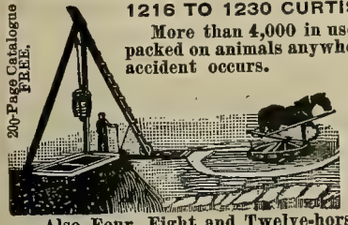
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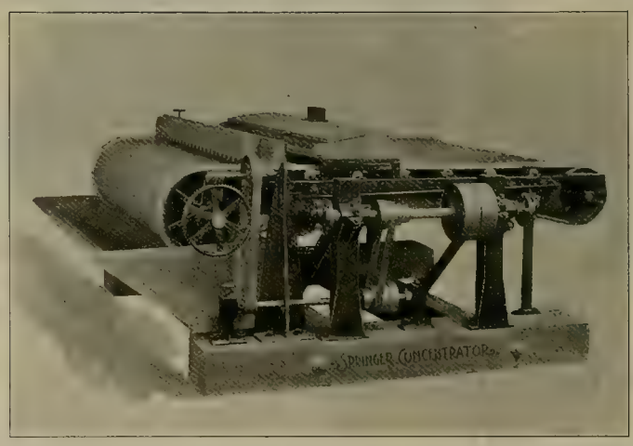
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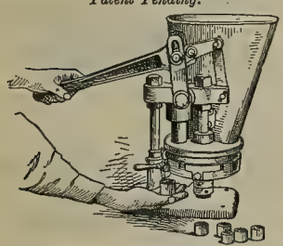
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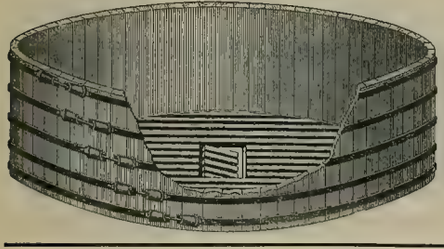
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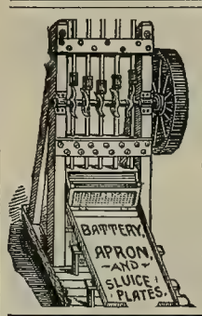
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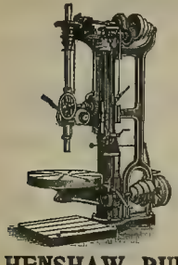
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Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

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Iron : Working : Tools.

Engine Lathes, Pulley Turning Lathes, Iron Planers, Slotters, Upright Drilling Machines, Horizontal Drilling and Boring Machines, Etc.

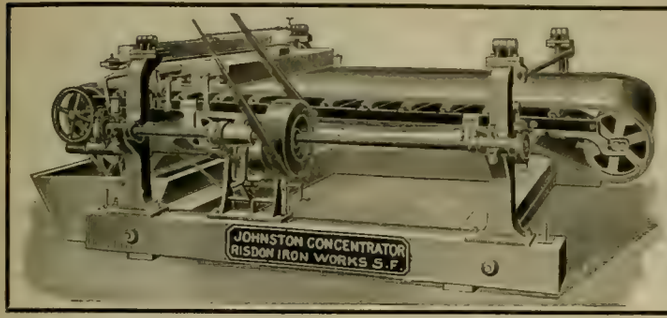
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DESIGNERS AND BUILDERS OF

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MACHINERY FOR PLACER MINING.
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THE JOHNSTON CONCENTRATOR.

DURABILITY, CAPACITY AND SIMPLICITY : : ARE ITS ESSENTIAL POINTS. : :

SAVES MORE VERY FINE SULPHURETS THAN ANY OTHER CONCENTRATOR MADE.

The Johnston Concentrator is slung with arms from above on an angle, giving it the oscillating motion that makes it a perfect machine. This undulating motion immediately settles the sulphurets, retaining all amalgam, leaving sulphurets very clean, one 6-ft. Johnston doing the work of two 4-ft. belt machines.

Send for Catalog No. 14. **RISDON IRON WORKS,** Howard and Beale Sts. San Francisco, Cal., U. S. A.

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Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

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ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

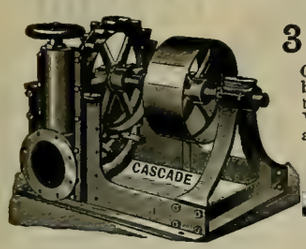
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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

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Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

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Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of **Excavating Work,** making a specialty of

PLACER MINING MACHINES,

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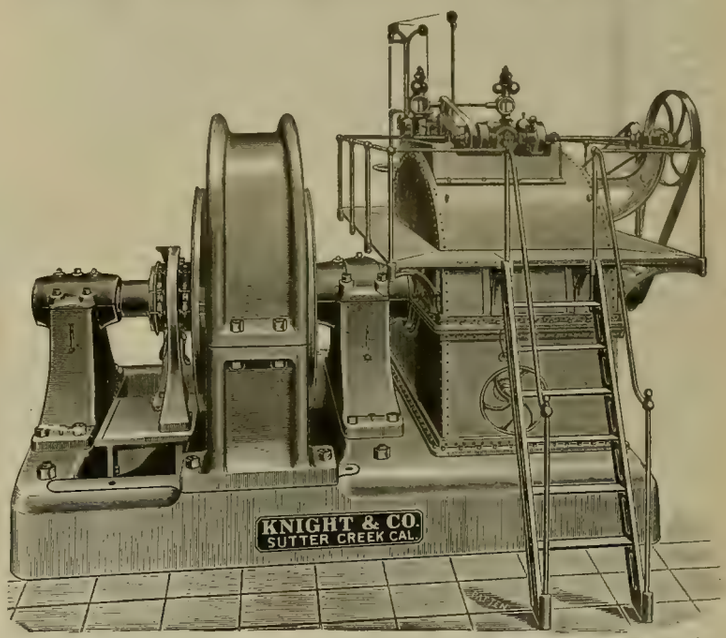
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Inventors on the Pacific Coast will find it greatly to their advantage to consult this old experienced first-class agency. We have able and trustworthy associates and agents in Washington and the capital cities of the principal nations of the world. In connection with our scientific and Patent Law Library, and record of original cases in our office, we have other advantages far beyond those which can be offered home inventors by other agencies. The information accumulated through long and careful practice before the Office, and the frequent examination of patents already granted, for the purpose of determining the patentability of inventions brought before us, enables us to give advice which will save inventors the expense of applying for patents upon inventions which are not new. Circulars and advice sent free on receipt of postage. Address **DEWEY, STRONG & CO., Patent Agents, 330 Market St., San Francisco, Cal.**

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The accompanying cut shows the general arrangement of **The Knight Water Wheel,** direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

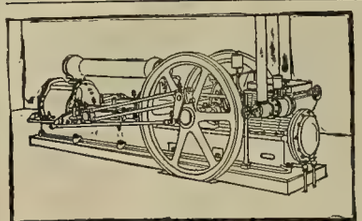


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Don't buy any other until you have seen them and investigated their merits. We not only guarantee high efficiency and regulation, but obtain it in actual practice. Estimates and surveys made for the installation of Water Power Plants of all sizes and capacities.

Write for Catalogue.

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THE NORWALK
Air and Gas Compressor.

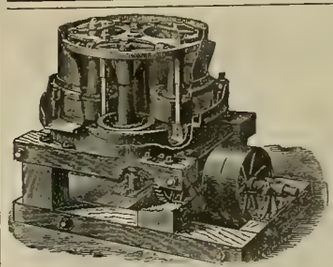
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ESPECIALLY DESIGNED FOR DRIVING

Rock Drills,
Pneumatic Locomotives,
Engines, Pumps, Coal Cutters,

And Other Mining Machinery. The Best Machine for Compressing Air for All Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

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Centrifugal Roller Quartz Mill.

F. A. HUNTINGTON,

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CENTRIFUGAL Roller Quartz Mills.

CONCENTRATORS and ORE CRUSHERS.
Mining Machinery of Every Description.
Steam Engines, Shingle Machines.
Room 1, 3d Floor, Mills Building,
SAN FRANCISCO, CAL.

Market Reports.

SAN FRANCISCO, Oct. 12, 1899.

SILVER.—London, 26¾d; New York, 58⅛; San Francisco, 58⅜; Mexican Dollars, 47⅛ @48¾; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.65 asked; brokers' price, $4.40. Local, pipe, 7¼@7¾c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake very quiet at $18.50; brokers' price, $18.37½. Local—Mill copper plates, 23¾c.

The copper situation remains dull and unchanged, there being no disposition on the part of buyers to purchase ahead, while the producers hold firm at $18.50.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Lower, $31.90 bid and $32.15 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $47; export, $42@42.50; carload lots, special rates.

Within the past week quicksilver has taken another upward bound of $1 on both domestic and export market. The business is controlled by the Rothschilds, who dictate the price. The present price is $4 to $5 higher than six months ago.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 63⅛s per ounce; York, $16.25; San Francisco, $16.75.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½ @6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@ 2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¾c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.00; cut, $3.70; 10 to 16d, wire, $4.05; cut, $3.75; 8d, wire, $4.10; cut, $3.80; 6 and 7d, wire, $4.20; cut, $3.90; 4 and 5d, wire, $4.30; cut, $4.00; 3d, wire, $4.45; cut, $4.15; 2d, wire, $4.70; cut, $4.40. In carload lots, special rates in carload lots 10c per keg less.

CORDAGE.—

	Sisal.	Manila.
1¼-in. cir. (7-16 dia. and upward	13½	16
12-thread (⅜ dia)	14	16½
6 and 9 thread (¼ and 5-16 dia.)	14½	17
Bale Rope (3 and 4 strand)	13½	16
Bale Rope (2, 6 and 8 strand)	14	16½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 11, 1899.

9:30 A. M. SESSION.

100 Belcher	23c	300 Ophir	92c
100 Challar	40c	300 Savage	26c
100 Con. Cal. & Va.	$1 70	200 Sierra Nevada	67c
200 Mexican	32c	400 Union Con	38c
100 Potosi	58c		

2:30 P. M. SESSION.

100 Belcher	23c	600 Hale & Norcross	35c
100	24c	300	36c
500 Best & Belcher	34c	1300 Mexican	30c
200 Bullion	04c	600 Ophir	87c
100 Caledonia	71c	100	86c
100 Challar	38c	600 Overman	20c
300	39c	1200 Potosi	56c
200 Con. Cal. & Va.	$1 65	100 Savage	25c
200 Gould & Curry	35c	300 Union Con	37c
300	34c	500 Yellow Jacket	30c

Commercial Paragraphs.

AT THE Golconda, Oregon, mine a Bryan roller mill and eight Johnston concentrators have been ordered.

JEAN F. WEBB, of Denver, Colo., proprietor Webb Pneumatic Cyanide Process, has sold Boulder, Colo., rights to the Manila M. Co.

THE Weigele Pipe Works, Denver, Colo., report having contracted for water power and placer pipe which requires their full capacity for two months.

THE Vulcan Iron Works Co. of Seattle, Wash., are building and installing a large tramway on the property of the Golden Tunnel M. Co. at Baring, Wash.

HENDRIE & BOLTHOFF Manufacturing & Supply Co., Denver, Colo., have the contract to erect an 80-stamp mill for the Boston & Denver M. & M. Co. at Black Hawk, which will handle all the ores from the Gregory-Bobtail mines and those of the Cook M. Co. The stamps will be 1000 pounds weight, rapid drop, and will be equipped with twenty-four Woodbury concentrators. It will be automatic throughout and will be built under the direct supervision of Mr. H. Bolthoff, one of the pioneer millwrights of the State.

THE Denver Engineering Works Co. have made a shipment of eight carloads of machinery to Atlanta, Georgia, for the construction of a Loder pyritic smelter near that place by the Southern Smelting Co. The same type of furnace has been put in at the remodeled Elgin smelter at Leadville, Colo. A plant of similar style is contemplated for British Columbia. Cammett & Shepard of the Denver Engineering Works report having received patent papers No. 632,892 on the Cammett concentrator. The Denver Engineering Works report having shipped the machinery to Breckenridge, Colo., for the Mountain Pride 75-ton concentration mill, of which H. C. Foote is Mgr. Shipment has also been made of machinery for the Excelsior mill at Frisco, Colo.

Recently Declared Mining Dividends.

Portland, Cripple Creek, Colo., $60,000; payable Oct. 15.

Gold King, Colorado, $30,000; payable Oct. 20.

Lost Dollar, Colorado, $20,000; payable Nov. 1.

Daly-West, Park City, Utah, $30,000; payable Oct. 25.

American Zinc M. Co., 1%; Oct. 12.

New York-Honduras Rosario Co., 10 cents per share; payable Oct. 20.

Empire M. Co., Grass Valley, Cal., $50,000; payable Oct. 20.

Silver King, Park City, Utah, $50,000; Oct. 9.

Mercur Co., Utah, quarterly, $50,000; payable Oct. 20.

Bullion-Beck, Utah, $10,000; payable Oct. 15.

Catalogues Received.

CATALOGUE No. 15 of the Gates Iron Works series is devoted to the exclusive discussion of cement machinery, which this company produces. So far as known this is the first time that a manufacturing establishment has produced a catalogue relating to a complete line of modern machinery for cement making, taking in the whole process. The Gates Iron Works show in Catalogue No. 15 that they are prepared to make complete plans for cement mills, equip the entire plant with all requisite machinery and erect the buildings, and have everything ready to begin successful operation. Machinery of the latest modern type, built with special reference to requirements of commercial economy, is described, suitable for the production of Portland or hydraulic cement. Not the least interesting part of the pamphlet is the emphasis placed on the statement that all machinery is so packed and prepared that it may be safely carried and delivered foreign. The catalogue will be sent anywhere on request. Address Gates Iron Works Co., 650 Elston avenue, Chicago.

Mining Stocks and Securities for sale. Purchaser guaranteed against loss. Correspondence solicited from people wishing to buy Stocks and Securities, and also from brokers and others who are able to dispose of Stocks and Securities.

Address **E. N. BREITUNG,**
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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

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All the oil lands of the Union-Consolidated Oil & Transportation Company have been bought by us.
WE HAVE OIL LANDS
In Merced, Contra Costa, San Mateo, Santa Clara and Colusa counties. Oil in 60 days our experts claim. Shares now at $5 for a limited time only. Particulars on application. New York references.
AMERICAN OIL and REFINERY COMPANY,
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Quicksilver
For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

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FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

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Electric Motor, 220 Volts, Westinghouse
Used very little; 1 H. P. Liberal discount on price. Apply at No. 7 Morris Avenue, near Sixth and Harrison Streets, San Francisco, Cal.

MARBLE QUARRY FOR SALE.
Group claims with beautiful tinted and variegated marbles for sale at low figure. Immense deposit. Fifteen miles from railroad. Interested parties address BOYER & HUBBELL, Dos Cabezos, Cochise County, Arizona.

Mines for Sale.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
Gold Properties in Various Stages of Development.
Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each. JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

WANTED—For Eastern syndicate, developed and paying gold mine; no limit as to price. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

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AMALGAMATOR AND MILLMAN WHO ALSO UNDERSTANDS ASSAYING.
Address GOLD HILL QUARTZ MINING CO., Gold Hill, Oregon.

Mining Engineer and Metallurgist Desires Position as Superintendent.
Fifteen years of practical experience in mining and milling in the United States, Canada and Mexico. Thoroughly competent in every respect. Speaks and writes Spanish fluently. Specialist in the treatment of rebellious silver and gold-bearing ores. Experienced in designing and building of mills.
Address F. VALENTINOV, Apartado Postal 814, City of Mexico.

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2500 MINERS
To work in the Metalliferous Mines of British Columbia, at the following prices per day of eight hours:

Hand Drillers,	$3.00
Machine Men,	3.50
Miners in shafts,	3.50 to $4 00
Carmen,	2.50 to 3.00
Shovellers,	2.50
Laborers,	2.50
Blacksmiths,	3.50 to 4 00
Timbermen,	3.50 to 4.00

Apply to THE SILVER-LEAD MINES ASSOCIATION, Sandon, British Columbia.

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MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.
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BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.
Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

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Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron
And other Chemicals for Mining Purposes.

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—AND—
Locomotive Headlights.
SIZES ON HAND:
24-inch,
20 "
17 "
14 "
12 "
10 "
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MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.



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Made in Brass Also. ★

STAR PATTERN for Heavy Pressure.
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We warrant them for all service where a quick, reliable action is required.
It will pay you to investigate.
Full particulars from any jobbing supply house, or direct from the manufacturers.

THE WM. POWELL CO., CINCINNATI, O.

Quicksilver

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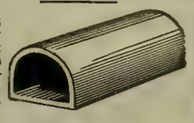
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Assessment Notices.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of September, 1899, an assessment (No. 20) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1899, an assessment (No. 1) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of October, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 28th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of September, 1899, an assessment (No. 13) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1899, an assessment (No. 33) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, 10th floor Mills building, San Francisco, California.

ANDES SILVER MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of October, 1899, an assessment (No. 49) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of November, 1899, at 1 o'clock P. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of October, 1899, an assessment (No. 3) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

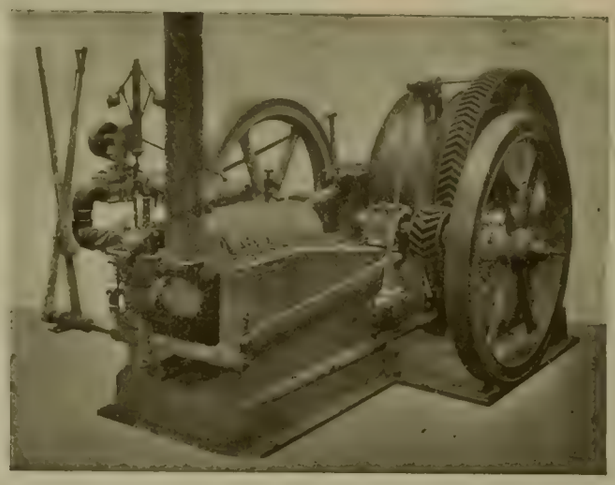
THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Henry H. Meyer et als., in the French Claim, at Alabama Hill, near Downieville, Sierra Co., to deposit tailings in a ravine below the mine; from R. J. Sinnott and F. M. Spencer, in the Hopkins Creek Tailing Claim, in Goodwin Township, Plumas Co., to deposit tailings in Hopkins Creek; and from James C. West, in the Eagle Gulch Mine, in Butte Co., near Strawberry Valley, to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 30, 1899, at 1:30 P. M.

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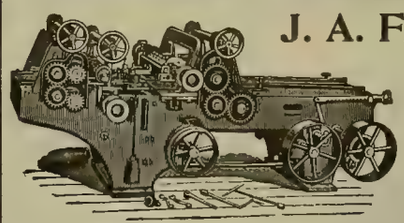
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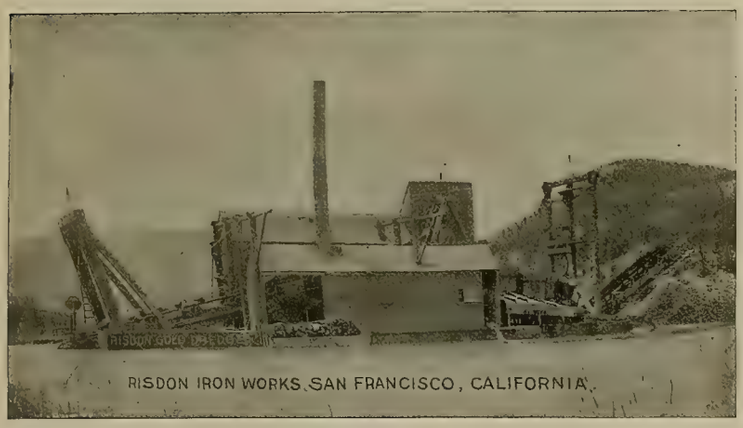
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Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

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Catalogue on Application.

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CALIFORNIA STATE

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2050.—VOLUME LXXIX. Number 17. SAN FRANCISCO, SATURDAY, OCTOBER 21, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mine Management.

One of the most important factors in making a success in mining is the exercise of common sense. A vein or an ore body may be large, but it is not always advisable to build a mill or reduction works before the vein has been developed. It may not prove to be as extensive with development as the surface showing indicates, or even if it does hold out there are few ore bodies which will keep a large mill supplied without some preliminary work being done to render the ore cheaply and quickly accessible. An instance in point is found at the old village of Altaville in South Dakota. In 1879 two brothers located several claims, the principal one being known as the Jenny Lind. It was recognized as a good prospect and in the course of a few months the property was sold to an Eastern company. The development was superficial, but a 40-stamp mill was rushed to completion, a large force of men employed, and, as the saying is, "everything went." A gentleman of high social standing in his Eastern home was sent out to manage the enterprise. He had never seen a mine before and knew not even the rudiments of an industry which requires more than ordinary business capacity to say nothing of practical experience. The natural result—failure was the consequence. The mine was closed down and later the mill moved elsewhere. A year or two since a practical miner took the property after an investigation and commenced working it on a small scale. He discovered that not all of the vein or lode was rich, though some of it contained sufficient to constitute pay rock. By careful selection of his ore he made a success from the start and has since enlarged his plant and is making a success. This is but a single instance. Nearly every mining community has similar monuments of ill-investment and folly in management. A mine manager who is deficient in technical knowlege of his business will, if he is wise, select reliable and experienced men to take charge of the various departments of the enterprise, making them responsible for the results, and where this has been done few failures have followed. This is common sense mine management.



Beach Diggings, One-Half Mile From Anvil City.



Beach Mining at Anvil City.



Beach Mining, Five Miles From Anvil City.



Beach Diggings, One and a Half Miles North of Anvil City



J. B. Priess—One Day's Work on Beach Claim of Preiss and Partner, $298.



Beach Diggings, Ten Miles From Anvil City.

THE NEWEST EL DORADO. THE OCEAN BEACH AT CAPE NOME, ALASKA. (See page 462.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....Publisher

San Francisco, October 21, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—The Newest El Dorado, the Ocean Beach at Cape Nome, Alaska—Beach Diggings, One-half Mile from Anvil City; Beach Mining at Anvil City; Beach Mining, Five Miles from Anvil City; Beach Diggings, One and a half Miles North of Anvil City; J. B. Preiss—One Day's Work on Beach Claim of Preiss and Partner, $298; Beach Diggings, Ten Miles from Anvil City, 457. Cross-Section Copper Queen Mine, Arizona, 460. Beach Diggings near Anvil City—$360 Taken from this Claim in Three Weeks; United Verde Smelters, Jerome, Arizona, 462. Latest Mining and Metallurgical Patents, 463. Steam Stanhope; Fisher Automobile Truck, 464. King of Arizona Mill, Yuma, Ariz., 469.

EDITORIAL.—Mine Management, 457. Charcoal in the Cyanide Process; Mining in the Transvaal; Miscellaneous, 458.

MINING SUMMARY.—465-466-467.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 482.

MISCELLANEOUS.—Concentrates, 459. The Copper Queen Mine, Arizona, 460-461. The Newest El Dorado; The United Verde, Arizona; Liquid Air—Some Fallacies, and a Few Facts, 462. Latest Mining and Metallurgical Patents, 463. Cripple Creek Tunnel Enterprises; The Automobile, 464. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Commercial Paragraphs; Books Received; Recently Declared Mining Dividends, 468. A New Arizona Gold Mine, 469.

KNOWLEDGE comes with experience. The broader the field of observation the more extended the experience—the greater the knowledge gained. A man who has learned all he knows in one mine, or one district, or even in a single State, has not so much knowledge as one who has seen more, though he may have learned what he does know thoroughly. To say of a man, "He mined forty years in this or that mine or county," is not paying as high a tribute to his experience as at first might appear. Men who have mined for so long in any one place, or who have conducted the metallurgical operations in but one mill or reduction works for years, have much else to learn, and in some cases much which would be of advantage and value in the mines or mills in which they are employed.

THAT a stampede to Cape Nome is inevitable in the spring of 1900 seems certain. The facility with which gold has been thus far obtained on the ocean beach and in the shallow placers and the large returns for limited labor would prove a great incentive under any conditions, but being so easily accessible a "rush" which will eclipse the Klondike stampede is probable. Those who think of going to the arctic circle should remember that the thousands already there, and other thousands who will reach Nome from other sections of the North before the ships can possibly get there will have located everything within miles and the newcomer should go prepared with sufficient money to either buy property already located or to take return passage by steamer. There are miles of country farther north and all along the coast of which little is known, but the discovery of gold in those localities is a matter of good fortune and will be accompanied by all the hardships which have marked the progress of the development of the Yukon region.

EXAGGERATED statements concerning mine development, ore in sight, production and possibilities, are in these days taken with much allowance. Twenty or thirty years ago less attention was given to the facts than now. A mine with half a million in sight would readily sell then for double that amount. Now the cost of equipment and production is charged against the half million and a reasonable allowance made for ore not blocked out, for experience has proven that ore bodies are erratic; they often fail to "go down," or, going down, have been known to decrease materially in value. There are some who cannot understand why this is so. They were well known in the "good old days" when everything was taken for granted, and they can see no reason why the same conditions should not obtain now. Then all mining was looked upon as a gamble and investors had to take a gambler's chance. Now mining is a legitimate business and it is yearly growing more conservative. Capital is ready for investment, but it must see something tangible, and where this is possible it is not more timid than in ventures in other lines. Mining experts are not now solicited to give opinions as to what can not be seen, but to state the facts concerning a mining property as determined by development. They must also advise as to treatment of ores, equipment, transportation of product, etc. The palmy days of the speculative miner and investor are gone, and instead is found a demand for facts.

Charcoal in the Cyanide Process.

Several years ago charcoal was employed experimentally as a precipitant of gold from chlorine solutions, and a patent was issued for this process. It has not come into general use. At the Mount Morgan gold mine, Victoria, Australia, however, this method of precipitation of gold in the chlorination process is employed on an extensive scale. The filters are very large and are lined with cement. The process at these extensive works proves its utility and experience there has evidently determined its superiority to either the ferrous sulphate or sulphuretted hydrogen method of precipitation. In 1884 the late W. D. Johnson, of San Francisco, Cal., who at that time was chemist of the State Mining Bureau of California, made a series of experiments with cyanide as a solvent of gold and also with charcoal as a precipitant of the auro-cyanide. In order to facilitate the dissolution of the gold, Dr. Johnson added to the solution of cyanide of potassium a small quantity of peroxide of barium which, it was claimed, greatly facilitated and hastened the action of the solution, tests demonstrating that while the ordinary cyanide solution would accomplish the dissolution of a given amount of gold in from eighteen to thirty-six hours, the same quantity of gold would be dissolved with the Johnson solution in two to three hours. If worked on a commercial basis it would effect a great saving. In experimenting with charcoal as a precipitant Dr. Johnson first placed a small, solid block of charcoal in a beaker containing a solution of auro-cyanide, and it was found after a time to be coated on the under side with a thin film of gold. After numerous experiments of various kinds he devised a filter and passed the auro-cyanide solution through it. The filter was a small affair consisting of a 3-inch glass funnel, such as is commonly used in the laboratory. This was lined with filter paper of the ordinary kind and within it was placed powdered charcoal. It was found that the charcoal precipitated a notable quantity of gold but not sufficient to make it a success. The writer, who knew of these experiments, suggested that a second and third filter or even a larger number be employed in series. This was done with the result that all the gold was extracted from the solution.

In Australia, at the mills of the Brilliant Extended G. M. Co., wood ashes was used to keep the quicksilver in good condition when grinding concentrates which were being treated by amalgamation. In subsequent treatment by the cyanide process the amount of gold which could be extracted was small. An investigation discovered a considerable quantity of charcoal in the sludge which had come from the wood ashes. A quantity of this charcoal was collected and upon being incinerated and assayed was found to be rich in gold, thus proving further that charcoal is a precipitant of gold from cyanide solutions.

Notwithstanding the fact is well known that charcoal will precipitate gold from cyanide solutions, the process is very little employed. The most notable instance is at the South German Works, at Maldon, Victoria, where W. B. Gray has introduced it on a large scale, probably being influenced to give the process a thorough trial by the success of the application of charcoal in the chlorination process at Mount Morgan. The agitation process is employed at the South German Works, and the gold solution drawn off after settling, passed through a filter to arrest any slimes that may be in the solution.

In this plant forty filters are employed, set in eight series, with five filters in each row. The filters contain 560 pounds of powdered charcoal, which has been previously washed, and the plant treats 400 tons of tailings weekly. Bosqui, in "The Cyanide Process," says that the first filter precipitates 45% of the gold, the second 25%, the third 15%, the fourth 9% and the fifth 5%, thus effecting a saving of 99%. It will be noticed that each succeeding filter extracts an increasingly larger percentage of the gold remaining in solution. The filters may be employed until sufficiently rich to warrant their incineration and the recovery of the gold. Only those filters rich enough to justify it need be removed and the lower filters moved upward, new filters replacing them at the foot of the series.

The cost of charcoal at this plant is about 5 5 cents per ounce of gold saved. The gold has a higher fineness than that precipitated by zinc, and it is claimed the charcoal will throw down gold from the weakest solutions. The total cost at these works is 63 cents per ton, of which 32 cents is for cyanide.

An objection has been made to the use of charcoal filters for the reason, as it is claimed, that fine particles of the carbonaceous matter pass the filters and contaminate the solutions, unfitting them for subsequent use; but it seems that by the employment of a proper filter this might be obviated.

The incineration of the charcoal in retorts seems to offer less opportunities for loss than when accomplished in pans.

Mining in the Transvaal.

During the year 1898 the mines of the Witwatersrand produced $75,000,000, or within $6,000,000 as much as was ever produced in a single year in California, where in 1852 gold to the amount of $81,294,700 was taken from the mines.

The gold output of the Witwatersrand was from the operations of seventy-seven companies, having in the aggregate 4765 stamps. The greater number of these companies are working from the outcrop downward, or on the first row of levels, there being during the year but eleven companies operating what are termed deep levels, though there are a number of companies sinking on the second and third row of deep levels, which have not yet come into production. When this occurs the output will be largely increased. The average duty of a stamp on these mines is about four tons per day, or about 1500 tons yearly. Taking this as representing the average crushing capacity, the tonnage milled was about 7,000,000 tons. A much larger amount of ground was broken, as many of the mines sort out and reject that portion of the conglomerate too low grade to pay.

When quiet again reigns in the Transvaal its mining industry is likely to expand far beyond its present limits. The Minister of Mines has ventured the prediction that not less than 12,000 stamps will be in operation within the next five years, with a crushing capacity of 18,000,000 tons annually, which at the present value per ton will make an output of $180,000,000 annually.

These mines are of such character that they render these estimates entirely within the bounds of probability, for up to the present time they have not developed those extreme inequalities of occurrence so characteristic of mineral veins and deposits elsewhere, and the mining operators of that region figure as confidently on the future development and production of their properties as though the rock were actually in sight. In these mines it is not unlikely that deep mining will only be limited by the economic result, and that so long as the mines can be profitably worked other obstacles than heat and distance must be encountered before mining ceases. As in the past, the necessities of the case will result in ways and means now untried.

The cost of labor in these mines during the year 1897 was 32% of the total expenditure, and in 1898 was 34.5%. That of native labor was but 15%. During the present year, owing to the falling off of the supply of native labor, the white labor will no doubt show a material increase, but the extensive introduction of power drills will become a factor in keeping the cost of mining down, so that while the cost of white labor may be found to constitute a larger percentage of the total expenditure than in former years, the cost of mining may not be materially increased.

Concentrates.

MANGANESE has more affinity for carbon, sulphur and oxygen than iron has.

SULPHUR combines with iron in any proportion up to 55%, forming a sulphide.

THE royalty charged by the Russell process people is from 10 cents upward per ton.

GALVESTON, Texas, is exporting spelter ores. The September total was 1939 tons.

A COMPLETE description of the "bromine process" appeared in the issue of Feb. 19th, '98.

SAN FRANCISCO foundrymen are buying old mining machinery in Eureka, Nevada, for $8.50 per ton.

PETROLEUM, or other oil lands, may be located, held and patented under the rules governing placer locations.

IT is understood that the De Lamar, Nevada, mill has used 900 pounds of cyanide daily, about three pounds per ton.

A DYKE as an accompaniment to a vein is an indication of permanency of the fissure rather than of richness.

A COLUMN of water 1000 feet in height is equal in weight to a column of mercury of equal cross-section 73.8 feet high.

RUSSIA allows cyanide of potassium, exclusively for use in the Siberian and Ural gold mining industry, to be imported duty free.

EXCEPT some desultory operations in San Luis Obispo county, no chrome iron deposit in California is now being worked at all.

THE success attending the intelligent reopening of old mines in California is proving a strong stimulus in adding others to the increasing list.

A PURCHASER at foreclosure sale takes whatever interest the mortgagor had in the land at the time the mortgage was given, and that alone.

THE deepest mine in Colorado is the Geyser, at Silver Cliff. For nearly a year Supt. Elmendorf has been hoisting from the 2600-foot level.

THE State Tax Commissioner of Michigan says that there is over $100,000,000 worth of mining property in that State which now escapes taxation.

THE Mining Department of the Russian Government offers for sale Eastern Siberia placer mines to the highest bidder, the sale to be next February.

THE controlling interest in the Tacoma, Wash., smelter is understood to be held by D. O. Mills and other owners of the Alaska-Treadwell property.

WHILE zinc occurs as abundantly as either lead or iron in the sulphide zone of Leadville, Colo., it is almost wholly absent in the zone of oxidized ores.

THERE is no local demand for, or production of, nickel. Latest New York quotations are $1 per pound for No. 1 oxide black, or green; for No. 2, 60 cents.

WHEN it is noon in London it is 7 A. M. in Boston; when noon in San Francisco it is about a quarter past 3 the same afternoon in New York City, sidereal time.

PLATINUM is worth $15 to $18 per ounce. The reported discovery of platinum at Hot Springs, Arkansas, "going five pounds to the ton" is not likely to affect the market.

ALL government land is subject to mineral location if discovered to contain mineral deposits or veins, whether the land was previously recognized as mineral land or not.

THE law of Colorado does not give a lien on the estate of the lessor of a mine to secure a claim for wages to one who has done work in it under a contract with the lessee.

A FIRE EXTINGUISHER which may easily be made and kept stored in bottles ready for use consists of 3 pounds of salt and 1¼ pounds of sal ammoniac dissolved in a gallon of water.

THE Lake View Consols mine in Western Australia is one of the richest gold mines in the world. In July it produced 8009 tons of ore which yielded $622,500, an average of over $77 per ton.

IN the Terrible mine, in Colorado, a large quantity of carbonate of lead was found in a porphyry dyke, in which the ore occurred as a replacement of the original rock. The dyke cuts a granite formation.

WITHIN the present month a number of serious accidents, some of them fatal, have occurred in mines from the explosion of missed holes. Too great care cannot be taken when disposing of a missed hole.

A NOTE of a corporation, issued by an officer or an agent having authority to issue notes, is valid and enforceable against it, in the hands of a bona fide holder, though it was executed for an unauthorized purpose.

WHERE the business operations of a corporation have become unprofitable, its working plant, franchises and privileges may be disposed of at private sale if the terms have been agreed to by a majority of the stockholders.

THE wages of a watchman or keeper of a mining property cannot apply as assessment on an unpatented claim unless the watchman or keeper actually performs labor or improvements to the extent of the necessary assessment.

PUMICE is produced in commercial quantities in California. It is also mined at Black Rock, Utah, the finished product selling in Chicago at from $25 to $35 per ton. It is brought as ballast from Europe, which militates against domestic production.

THE term "blowing in," as applied to blast furnaces, has reference to the time when the fires are started up after having been shut down for a time. The fire is started and gradually increased for several days in order to have the brickwork thoroughly dry.

THE courts have decided that a certified check is one secured by the bank against which it is drawn—the bank holding an amount equal to the value of the check subject to the demands of the person in whose favor it is drawn until the check is presented for payment.

IN the issue of Sept. 30th a misstatement was made in regard to the limitation of time for filing location certificate with the county recorder in the Territory of Arizona. Ninety days are given by the revised code of Arizona, not sixty days as previously stated.

EASTERN "scientific" journals assert that Prof. W. C. Day of Swarthmore College, Philadelphia, Penna., has "duplicated Utah gilsonite by making asphalt out of herrings and sawdust," but it is not probable that the commercial success of the former will be seriously interfered with thereby.

THE gross ton is employed by many technical writers in their computations of quantities for the reason that it corresponds more nearly to the metric ton than the short ton of 2000 pounds. A long or gross ton (2240 pounds) equals 1.01605 metric tons. A metric ton contains 2204.62+ pounds.

ON a mining claim, patented, or whereon the necessary assessment work has been done, no one against the will or permission of the owner can work or legally attempt to work in any manner. This applies in a quartz claim to an area of 300 feet each side of the center of the vein and 1500 feet in length.

MOST of the great iron ore deposits of the United States occur in the Algonkian formation, which is intermediate between the Archæan and the Cambrian. The Algonkian includes various clastic rocks—the result of the degradation of the Archæan—and contains traces of the remains of organic life.

IN the early days of drift mining at Mokelumne Hill, Calaveras county, Cal., an amorphous silica was found associated with the volcanic tuff covering the gravel channels. Some of these segregations possessed all the properties of opal, and a very few of them exhibited a faint play of colors. One, it is said, was sold for $75.

THERE are numerous hills which are the result of uplift, and some are formed by the outpouring of lava upon the surface or the accumulation of vast heaps of cinders and fragmental volcanic detritus about craters, but for the most part the hills are carved from greater masses and are the result of erosion, being remnants of much larger bodies of rock.

"CALL LOANS" such as cited are secured at very low interest rate because the lender is amply secured by collateral that can be instantly turned into cash, different from real estate security. Then, too, in a "call loan," the lender can at once sell the collateral without delay or legal expense in the event of the borrower not meeting his obligations.

NICKEL occurs associated with chrome ores in serpentine in North Carolina, and the deposits near Riddles, Oregon, are similar. The ore occurs chiefly as silicate. The nickel ores of the noted mines of Sudbury, Canada, are sulphide — nickeliferous pyrrhotite with chalcopyrite. All pyrrhotite does not contain nickel, though it is of common occurrence.

EARTHQUAKES cannot be successfully predicted. A long period of scientific observation of seismic disturbances has failed to show that an approaching earthquake can be predicated by the weather or by the most scientific instruments. These disturbances, which are caused by movements of the earth's crust, may occur at any time in any part of the world.

LOCAL mining regulations determine the width of quartz lode locations, but in the United States they cannot exceed 300 feet on each side of the middle of the vein, nor can local law make them less than 25 feet on each side of the middle of the vein. All placer locations are twenty acres, and local law cannot make them less than that area, no matter how rich they may be.

T. D. S., GRASS VALLEY, Cal., can, by sending 50 cents to the Director of the U. S. Geological Survey, Washington, D. C., with request for Folio No. 29, enclosing the exact amount (50 cents), get a good publication that could not be issued privately for $50. Stamps or money orders are not accepted. Should the edition be exhausted, the money would be returned to the sender.

NOTHING is regarded as utterly impossible, nor is it assumed that the limit of knowledge has been reached. Some of us expect to die learning, but wave motor mechanism and flying machines do not yet seem to have reached the stage of practical development that would warrant immunity from such irreverent criticism as that so vigorously objected to by a Jerome, Arizona, correspondent.

TIN ORES occur in Bolivia in andesitic or trachytic rocks of Tertiary age. In the Black Hills the tin ores are associated with tantalite, columbite and certain lithia-bearing minerals, occurring in granitic dykes of coarse crystallization. In California the cassiterite is found in a matrix of tourmaline, consisting of a mass of fine acicular crystals, with some quartz. The veins occur in or associated with granite.

REGARDING T. A. Edison's acquiring a New Mexico tract to extract gold therefrom, Edison's agent says that "electricity is to make everything ready for another force to do the work of separation which electricity can not do, since it repels rather than attracts gold. That other force is air, propelled in some way at the right time and in proper quantity to blow the lighter material away from the heavier gold," which seems sufficiently obscure.

THE former ruling admitting patent on groups of mining claims, on one of which $500 worth of work had been done, was superseded by a new ruling Dec. 17th, '97, making it necessary to have $500 worth of work done on each claim, whether alone or a part of a group, before patent would issue. Subsequently this ruling was suspended until July 1st, '98, applying only to patents issued up to and including that date.

IN a system of mine timbering care should be taken in framing the joints, but the greatest care exercised in this direction by experienced carpenters is lost if the timbers are not properly placed in the mine. A very important matter, if not the most important, is to give careful attention to wedges when the timbers are in position. Not only is it necessary to properly and firmly drive the wedges when first put in position, but they should receive attention from time to time, to see that they do not become loosened by the shifting of the ground. In some large mines, where the excavation of large masses of rock weakens the ground and causes it to shift, or where there is swelling ground, men are detailed whose duty it is to look after the wedges and see that they remain firmly in place.

MANGANESE is usually found associated with iron, it being rare to find one without some trace of the other. The most common ores are oxides and carbonates. The sulphide (alabandite) is an uncommon mineral. In the United States it is found in Arizona and in Colorado, but nowhere in large amount. It is supposed that the scarcity of the sulphide of manganese is due to the instability of compounds of sulphur and manganese.

THE copper ores of the United Verde mine, Arizona, occur in Algonkian rocks; those of Bisbee, Globe and Clifton in rocks of Palæozoic age. The copper-bearing rocks of the foothill section of California occur in Cretaceous or Jurassic rocks in contact with diabase or serpentine; those in Shasta county, Cal., in eruptive rock-quartz porphyry. In the Lava Beds of San Bernardino county, Cal., rich copper ores also occur in quartz porphyry.

THE great gold-bearing zones of the Black Hills are in Algonkian rocks (formerly classed as Archæan) and are among the oldest gold-bearing veins in the world. Those of Cripple Creek are in a late Tertiary eruptive formation—andesite breccia. The existence of detrital gold in the conglomerate at the base of the Cambrian series in South Dakota proves the Algonkian veins to have been gold-bearing before the Cambrian was deposited, thus establishing their great age.

CALIFORNIA has furnished about one-sixth of all the quicksilver production of the world. In that State the ores occur chiefly in a form of mineral deposit peculiar to the ores of that metal, and which have been described by Geo. F. Becker as chambered veins, being found along complicated systems of fissures and zones of fracturing, often of great extent. These deposits usually occur in the vicinity of eruptive dykes; at New Almaden, a rhyolite; at Sulphur Bank, with basalt.

THE reporting of the international yacht race near New York City by wireless telegraphy was done from the deck of an accompanying steamship by Signor Marconi, the discoverer of the system. A vertical signal wire, 140 feet above the water, was attached to the vessel's foremast. Messages were correctly transmitted fifteen miles at the rate of sixteen words per minute and immediately transmitted by cable and land wire so that New York, London and other places simultaneously received the dispatch.

THE meeting on the 23rd inst. of the California State Miners' Association will be the eighth annual convention of that organization. It will be held at Golden Gate Hall, Sutter St., San Francisco. Questions of importance to the mining industry will be discussed and officers elected. The work of the Association goes on through its executive committee and officers through the year. The annual convention hears reports from those who have been working, and largely decides what the work shall be for the ensuing year.

WHERE A locates a lode claim and complies with all the requirements of the law, and B, coming after him, locates a claim including a large portion of A's claim, and proceeds to patent; having obtained a patent, A has no recourse unless he can prove that B obtained his patent by fraud. B cannot obtain a patent without due form of legal process, including the publication of a notice in a paper nearest the claim, and it is A's business to know that no one has jumped his claim. The United States deputy mineral surveyor is not supposed to know anything about A's location officially. He makes a survey of B's claim from data furnished by B, and has no interest in other claims in the vicinity.

RUTILE is a mineral of somewhat variable composition, but consists essentially of titanium dioxide—oxygen 40, titanium 60. Iron is usually present up to 10%. It occurs usually in the form of prismatic crystals, with the faces vertically striated or grooved. Occasionally found compact and massive. It is almost as hard as quartz, luster metallic-adamantine; color reddish brown passing into red; sometimes yellowish, bluish, violet, black, rarely grass green. By transmitted light deep red, streak pale brown. The ordinary mineral is red and other shades not black. It is often observed in the form of fine needle like inclosures in quartz crystals. It occurs in granite, gneiss, mica, slate, and syenitic rocks and sometimes in granular limestones and dolomite.

ANY person who is a professional mining engineer, geologist, metallurgist or chemist, or persons practically engaged in mining, metallurgy or metallurgical engineering are eligible to membership in the American Institute of Mining Engineers. Associate members include all suitable persons who are desirous of being connected with the Institute and duly elected. Each person desirous of becoming a member or associate shall be proposed by at least three members or associates, approved by the council, and elected by ballot at a regular meeting (or by ballot at any time conducted through the mail). A printed form—proposal for membership—bearing the name of the person whose name is to be proposed and signed by three members of the Institute is forwarded by mail to the Secretary who submits the proposal to a ballot of the members. A membership fee of $10 must accompany such proposal. Information as to the publications of the Institute may be obtained by addressing the Secretary, R. W. Raymond, 99 John St., New York City.

TELEDIAGRAPH is the name given to the apparatus invented by E. A. Hummell of St. Paul, Minn., for the telegraphing of pictures. The picture to be sent is first drawn on tinfoil with a certain kind of ink which will not easily blur by rubbing. The foil is then wrapped around a cylinder in the sending machine, similar to the wax cylinder of a phonograph. At the receiving end is a similar device arranged to work synchronously with the sending apparatus; but instead of tinfoil, a sheet of carbon or manifold paper is placed between two blank sheets of paper. In the sender a needle or platinum point is made to trace its way over the surface of the tinfoil, automatically moving down the cylinder a certain distance on the completion of each revolution. As this needle comes in contact with the ink lines it is thereby raised from the metallic surface and the circuit is broken. At the receiving end a corresponding needle reproduces the pulsations of the needle in the transmitter, and, pressing against the sheet in contact with the carbon paper, traces upon it an impression of the desired picture.

The Copper Queen Mine, Arizona.*

NUMBER II—CONCLUDED.

By JAMES DOUGLAS, Gen'l Mgr. Copper Queen Mine.

Though, as a rule, the clays of the ledge matter are ferruginous, they enclose here and there masses consisting of pure white clay, so free from iron as to be suitable for the plastic material of of converter linings. Such white clays may have been originally partitions of pure limestone between masses of sulphuretted ore, blocks of limestone intercalated in the ore, which we assume the ledge matter to have originally been.

If, therefore, we assume that the ledge matter represents or replaces ore as originally deposited, in what condition was that ore, and through what process of alteration has it come to assume its present composition and appearance? It has been suggested that the ledge matter is an altered feldspathic rock in place; that this intrusive rock carries the ore; and that the ledge matter and the ore, as found to-day, are merely instances of alteration. It is difficult to conceive how irregular, isolated masses of intrusive rock could be injected into the limestone so as to fill the space occupied by the ledge matter; but a more cogent reason for questioning the correctness of the theory is the fact that outside of, and below, the area of alteration we find no such bodies of copper-bearing "porphyry" (to use the popular term) as the theory calls for; whereas we do find large bodies of unaltered copper-bearing iron pyrites in contiguity with the altered bodies.

Fig. 2 is a cross-section through altered and unaltered ore bodies.

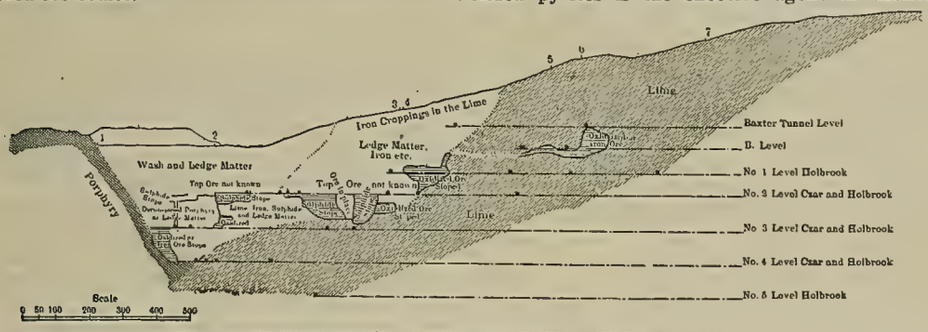


FIG. 2.—CROSS-SECTION COPPER QUEEN MINE, ARIZONA.

One or more granite veins traverse the limestones of the Queen hill, and even cut through, without appearing to affect, the ore bodies; but these veins are barren. They have not been traced from the surface, but they correspond approximately in position and direction with heavy quartzite croppings, which break through the limestones near the crest of the hill. If the surface quartzites and the deeper granites belong to the same system, this instance would confirm the evidence presented elsewhere, that feldspathic rocks, under such potent influences of decay as exist in the Southwest, lose all their basic ingredients at, or near, the surface, and are altered into very acid felsites, or even quartzites. We have used the decayed granite on the 400-foot level as plastic lining for the converters.

With regard to the ledge matter and the oxidized ore, my own opinion is that they are the product of replacement and local concentration; that where there is ledge matter to-day, there was, originally, more or less compact iron pyrites carrying a small percentage of copper; and that, during the process of alteration, not only did ferruginous solutions of alumina replace the pyrites, but the copper, by a process of segregation akin to crystallization, was concentrated and collected into areas of limited size, thus constituting the comparatively small bodies of oxidized ores which are disseminated irregularly through the very large masses of ledge matter. The acid products of decay thus liberated must have been enormous. As the outline of the masses of ledge matter has never been traced, it is impossible to determine their actual size, and thus arrive at an accurate estimate of their quantity; but, approximately, there has been exposed on all the levels above the 400-foot level not less than 10,000,000 tons of ledge matter. If this was, before alteration, a sulphide ore of the average composition of the existing unaltered masses, there must have been set free at least 4,000,000 tons of sulphur. That the ore before alteration was as compact, and therefore carried as high a percentage of sulphur, as the existing unlatered ore, may be doubted. It is possible that one reason why the sulphide ores of to day on the upper levels are only partially decayed is that they were composed of more compact pyrites than the ores which have been completely altered and are imbedded in ledge matter. In any case, assuming that the ledge matter and ore represent sulphuretted compounds now altered, there must have been oxidixed and rendered soluble more than a million tons of sulphur, which would be sufficient to produce widespread alterations in the adjacent limestones and hasten decay in the ore masses themselves; to reach by diffusion the adjacent eldspathic rocks; to alter them, and to carry back some of their basic constituents and silica to replace dissolved elements of the limestones and ores.

As I have already pointed out, the limestones themselves which enclose the ledge matter are extensively altered. As the result of such alteration, there must have been produced correspondingly large quantities of sulphate of lime. Through the percolation of water this has been completely dissolved and removed. In dryer mines, such as those at Globe, small quantities of gypsum are found; and in such extremely dry regions as that in which the Boleo mines of Lower California are situated, gypsum accompanies the oxidized copper ores in such quantities as to convert the furnace product very largely into matte. At Bisbee, however, where the ledge matter is everywhere wet, where fissures and caves afford channels for the flow of water, and where, during the wet season, our pumps have to handle from one to two million gallons of water a day, even such sparingly soluble products of decay as gypsum have been dissolved and have disappeared.

It is more difficult to account for the enormous quantities of alumina which must have been derived from extraneous sources to form the clays. They must have been derived and conveyed by diffusion from the adjacent feldspathic rocks. As I have already remarked, when we drift from the limestones into the feldspathic rocks, assumed to be rhyolite, to the east, it is impossible to distinguish the difference between altered limestone and altered rhyolite. But in the distinctly feldspathic rocks we find that widespread decay, though less destructive, has occurred. As this rhyolite carries more or less iron and copper pyrites, it may be argued that the enclosed pyrites is the effective agent in assisting decay. But except at the surface, where the rhyolite is colored, the pyrites is undecomposed. Below the surface the rhyolite is white and softened to considerable depth. It is therefore quite conceivable that, by means of the insensible interchange of solutions from the decaying bodies of pyrites through the adjacent feldspathic rocks, alumina and a silica should be dissolved, and that they, in their turn, should displace the carbonate of lime and replace some of the iron in the altered pyrites.

At the Copper Basin in Yavapai county, Arizona, a copper solution oozes from feldspathic rocks which carry only a trace of copper. On exposure to the air, there separates in the bottom of the streams an insoluble magma, the solid constituents of which are:

	Per Cent.
Silica	7.17
Fe_2O_3 and Al_2O_3	16.21
CuO	64.40
SO_3	12.22
Total	100.00

In time this sludge is converted into a mixed carbonate of copper and alumina, which binds together the gravels into conglomerates, of which some twenty thousand tons constitute horizontal beds of copper ore. The alumina and silica are in this case dissolved from the granite, through which percolate the soluble products of the decay of copper and iron pyrites.

A feature of the Bisbee mine is the large caves, which have had some influence on the occurrence of of the oxidized ore bodies. The walls, roofs and floors of these caves are always covered with stalactitic accretions, which are often tinted green, blue and red by the copper and iron solutions which are mixed with a solution of carbonate of lime. What, however, gives these caverns practical interest is that they have invariably covered oxidized ore bodies. Fig. 3 gives a cross-section through one of the large caves. Three such caves of considerable extent have been encountered, and in every instance this combination has occurred. It may be accidental; but so satisfied are we to the contrary that when a cave is now met with, drifts are run beneath it to strike the ore body. It is a fair assumption that the cave, if not originally formed by the contraction of an ore body, was increased by the shrinkage of the latter during its oxidation, and that, therefore, a genetic relation really exists between the cave and the underlying ore.

Moreover, some real, and not accidental, relation can be traced between the surface contour of the country and the underlying ore bodies. Where the ore bodies have come to the surface, and have been decayed into ledge matter, erosion has been extensive, as in the case of the depression east of the Copper Queen hill, through which the Arizona and Southeastern R. R. enters the town, and in which the slag dump is being deposited. This depression, already observed, marks the line of contact between the limestones and the rhyolite. The fissure between the Copper Queen hill and Copper King hill to the west uncovers the deposit of cerussite which attracted attention to the district before the copper; and this gulch may occupy the position of ore bodies which, there is reason to think, have been completely removed by denudation. South of the Copper Queen hill there is a broad depression which corresponds roughly to the ore-bearing ground in depth. It would be drawing an unwarrantable conclusion to predict the position of an ore body from the surface contour of any country; but where the rocks are known to be ore-bearing, it is often as fair an assumption that surface elevations and depressions represent ore bodies in depth as that the colors of soils and rock are indicative signs.

The metallurgical practice has necessarily undergone radical modifications with the change in the character of the ore; and the plant has also grown, both in size and in the dimension of its separate parts, with the expansion of the mine. The water-jacketed furnace which was introduced when the mine was opened by Mr. Lewis Williams, who was probably the first metallurgist to apply it to copper smelting, has remained the type of furnace used; but the 36-inch round shell has, by successive changes, developed into furnaces of 122 inches by 42 inches. There is no other reason for confining them to this size than that the capacity of such a furnace is approximately that of the converters, which are coupled with the furnaces. Originally the furnace plant, consisting of two 36-inch jackets, was built directly below the open cut, and the ore was crushed under a separate roof, thus involving unnecessary handling; but in 1886–1887 the smelting works were removed to their present site, though they were still planned for the treatment exclusively of oxidized ores. Already, however, the percentage of sulphur in the oxidized ores was increasing to a degree which injured the quality of the black copper bars, and involved the retreatment of part of the product as matte. Simultaneously large bodies of compact sulphurets were being discovered, the utilization of which involved a change of treatment. By that time the pneumatic method of concentrating matte had acquired such undisputed acceptance in Butte that the company decided to adopt it; but, instead of building the vertical converter, which had heretofore been exclusively used in this country, the horizontal barrel type was copied, with modifications, from those in use at the metallurgical works in Leghorn, Italy, at Aiguilles, France, and at Vivians' works in Swansea, Wales.

At first the converters were fed from a remelting furnace, but this wasteful operation was soon abandoned, and each of the three converters was placed opposite its companion smelting furnace, and the molten matte was poured from tilting wells directly into the converters. This plan secured notable economy over the cost of remelting, with its attendant handling of the cooled matte, but was found to involve occasional delay—at one time of the furnaces, at another of the converters—so that neither furnaces nor converters could be pushed to their maximum capacity. An electric crane is therefore being introduced to transport the matte from any one of the furnace wells to any one of the converters. The smelting plant of the mine will hereafter consist of four water-jacketed cupolas, 42 inches by 120 inches, of oval shape, and with taper from the feed door to the tuyeres. Each furnace is provided with two tilting wells, arranged in tandem. From the second well the slag will flow into two-ton ladles, which are moved by the electric crane to the four-ton slag cars, drawn by a steam locomotive. The matte will be poured from whichever of the tilting wells of

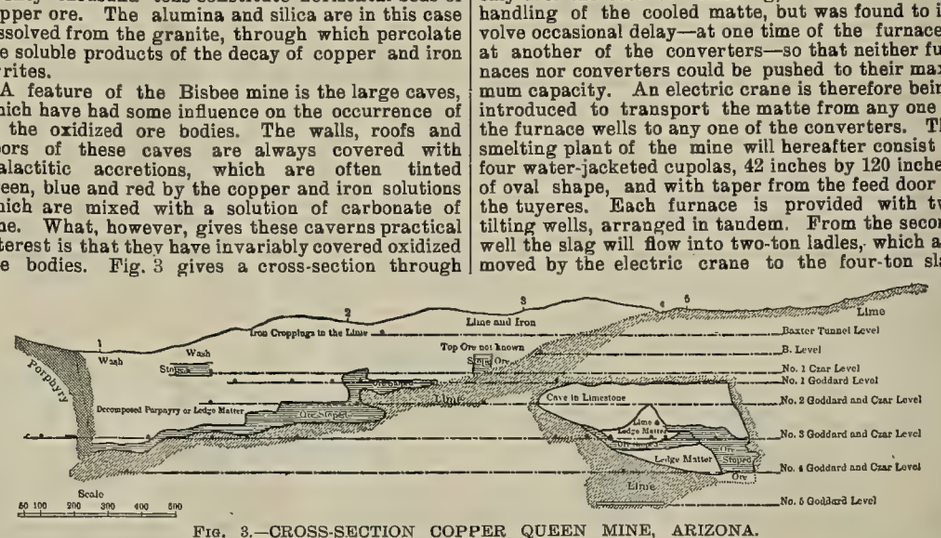


FIG. 3.—CROSS-SECTION COPPER QUEEN MINE, ARIZONA.

each furnace is quite full, and conveyed to a converter; and the same crane will return the converter slag to the well nearest to the furnace, thus allowing the slag ample time and space to settle while traveling to the discharge of the second well. The converters are 8 feet long and 5 feet 6 inches in diameter. The average daily capacity of each furnace is about 160 tons of ore, exclusive of extra charge of foul slag, and each converter can blow daily thirty to forty tons of 45% matte to metallic copper, averaging a trifle over 99%. The blast is derived either from a horizontal duplex Riedler engine or a vertical Scranton engine. The pressure usually maintained is from seven to eight pounds. While the matte can be blown at much lower pressure, a lower blast retards the operation.

In "Mineral Resources of the United States" for 1883–1884 I described the construction and operation of the old 36-inch jackets then treating the oxidized ores of the mine.

At present a charge of the large 42x120-inch furnace is composed of naturally oxidized ores mixed with sulphuretted ores in such proportion as to yield a matte of about 45%. The following samples of ore charge and slag were taken during a day's run of the same furnace. Each ore charge consisted of:

	Lbs.
Oxidized ores from various parts of the mine, carrying more or less sulphur	1,500
Low-grade clay ore	1 000
Raw sulphide ore	1,000
Roasted sulphide ore	100
Total	3,600

One charge of briquettes, made from fine ore screenings, flue dust and coke dust, in a Chisholm & Boyd brick press, is fed for every ten charges of ore. The coarse screenings from the converter are added as extras—hence the larger proportion of silica in the slag than the composition of the ore charge would warrant.

ANALYSIS OF ORE CHARGE.

	Per cent.
Copper	9.1
Silica	17.1
Lime	Trace
Sulphur	16.44
Iron	29.7
Aluminum	5.4
Zinc	Trace
Lead	Trace
Manganese	0.58
Moisture in the ore	9.2
	Ozs. per ton.
Silver	0.9
Gold	Trace

ANALYSIS OF RESULTING SLAG.

	Per cent.
Copper	0.6
Silica	33.8
Lime	1.11
Sulphur	1.1
Iron	37.7
Aluminum	13.15
Zinc	Nil
Lead	Nil
Manganese	1.95
Silver	Trace
Gold	Nil

The dry copper content was, therefore, 8.27%. This, of course, represents not the average run of the mine, but selected ore, as rough sorting is done underground. No flux is ever added to the furnace charge, as by a judicious selection of acid and basic ores a fusible mixture can always be obtained. The coke consumption is 12.5% of burden of furnace. The coke used is a very impure product of the Trinidad, Colo., ovens, carrying over 20% of ash, but the furnace charge is sufficiently basic to permit its economical use.

The operation of one of the converters when fed from a single furnace, involving, as already stated, a considerable waste of time, can be followed by tracing the steps of the life of a single lining, as in the following table; and the behavior of the principal ingredients of the matte is indicated by the analysis and the products of the blow:

Samples of Products of Bessemer Converter No. 3, at Bisbee, During the Life of One Lining.

NEW LINING—FIRST CHARGE.

First tap of matte from well No. 3. Blast turned on at 12:13 P. M.; blast turned off at 12:28 P. M. Time of first blast, 15 minutes.

Pour finished at 12:33 P. M.

Second blow began at 12:52 P. M.; second blow ended at 1:20 P. M. Time of blow, 28 minutes.

Third blow began at 1:30 P. M.; third blow ended at 1:58 P. M. Time of blow, 28 minutes.

Bullion all poured at 2:06 P. M.

Length of blast on charge: First blow, 15 minutes; second blow, 28 minutes; third blow, 28 minutes. Total, 1 hour 11 minutes.

Sample No. 1—First tap of matte into converter; ladle at beginning, middle and end of tap.

Sample No. 2—First pour of slag, 4½ pots; dip sample, two rods to each pot.

Sample No. 3—Ladle sample of white metal from converter.

Sample No. 4—Second tap of matte into converter from well No. 3.

Sample No. 5—Six pots, poured slag.

Sample No. 6—Two pots, skimmed slag.

Sample No. 7—White metal from converter.

Sample No. 8—Metallic copper; ladle sample taken near beginning and end of pour. Copper made from this charge, 9½ bars.

[Sample No. 2 probably too high, as dip of rods from last pot was too deep.]

SECOND CHARGE OF CONVERTER.

First tap of matte from No. 3 well into converter.

First blow began at 2:20 P. M.; first blow ended at 2:48 P. M. Time of blow, 28 minutes.

Second blow began at 3:12 P. M.; second blow ended at 3:37 P. M. Time of blow, 25 minutes.

Third blow began at 3:50 P. M.; third blow ended at 4:32 P. M. Time of blow, 42 minutes.

Length of blast on charge: First blow, 28 minutes; second blow, 25 minutes; third blow, 42 minutes. Total, 1 hour 35 minutes.

Sample No. 9—First tap of matte taken as for sample No. 1.

Sample No. 10—First pour of slag, 10 pots.

Sample No. 11—White metal in converter, end of first blow.

Sample No. 12—Second tap of matte from well No. 3 into converter.

Sample No. 13—Second pouring of slag, 9 pots.

Sample No. 14—Two pots skimmings.

Sample No. 15—White metal, end of second blow.

Sample No. 16—Taken like sample No. 8; 14½ bars of metallic copper.

[Converter lining patched with one wheelbarrow load of lining after this run.]

The converter lining used in Bisbee is composed of quartzite and clay from the mine, the latter carrying a small percentage of copper. No ore sufficiently siliceous, and, at the same time, sufficiently plastic, has been found at Bisbee to serve as lining; but at Morenci an ore with an average composition of 54% SiO_2 and 20% Al_2O_3 is used to line the body of the converter. A more siliceous mixture is preferred for the zone of the tuyeres. The small quantity of gold and silver, which the above analyses reveal, comes from every section of the mine—a certain stope containing more on one day than on another day. For a time a selection was made, one converter and one furnace being run on the more highly argentiferous ore, and bars of slightly higher tenor in gold and silver were made from them; but the difference between these and the average was too small to encourage us in continuing the practice. No roasting is actually needed; but two cylinder calcining furnaces are kept running on very heavily sulphuretted ores, extracted chiefly during exploration. The furnaces are automatic and self-roasting. Each handles eight tons of coarsely crushed ore a day, reducing the average sulphur contents from 45% to 8%.

The power plant of the works, like that of all plants built up by installments, is very defective. No steps are being taken to improve it, because the company contemplates building in the near future a large gas producer and a gas engine plant, the experience of both the Arizona Copper Co. and the Detroit Copper Mining Co. having been overwhelmingly and unreservedly favorable to that mode of generating power, at least under the local conditions here existing.

THIRD CHARGE OF CONVERTER.

First blow began at 5:10 P. M.; first blow ended at 5:41 P. M. Time of blow, 31 minutes.

Second blow began at 6:10 P. M; second blow ended at 6:35 P. M. Time of blow, 25 minutes.

Third blow began at 6:45 P. M.; third blow ended at 7:26 P. M. Time of blow, 41 minutes.

Length of blast on charge: First blow, 31 minutes; second blow, 25 minutes; third blow, 41 minutes. Total, 1 hour 37 minutes.

Sample No. 17—First tap of matte taken from settler No. 3, taken like sample No. 1.

Sample No. 18—First pour of slag, 10 pots.

Sample No. 19—White metal, after first blow.

Sample No. 20—Second charge of matte from No. 3 well into converter.

Sample No. 21—Nine pots slag, second pour.

Sample No. 22—Two pots skimmings.

Sample No. 23—White metal, after second blow.

Sample No. 24—Metallic copper, 14½ bars, taken like No. 8.

[Converter lining reinforced with one wheelbarrow load of lining after the run.]

FOURTH AND LAST CHARGE OF CONVERTER.

First blow began at 8:43 P. M; first blow ended at 9:09 P. M. Time of blow, 26 minutes.

[Had to wait nearly an hour for matte, as No. 3 furnace had been run down.]

Second blow began at 9:19 P. M.; second blow ended at 9:56 P. M. Time of blow, 31 minutes.

Total time of blast: First blow, 26 minutes; second blow, 31 minutes. Total, 57 minutes.

Product, 52 bars; weight, 15,070 pounds.

Sample No. 25—Matte (only tap) poured from No. 3 well.

Sample No. 26—Nine pots slag poured.

Sample No. 27—One pot of skimmings.

Sample No. 28—White metal in converter after first blow.

Sample No. 29—Metallic copper, 12 bars.

Sample No. 30—"Granulated slag," 2 pots grab as raked out.

Sample No. 31.

Sample No. 32.

[In blowing up the charges to white metal there were always some fumes coming from the converter. But the fumes were very much heavier than usual in the last charge. In fact, there were very dense fumes — probably lead—through almost all of the time of the first blow on the fourth charge.]

ASSAYS OF ABOVE SAMPLES—FIRST CHARGE.

	Matte No. 1.	Slag No. 2.	White Metal No. 3.	Matte No. 4.	Slag No. 5.	Slag Skimmings No. 6	White Metal No. 7.	Copper No. 8.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Silica	.....	36.78	.....	.....	34.64	36 62	.....	.....
Copper	55.48	3.09	78 79	55.40	4 36	6.48	79.22	98.64
Iron	21.09	45.82	0.86	21.06	48.47	43 01	0.47	0.159
Nickel	0.34	0.28	0.07	0.36	0.56	0.38	0.15	0 04
Zinc	0.16	.....	0.04	0 09	.....	.....	0.06	0 027
Lead	0.612	.....	0 12	1.04	.....	.....	0.13	0.084
Antimony	0.021	.....	0.010	0.031	.....	.....	0.014	0.009
Arsenic	0.051	.....	0.014	0.932	.....	.....	0.015	0.012
Selenium & Tellurium	0 05	.....	0.015	0.029	.....	.....	0.043	0.043
Sulphur	21.39	0.26	19 78	21.93	.....	.....	19 45	0 244
Silver*	(9.02)	(0.20)	(9 12)	(6 82)	.....	.....	(10.22)	(12.24)
Gold*	(0.12)	.....	(0.20)	(0.10)	.....	.....	(0.22)	(0 24)
Insol. resid.	0.34	.....	.....	.....	.....	.....	.....	0.196

*The figures for silver and gold, in parenthesis, represent ounces per ton. As 9.02 ounces is much more silver than any of our low-grade melts contain, this sample is undoubtedly incorrect; and therefore the silver and gold in the second sample (next table) should be taken for purposes of comparison.

SECOND CHARGE.

	Matte. No. 9.	Slag. No. 10.	White Metal. No. 11.	Matte. No. 12.	Slag Poured. No. 13.	Slag Skimmings. No. 14.	White Metal. No. 15.	Copper. No. 16.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Silica	.....	35.30	.....	.....	33 46	39.62	.....	.....
Copper	54.04	4.08	79.10	50.50	4.47	4.31	78.44	98.90
Iron	21.35	47.05	0.595	24.95	49.60	42.44	0.86	0.184
Nickel	0.24	0.39	0.072	0.22	0.96	0.49	0.15	0.033
Zinc	0.145	.....	0.031	0.08	.....	.....	0.063	0.004
Lead	1.21	.....	0.192	2.12	.....	.....	0.37	0.103
Antimony	0.02	.....	0.006	0.033	.....	.....	0.013	0.014
Arsenic	0.04	.....	0.015	0.035	.....	.....	0.016	0.016
Selenium & Tellurium	0.04	.....	0.022	0.035	.....	.....	0.042	0.045
Sulphur	21.67	.....	19.46	21.61	.....	.....	19.59	0.403
Silver*	.....	.....	118.0	.....	.....	.....	109.	100.6
	(6.08)	(0.18)	(10.64)	(6.08)	.....	.....	(9.28)	(11.13)
Gold*	.....	.....	70.	.....	.....	.....	111.	101.2
	(0.16)	.....	(0.18)	(0.12)	.....	.....	(0.20)	(0.25)
Insol. resid.	0.51	.....	.....	.....	.....	.....	.....	.....

THIRD CHARGE.

	Matte. No. 17.	Slag. No. 18.	White Metal. No. 19.	Matte. No. 20.	Slag Poured. No. 21.	Slag Skimmings. No. 22.	White Metal. No. 23.	Copper. No. 24.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Silica	.....	34.35	.....	.....	32.60	37.84	.....	.....
Copper	53.46	3.87	78 98	55.30	4.12	4.94	78.92	98.08
Iron	21.95	48.40	1.10	19.99	54.33	43.10	0.86	0.161
Nickel	0.24	0.76	0.07	0.29	0.99	2.02	0.12	0.042
Zinc	0.18	0.39	0.03	0.09	.....	.....	0.06	0.016
Lead	1.89	1.51	0.10	1.37	.....	.....	0.26	0.11
Antimony	0.03	.....	0.005	0.03	.....	.....	0 014	0.02
Arsenic	0.05	.....	0.014	0.04	.....	.....	0.015	0.016
Selenium & Tellurium	0.04	.....	0.018	0.03	.....	.....	0.026	0.048
Sulphur	21.72	.....	19.22	22.49	.....	.....	19.47	0.51
Silver*	.....	.....	96.	.....	.....	.....	96.3	100.0
	(6.76)	(0.11)	(9.80)	(6.40)	.....	.....	(8.88)	(11.86)
Gold*	(0 14)	.....	97.	.....	.....	.....	104.	97.5
		.....	(0.20)	(0.15)	.....	.....	(0.18)	(0.24)

FOURTH CHARGE.

	Matte. No. 25.	Slag Poured. No. 26.	Slag Skimmings. No. 27.	White Metal. No. 28.	Copper. No. 29.	Granu. Slag Rakings. No. 30.	Hood. No. 31.	Lining. No. 32.
	Per ct.	Per ct	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Silica	.....	32 57	35 16	.....	.....	43.14	1 14	86.64
Copper	57.86	3.18	4.22	77.58	99.05	9 27	76.72	0.23
Iron	17 68	50.84	50.43	0.98	0.164	27.195	3 31	2.62
Nickel	0.12	.....	.....	.....	.....	.....	.....	.....
	0 33	0.19	1.34	0.13	0.024	.....	0 26	.....
Aluminum	.....	.....	.....	.....	.....	.....	0.22	3.71
Zinc	0.21	0.42	.....	0.05	0.016	0.04	0.163	.....
Lead	1.85	2 25	.....	0.48	0.08	2.84	1.51	.....
Antimony	0.03	.....	.....	0.15	0.018	.....	0.023	.....
Arsenic	0.04	.....	.....	0.17	0.016	.....	0.033	.....
Selenium & Tellurium	0.04	.....	.....	0.02	0.044	.....	0.053	.....
Sulphur	21.24	.....	.....	20.11	0.07	.....	12.40	.....
Silver*	.....	.....	.....	100.2	127.	(0.52)	(7.50)	.....
	(5.86)	(0.16)	.....	(7.86)	(12.78)			
Gold*	.....	.....	.....	88.8	131.	.....	(0.10)	.....
	(0.12)	.....	.....	(0.18)	(0.27)			
Insol. resid.	0.39	.....	.....	.....	.....	.....	.....	.....

* The figures for silver and gold, in parenthesis, represent ounces per ton.

An examination of the above statement shows that 10 hours 43 minutes were consumed in making 15,070 pounds of copper, in four charges, or 2 hours 40 minutes per charge. To this, 20 minutes must be added for the time allowed for changing converter shells.

Of this time, the first charge was blown up to copper in 1 hour 11 minutes; the second, in 1 hour 35 minutes; the third, in 1 hour 37 minutes, and the fourth, in 57 minutes. Total, 5 hours 20 minutes.

The skimming and second matte filling actually occupied 34 minutes for the first charge; 37 minutes for the second; 39 minutes for the third, and the skimming of the fourth charge occupied 16 minutes. Total, 2 hours 6 minutes.

The difference of 3 hours and 17 minutes, or 49 minutes per charge, was therefore spent in pouring copper, patching and charging,—an excessive allowance, due in part to the system, otherwise so economical, of linking a furnace to one converter, as previously explained.

The Newest El Dorado.

Three years ago the MINING AND SCIENTIFIC PRESS illustrated and described the newest found gold fields of the dreary Yukon region. From other regions, drearier and still farther toward the reign of ice and night, comes confirmation of rich gold finds at Cape Nome, Alaska, and already are reported the usual "rushes" toward the bleak spot where men who are believed to be reliable write us gold is plenty.

Cape Nome is said by returned visitors to be "the coldest and windiest place on earth." Norton sound



BEACH DIGGINGS NEAR ANVIL CITY,—$3,600 TAKEN FROM THIS CLAIM IN THREE WEEKS.

freezes over and the ice piles up high on the beach. The beach is a summer sluicing proposition, and no place for any white man to want to winter. This season there were about 2000 people working with rockers on the beach, some taking out $25 per day, others $100. The diggings are shallow, the deposit extending along the beach for twenty miles. The "formation," etc., have heretofore been described at length. Nuggets worth $300 have been found, the most of the gold being fine. As often happens, it was "tenderfeet" who made the discovery. Two boys who had never handled mining implements began "working" out some grey sand in front of the store tent of the N. A. T. Co., and found "wages." Near by a man who had a tent near the beach, wanting to build a "porch," sunk a hole for a post, and found hardpan at a depth of 2 feet. On this clay hardpan was a layer of 3 inches of ruby sand, full of fine gold. That started a lively securing of claims. At first the Transportation Co. wanted to monopolize the beach, but found it impossible, the rocker men claiming and maintaining a right to a 30 foot strip above high water. Miners say that not more than half the gold is saved; it is very fine and is found in black or ruby sand on a thin layer of clay, from off which the black sand is scraped. No one goes below the second stratum of this clay lest the water come in upon him. The rockers and work are crude, some of the gold is rusty and will not hold to the plates, the black sand is sometimes nearly as heavy as the gold, so that the saving is not more than 50% of the gold actually present. Anvil City will be a lively place next season, when considerable of Dawson City's present population will have left the Canadian El Dorado of '97 for the newest El Dorado on American soil. The chief charm about Cape Nome is that, unlike Dawson on the Klondike, it is a poor man's camp, and for a while at least no one has any advantage. The MINING AND SCIENTIFIC PRESS of April 22 had an account of the discovery and organization of the Cape Nome district, and gave the first authentic account from miners of that region.

Herewith and on page 457 are presented some views specially engraved for the MINING AND SCIENTIFIC PRESS, which portray more faithfully than can any description just how the gold is being won from the water's edge. It is on a bigger scale just what has been done for forty years along the California and Oregon coast. In the latter case the richest results were always after a great storm had "concentrated" the surface sands and made a little rich pocket of beach sand that paid well. In the case of the Cape Nome beach diggings the ocean shore is rich in gold dust and nuggets partially protected from the tides and storms by the overlying sand, being the disintegration of the mountains seaward, and indicating a "mother lode" inland. It is probable development will show that the whole expanse of tundra from the Cape Nome beach clear back to Anvil creek is a gold-bearing plain similar in formation and scarcely less rich in gold than the slice of beach which the ocean has been cutting away. Anvil City, the most northern American town, may prove as big a shipper of gold as was its waning competitor on the Canadian side of the Yukon.

The United Verde, Arizona.

The largest copper mine in the southwestern United States, and one of the richest in the world, is the United Verde at Jerome, Yavapai county, Arizona. The district was discovered in 1875 by a party of prospectors who made numerous locations on the hills where the great copper mines now are, among them some of those now forming the United Verde group.

During the following seven years the original locators did development work on some of the claims, and in 1882 sold their interest to ex-Governor Tritle of Arizona and F. F. Thomas of California for $15,000. A thirty-ton smelter was built in the early summer of 1883, which was run continuously for a year or more. Up to October, 1884, the smelter had produced in 289 days 4,396,951 pounds of metallic copper and 237,951 ounces of silver. The copper was worth at that time 12½ cents per pound and the silver about $1 per ounce. In December, 1884, a new furnace was purchased and there was an intention to increase the capacity of the works, but the constantly decreasing price of copper discouraged the enterprise; and this, together with the expense and difficulty in obtaining coke during the following winter, and also to the fact that sulphides had commenced to make their appearance in the mine, led to the closing down of the property, as the situation at that time did not appear to justify the reconstruction of the works or additions thereto. The property remained idle until the summer of 1887, whenex-Governor Tritle took it under lease, and in August of that year the furnaces were again blown in and a successful run was made lasting several weeks. In the fall of the year the works and mine were again closed down.

In March, 1888, W. A. Clark of Butte, Montana, came into possession of the United Verde, which at that time had a reduction plant of 100 tons daily capacity. Since the early attempts to work the property, a railroad had been built from Seligman Junction, on the line of the Atlantic & Pacific, to Prescott, passing within twenty-two miles of the mines, greatly simplifying the transportation problem. Copper had also gone up in price to about 16 cents per pound. In the following May the furnaces were once more blown in under Mr. Clark's management, and then began the successful history of these mines. From time to time additions and improvements were made to the plant, and at the present time the property is thoroughly equipped with modern machinery



UNITED VERDE SMELTERS, JEROME, ARIZONA.

and labor-saving devices, which have enabled it to make a large output at nominal cost.

The plant now has six water-jacket furnaces, having a capacity of 200 tons each, a reverberatory furnace of ordinary type, one tilting furnace and six converters. A battery of ten boilers, having in the aggregate a capacity of 1500 H. P., furnishes power for these works. A complete electric plant has also been installed. Cranes and travelers handle the matte, conveying it from the furnaces to the converters and also carrying the bullion from the converters to the refining furnace. The slag pots are handled by electric motors, and everything about the mine and reduction works is conducted on a large scale. The mines are making an annual output approaching 40,000,000 pounds of refined copper and several hundred thousand ounces of silver, the enterprise giving employment to nearly 1000 men.

The accompanying illustration, from a photo specially taken for this article, is a general view of the reduction plant, showing also the company's offices and workmen's cottages.

Liquid Air—Some Fallacies, and a Few Facts.

Written for the MINING AND SCIENTIFIC PRESS by GEO. S. BINCKLEY.

In the first place, liquid air is not stored energy at all. On the contrary, it contains not nearly as much potential energy as the same weight of ice.

Its expansive power is less than that of water. In other words, its ratio of expansion is lower; consequently, in the evaporation of equal volumes of liquid air and water to greater but still equal volumes of air and steam, more work will be performed by the expansion of the steam than the air.

In the production of the liquid air, the work performed in the compression of the air from atmospheric pressure to that required for liquefaction must always be in excess of that represented by the expansive power of the liquid air, owing to the fact that the compression of the air cannot be isothermal, that there are losses of power due to the clearance spaces in the cylinders, leakage and friction in the machine itself. Taking all these matters into consideration, it will be seen that even with the most improved machinery there will always be very considerable losses, thermal and mechanical. Eliminating these losses, we would have an exact balance in the amount of power exerted and in the power available in the form of liquid air.

In the liquefaction of air, the result to be attained is not the storage of energy in the air, (although this is the preliminary step), but the extraction of almost all the potential energy that it contains at atmospheric pressure and ordinary temperatures, reducing it from the state of a gas to that of a liquid, having an extremely low temperature, and, consequently, little energy. In this state it has, very naturally, a great capacity for the rapid absorption of heat, from the surrounding air or anything else near it, until a thermal equilibrium is reached. During the establishment of this equilibrium the liquid will expand as a vapor and, if confined, will exert a corresponding pressure, which may be utilized in an engine of the ordinary form. It derives its energy, however, from the surrounding atmosphere, the energy stored in it during compression having been entirely dissipated during liquefaction.

In the liquefaction of air, the purpose of compression is to concentrate the total heat or energy existing in the air into a small volume, the temperature of which is first reduced by the application of cold water to the tubes forming the receiver, and further reduced by allowing air, at ordinary temperatures but under high pressure, to expand around the receiver. This air, having been deprived of a great part of its energy, will, on expanding, absorb from anything that it comes in contact with the amount of heat necessary to establish a thermal equilibrium, and, in doing so, will further reduce the temperature of the air under pressure. Carried far enough, this will produce liquefaction, the liquefied air having parted with as much energy, or heat, as was expended in its liquefication.

Mr. Tripler, who has accomplished the most conspicuous results in the way of liquefication of air, and who has written about it a good deal, says that after the process is begun and the temperature in the condenser brought to a sufficiently low point, the compression of the air before liquefication will not be necessary, but that the air will condense at atmospheric pressure, fresh air rushing in as the process of condensation goes on. This would undoubtedly be true if the temperature in the condenser was maintained at the same low point; but the heat in the inrushing air must be absorbed by something, and no matter how short a time is assumed, the change of temperature of the condensing surface will necessarily be immediate, and will continue until a thermal equilibrium shall have been established. To maintain the condensing surface at the same low temperature, the expansion of air or gas from a

high temperature is necessary in order to absorb the heat carried by the in-rushing air, and the energy stored in this air or gas and dissipated by its expansion is equal to the energy that it will absorb from the air condensed and liquefied, assuming that the process is perfect, which it, of course, cannot be. This is a simple matter, in the face of which it is difficult to accept Mr. Tripler's statement that, with the expenditure of three parts of liquid air used as a source of power in an engine, he can produce seven parts of fresh liquid air. He says that in the process of liquefaction he "does not know what becomes of the heat;" but the writer is of the opinion that, if he will make careful experiments, instead of deductions from false premises, he will find out. Assuming that his statement is made in good faith, it would be perpetual motion of an aggravated type, and it is as reasonable to suppose that a man can lift himself by his bootstraps as that nature will fail to establish an equilibrium of temperatures.

Pressure and heat are as tangible elements in a problem of this kind as weights and volumes are in problems dealing with the movement of water, and, as water seeks its own level, so do the temperatures of two bodies placed near each other tend to an equilibrium if they differ at first. The problem of liquefaction of air deals with the dissipation of energy, but the dissipation of a certain amount of energy below the plane of equilibrium is equal to the accumulation of the same amount above this plane, which is represented in this case by atmospheric pressure and ordinary temperatures.

Turning from the theoretical considerations of the question to the probability of practical utility, the outlook is rather encouraging. In the first place, it has been demonstrated that the liquid may be transported with comparatively small loss, and if proper means were taken to prevent radiation and the liquid stored in spherical reservoirs, it is reasonable to conclude that the loss from radiation would be slight. It will remain liquid at atmospheric pressure, if the temperature is kept at a proper point, and there would be an excellent economy in the operation of an engine using it if the cylinders were heated and a high ratio of expansion employed. There could be no trouble from freezing, as liquid air is as dry as a bone, and the small amount of heat necessary to keep the cylinders warm would be directly converted into work with very small waste indeed, and if multiple cylinder engines were used and the air thoroughly heated in the jackets and receivers, as well as in a pre-heater, there might be a high degree of economy shown in the utilization of liquid air as an absorbent and vehicle for the transformation of the heat of the atmosphere into useful work. This is its only function as a "source of power."

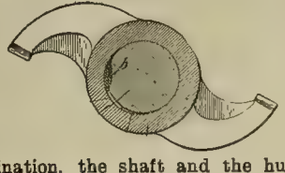
Owing to the fact that the evaporation of liquid air and the attainment of high pressure does not involve the application of higher temperatures than commonly exist in the atmosphere, higher ratios of expansion may be used in an engine using it than in the steam engine, and the absence of heavy boilers and fuel supply would seem to make this method of indirect power transference of value in street car propulsion and possibly for automobiles and in aerial navigation. Not enough has as yet been done in the production of liquid air to be able to say what its relative economy will be as a system; but it may easily be that, with improved methods of production and earnest study of the subject, good results will be shown. In its sphere, there is reason to think that liquid air may be of great advantage in many ways; but its sphere is limited at the best, and further developments may tend to draw the limits closer than seems probable at this time. There is small reason for the enthusiasts to blind themselves to the facts, for there is nothing mysterious about the liquefaction of air, and there has been no development so far to shake one's faith in the results of years of patient experiment and investigation by the world's most famous scientists and engineers.

Latest Mining and Metallurgical Patents.

Patents Issued Oct. 10, 1899.

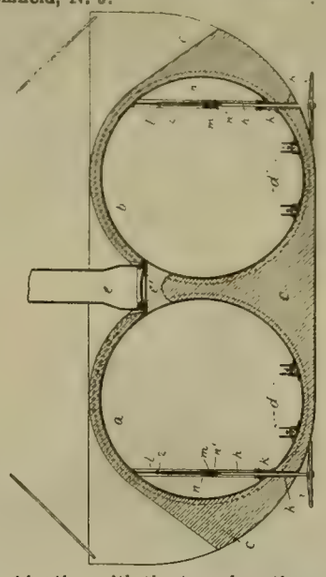
Specially Reported for the MINING AND SCIENTIFIC PRESS.

CAM OR PULLEY FASTENING.—No. 634,660; W. C. Davis, Denver, Colo.



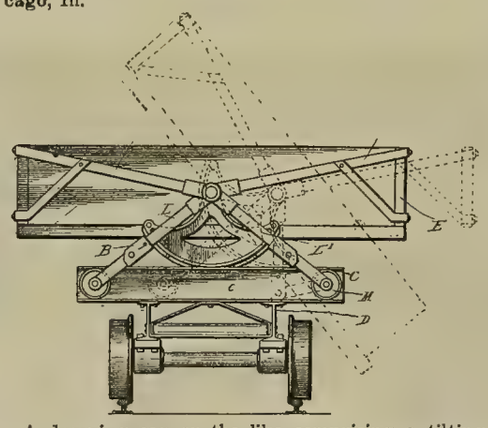
In combination, the shaft and the hub mounted thereon, one of parts having a curved key seat or recess, and a wedge block or key seated in key seat and having a curved outer face, the other part having an eccentric surface corresponding to the curve of the outer face of the key. The shaft having a curved recess therein, the hub having an eccentric groove or channel, and the wedge block having one face curved to correspond to the recess and the other face curved to correspond to the curve of the eccentric groove or channel formed on a curve corresponding to the curve of the key seat, and the wedge block or key having curved faces corresponding to the curves of the key seat and groove, and the wedge block loosely seated in recess, hub having a cut-away portion to permit the entrance of the key.

SUBMARINE TUNNEL.—No. 634,322; C. H. Buckelew, Plainfield, N. J.



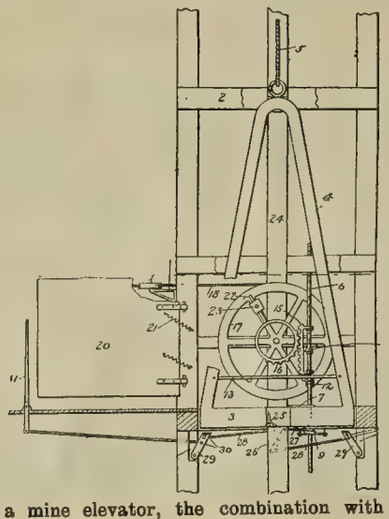
The combination with the tunnel sections of a submarine tunnel, of a bearing plate *i* outside the tunnel section, the shaft *h* connected thereto at the lower end and screw-threaded at the upper end, the sleeve *k* and stuffing box *k'* through which the shaft passes, a frame connected to the shell of the tunnel section and composed of vertical plates *l l'* and a cross-head *m*, nuts *n n'* upon the screw-threaded end of the shaft and at opposite sides of the cross-head *m*, an eye-frame *o* connected to the upper end of the plates *l l'*, an eye 2 at the end of the shaft *h* for a rope to connect and to suspend the shaft and its bearing plate from and by the eye-frame 2.

DUMPING CAR.—No. 634,683; M. G. Bunnell, Chicago, Ill.



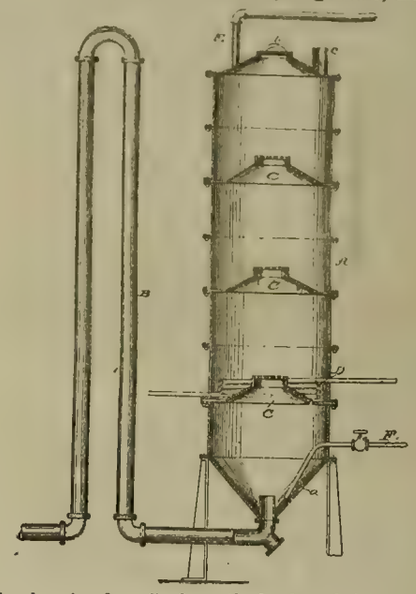
A dumping car or the like comprising a tilting body having a rocker base; and a gate for such body provided with break-joint arms which are pivoted to the tilting body and provided with rollers arranged to traverse the guideways, arms being each adapted to break joint one way at a point between its pivotal support and its roller.

DEVICE FOR OPERATING MINE SHAFT DOORS.—No. 634,802; C. Caldwell, Anaconda, Colo.



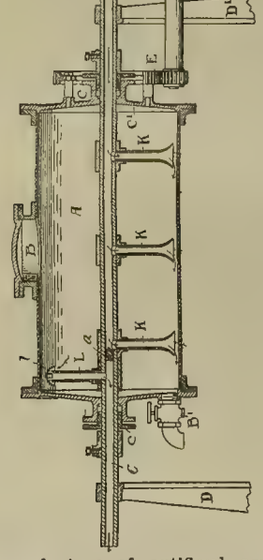
In a mine elevator, the combination with the hinged spring-actuated door, the oscillating rope wheel, the rope connected therewith and with door, and the cogwheel carried by rope wheel, of the rack bar meshing therewith, the vertical bar carrying rack bar and formed with a vertical groove, the shoe fixed to rod, the plate through which rod passes formed with a key engaging with groove, the bar pivoted to plate, the lever with which it is connected, the rods connected with lever, the pivoted chairs with which last mentioned rods are connected, the hand lever and connecting rod.

METHOD OF REFINING CUPRIC SULPHATE SOLUTIONS.—No. 634,751; O. Hofmann, Argentine, Kans.



The herein-described method of refining crude cupric sulphate solutions, consisting in first neutralizing the solution, then heating it, adding cupric oxide, and finally injecting air into the solution, to precipitate the impurities in the solution. A method of eliminating from a solution of cupric sulphate the salts of iron and other metals like arsenic, antimony, nickel and cobalt contained therein as impurities, by neutralizing and heating the solution, then adding cupric oxide, and injecting air in cupric sulphate solution in which the cupric oxide or oxidized matte is suspended until the iron and other impurities are precipitated.

ART OF MANUFACTURING ASPHALT FROM PETROLEUM RESIDUE.—No. 634,818; J. W. Hayward, Cleveland, Ohio.



In the manufacture of artificial asphalt from petroleum residue, the method of manufacture consisting in mixing pulverized limestone with the petroleum residue while it is in a heated state, and in this state oxidizing the mixture by subjecting it to the diffusion of air.

ART OF SMELTING ORES.—No. 634,566; F. Ballou, Leadville, Colo.

The improvement in the art of smelting metallic ores in stack furnaces herein described, which consists in first saturating coke with water, then charging the furnace with the ore to be smelted and with the saturated coke as fuel, forcing air through the lower part of the charge, and gradually feeding the charge downward to the point where reduction occurs.

Cripple Creek Tunnel Enterprises.

TO THE EDITOR:—In 1896 a decision by the United States Court of Appeals defined the rights under tunnel locations, giving them much wider scope than had been accorded by any prior rulings. The decision was followed by a great number of tunnel locations in Cripple Creek district, many of the locators apparently being prompted by the temptation to take undue advantage of surface claim locators, which the new interpretation of the law was supposed to make possible; as well as by the chance of striking rich ore in the blind leads. A few were located with drainage and ore haulage as the primary purpose, the projectors seeking and receiving the co-operation of surface claimants and avoiding litigation. At any rate, the district was full of tunnels (on paper) and the tunnel promoter, in selling stock, disseminated his inflated idea of the cinch his tunnel would have on the district. At that time, the writer, in an article in the MINING AND SCIENTIFIC PRESS, took occasion to indicate that the tunnel scheme, as it was then being conjured with, would fall far short of expectations as a real mining factor in the district.

Subsequent events have shown that mining sentiment has not sustained the doctrine that then prevailed. Tunnels have been driven to open veins located on the surface and to facilitate operations of well known mines; but the general tunnel proposition, as purely a means of adversing surface locations, has to a large degree lost its popularity in Cripple Creek district. The distinction between this and the enterprises that seek the co-operation of surface holders seems quite clear.

In view of the large number of locations made three years ago as tunnel enterprises, it may be interesting to make a brief summary of some of the tunnel work of the district as it stands to-day.

The Cripple Creek and Gold Hill tunnel enters Gold hill within the limits of the town of Cripple Creek, cutting easterly through the grounds of the Midget, Moon-Anchor and Anchoria-Leland, connecting with the last named workings at 685 feet depth. It is 3035 feet long and is of use in draining those properties.

The Goodwill tunnel, 100 feet lower in elevation than the one described, was driven 3000 feet in a southwesterly course through Gold hill, cutting under the E. Porter Gold King. It has been closed down for many months.

The Ophelia, better known as the Bush-Moffatt tunnel, enters Gold hill at the junction of Cottontail and Cripple Creek gulches, taking a southeasterly course. It was started in 1895, was driven 2600 feet when a strong vein of water was encountered that drained various mines on Gold hill. The water continued to flow till apparently the same channel was struck by the Standard tunnel, in Beacon hill, which diverted the water from the Ophelia, leaving the latter dry. About a year ago work was resumed on the Ophelia tunnel and it is now in about 4000 feet. Its course takes it through the southern portion of Gold hill, under the town of Anaconda, through Raven hill and Bull hill, terminating at the Victor mine, in Bull cliff. The projectors of this tunnel have secured leases from surface claimants along a portion of its course and the object is solely one of drainage and transportation.

The Uinta tunnel pierces Battle mountain from Eclipse gulch a distance of 2300 feet, and was originally designed as a prospecting tunnel, but later became the property of the Woods Investment Co. and for the past year has been inactive.

The Columbine-Victor tunnel, 3600 feet long, cuts through Squaw mountain, intersecting the Gold Coin shaft at the first level on the Victor side and terminating near the site of the Economic Extraction Co's. mill on the opposite side, and will soon be utilized as an electric haulage route for ore between the mine and mill referred to.

The Squaw mountain tunnel was driven 1680 feet, and subsequently sold to the Gold Coin people and has been idle for three years.

The Standard, owned by some of the officers of the Standard Oil Co., was driven from the west side of Beacon hill a distance of 4000 feet toward Raven hill when a tremendous flow of water was encountered, which made an abandonment of the work necessary.

The American tunnel enters Beacon and Guyot below the Brodie mill and starts, it is asserted, at a lower point than any other tunnel in the district. Its course is toward the Elkton and Last Dollar and is to pass into the hands of O'Connor Bros., who own the Hibernia and Deadshot.

The Raven tunnel was driven solely for the purpose of enlarging operations of the Raven mine and as such served its purpose. It is about 3000 feet in length.

There are others on which more or less work has been done, but in none of which is there much activity to day. WASCOTT.

Cripple Creek, Colo., Oct. 10th, '99.

The Automobile.

Frequent illustrated references have been made to the freight and passenger carriages built in California and elsewhere, which, under the general name of "automobiles," are attracting considerable deserved attention. Some of the best mechanical intelligence is now being directed to the improvement and evolution of those "horseless carriages." In the East their manufacture is an increasing industry, and they are coming into common use. The motive powers are steam, gasoline, compressed air and electricity, the second named being of most general appliance. In its September issue, "The Automobile," a New York publication, devoted to the advancement of this particular industry, illustrates the present state of the art. The passenger vehicle here reproduced therefrom is a steam stanhope vehicle of neat and light appearance. The weight of this carriage



FIG. 1.—STEAM STANHOPE.

is about 400 pounds. The speed can be regulated by driver from one to thirty miles an hour. The mechanical equipment is very simple, and it is claimed that any one can operate it. Water and fuel can be carried for a long run, or obtained in any town or village. The vehicle can be run forward or backward at the will of the driver. The carriage is guided by a lever, which turns the forward wheels. It is fitted with pneumatic tires, ball-bearing axles, springs, etc.

Steam and electricity are largely used in passenger automobiles. For freight service gasoline is in more general requisition. The latest and best application of a gasoline motor on the Pacific coast was noted and illustrated in the issue of Feb. 18th, '99. In the issue of March 4th, '99, appeared an illustrated technical account of an auto-truck, an experimental device, the motive power of which was compressed air.

Experiment still goes on, for, costly though such experiment be, it is manifest that with good roads will come great demand for machines that will carry freight and passengers over moderate grades regularly at less average cost than horse power.

Herewith is presented what is believed to be the latest development in this matter of experimenting. Instead of confining the propulsion to one form of energy, the design of the power equipment of the Fisher automobile truck involves a three-motor idea, a gasoline engine with a connected dynamo for generating an electric current, a storage battery and an electric motor for driving the truck. This amount of machinery results in great weight to the truck, which in this case amounts to more than four tons, of which amount the storage battery weighs about 1000 pounds. Certain advantages in this combination are claimed by those who have studied the problem.

It is independent of a power station. The storage battery provides energy for driving the truck four or five miles, the truck having a reserve force, should the generating part become deranged. The gasoline engine, with its dynamo, is supposed to keep the batteries charged, thus having on hand their full reserve strength. The dynamo, acting as a motor, can also be used to give the engine an initial start, and, when running, it can maintain a uniform speed irrespective of the motion of the truck.

Among the manifest objections are large first cost, heavy weight and complexity of machinery, though the advantages of a variable speed, a backward as well as a forward motion and the certain control of the truck are considered as offsets to such objections.

The engravings only partially show the mechanism of the truck. The cooling pipes are noticeable under the footboard and at the sides. A large surface is thus provided in order that the water for cooling the cylinder may not reach the temperature of the boiling point. The designers have noted the liability of these tubes becoming damaged in this exposed position and will provide for a more protected place.

This truck has a wheelbase of 10 feet, and wheelgage of 66 inches. The front wheel diameter is 34 inches and rear wheel diameter 46 inches. The tires are 4x$\frac{5}{8}$-inch. The dynamo weighs about 600 pounds, the battery 1000 pounds, and other parts in proportion, giving a total weight of about 8500 pounds. It is purely an experimental truck, and it is expected that much may have to be changed. It is here cited and illustrated as showing what is being done experimentally to evolve a really economical autotruck.

In the arrangement of the apparatus, the engine shaft lies lengthwise of the wagon, with the engine cylinders vertical. The dynamo is placed at the front end, and is shown in Fig. 3. The truck is said to handle well, being run through narrow alleys and turned on sharp turns and backed with equal facility. The steering arrangement is considered satisfactory and will be retained.

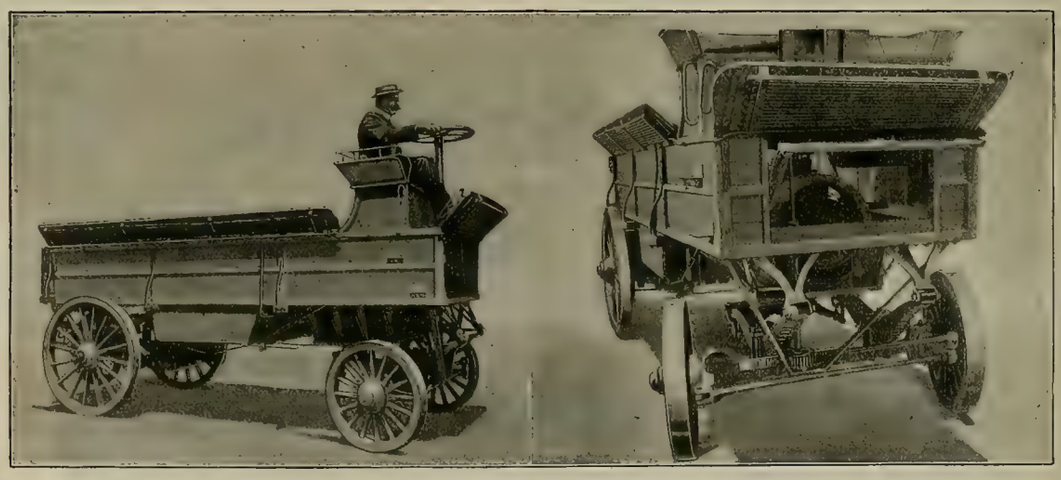


FIG. 2.—FISHER AUTOMOBILE TRUCK.

FIG. 3.—FISHER AUTOMOBILE TRUCK.

The makers say that the next truck built by them will be after a modified design of this truck. The engine is to be of a four-vertical-cylinder type, and about 12 H. P. It is to be located under the driver's seat, with the shaft placed across the body of truck. The wheels are to be made heavier, with heavier and broader tires. The speed will also be lowered, and will range from three to six miles per hour. It is hoped to reduce the total weight of truck relative to its carrying load. The weight of driving machinery requires greater strength in the truck itself, and, consequently, greater weight. It would seem that the whole problem lies in the driving equipment.

The truck in its present form is capable of carrying a load of 10,000 pounds over a good road at a speed of from four to eight miles per hour.

AT Butte City, Montana, the movement of a granitic mass along the line of what appears to be a fault plane has occasioned damage to numerous buildings along the fracture. Thus far the movement, though slight, has been sufficient to seriously crack the walls of these structures. That the movement is due to natural causes, and not to weakening by mine excavations, is determined by the fact that there are no extensive mines in the vicinity.

Mining Summary.

ALASKA.

(Special Correspondence). — This section, north end of Prince of Wales island, is beginning to attract attention. The Alaska Pacific M. Co. have erected and are now operating a 2-stamp (900-lb. stamps) mill and concentrator on the Bluebird group, and apparently have a large body of ore. The vein or veins exist along a faulted plane in granite, the axis of fracture being filled with quartz carrying auriferous sulphides, the granite itself having been to a great extent replaced by gold-bearing sulphides and vein matter. Apparently, a section of 50 or 60 feet in width is of sufficient value to pay. Negotiations are pending for the sale of the Wano group, on which a large surface showing has been fairly well developed to a depth of 150 feet.

Shakan, Alaska, Oct. 3rd, '99.

Seattle *Times*: Capt. Carroll, master of the steamer Queen, has made a trip to Nome, and says it is his impression that the wide expanse of tundra, or marshy moss-covered plain, extending from the beach back to the mines on Anvil, Snow Gulch and other creeks, are rich in gold-bearing gravel. Out of this flat a claim had been located and two men paid $6000 for it. They put up a rocker at a pool, stripped the moss and began making a cut, carrying the sandy material in wheelbarrows to the rocker. They had not gone 20 feet into the bank when they struck a bed of the ruby sand 18 inches in thickness, and it was as rich as the beach sands. Captain Carrol examined this mine and measured the stratum of sand. He says the cut or trench was 4 feet deep. The plain, which is a level stretch, extends back from the beach five to seven miles and runs along the coast. It begins 30 to 100 feet back from the present line of high tide and rises 12 to 15 feet above the beach. On account of its depth the beach miners did not take time to prospect it this summer, being too busy washing gold from the narrow strip of beach. Captain Carroll was at Nome several days and counted 1520 tents on the beach within a short distance of the town.

ARIZONA.

GILA COUNTY.

Globe *Times*: At the United Globe mines and smelter the company has put in a new 75 H. P. boiler at the Hoosier mine. A large pump will be put in the mine and as soon as the water is out sinking will commence. At the smelter a new furnace will be put in, the largest ever brought to Globe.

MOJAVE COUNTY.

The Oro Plata and the Mariposa mines have been transferred to Rocheford & Smith for $100,000.

Kingman *Mineral Wealth*: It is reported that the Kinsman M. Co. has struck an 8-inch streak of 500-ounce silver ore in the Echo mine in Cedar district. The Echo mine in early days produced ore that paid to be hauled to the river, sixty miles, thence to Yuma by boat, and from there to San Francisco by rail. The mine has been idle for years owing to the water in the workings. Of late years, however, the water has diminished until there is not enough to run the mill the company has erected.

YAVAPAI COUNTY.

The Morning Glory mill on Turkey creek was burned recently. The property is in litigation and the mill has been idle for some time.

Prescott *Courier*: New machinery for the Silver King mine on Groom creek has arrived. It consists of a large hoist and pumping plant. The Silver King is under control of Mr. Mackin and others. It figured several years ago in litigation and since has been idle, the shafts and workings filling with water. When the new machinery is erected Mr. Mackin will place men at work and handle the output at the Silver Flake mill, two miles from the mine.

Prescott *Courier*: The Tip Top mine, owned by E. and F. Wager, is being worked by the owners, who have taken out ore which carries 2000 ounces of silver per ton. R. Friedall is overhauling the Silver Museum mine, which is near the Tip Top, and is working on the top of a rich shoot of ore which carries 800 ounces of silver to the ton.

YUMA COUNTY.

It is reported that since Hubbard Bowers bought the Harqua Hala mines, his superintendent, C. Pickenbach, has opened new ore bodies and has enough in sight to run the mill two years.

Yuma *Sun*: C. Rader and V. Westfall will begin developement on a group of gold and copper claims twelve miles south of Tacna in the Copper Mountain district. They have ledges that assay well on the surface.——The coming winter will be a busy season along the Colorado river in northern Yuma county. R. J. Dyas, who recently acquired a group of fifty-six copper claims near Bill Williams' Fork, is working thirty men developing his property. The result so far has been satisfactory and he is considering the erection of a reduction plant. E. S. Blaisdel, in Empire Flat, also has a large force of men at work.

CALIFORNIA.

Amador.

Jackson *Ledger*: S. K. Thornton of the Shenandoah G. M. & M. Co. has a force at work developing the property of the company near Plymouth. The shaft is down 250 feet and the ore body fills the shaft at the bottom. Sinking continues and drifting in the ore body is being pushed at the 200-foot level.——Men at the Gover mine are pulling down the old buildings and getting ready to reopen the shaft as soon as the management of the Consolidated Gover, North Gover, Fremont and Loyal Lead mines is ready to enter upon that work. Arrangements have been made to commence the sinking of the three-compartment shaft on the Fremont, and the sinking of a shaft on the Loyal Lead and North Gover will be inaugurated. C. E. Purington has charge of the work.

Jackson *Republican*: Grading for the new 60 stamp mill at the Oneida mine is about finished.——It is reported the Butte Basin M. Co. will resume work with W. E. Stewart as Supt.——The Central Eureka mine will haul ore to the Zeila mill at Jackson for treatment. ——The shaft at the Bellwether mine at Jackson has been unwatered and preparations for sinking made. It is reported the owners intend to sink until a depth of 1000 feet has been reached.——The machinery of the Anita mine, near Jackson, has been sold to a company operating near Plymouth.

Sutter Creek *Record*: At the Mutual mine, on the Fernando ranch, the shaft is down 110 feet, and carpenters are erecting the framework around the shaft. A donkey engine for temporary use is being put in. The hoisting and pumping machinery will be completed in a few weeks.

Calaveras.

A. Lee has commenced the construction of the 120-stamp mill at the Melones Con. mines near Robinson's Ferry.

Two miners at Lancha Plana, while working placer ground on the site of the old schoolhouse, recently found an old can containing $985 in gold coin.

The copper mines at Copperopolis are being pumped out preparatory to starting up.

The work of unwatering the Sheep Ranch mine is progressing, and by the first of the year the mill now in course of construction will be in operation.

Recently a dam of the Ross Reservoir Co. broke and the Utica M. Co. was thereby deprived of one of its principal storage reservoirs. Half of that large body of water escaped down the San Antonio creek before the flow was checked. The Lightner mine was compelled to shut down. The mine was run by electric power. After the break in the Utica dam, water could not be spared for the batteries. Five years ago the same dam broke.

The What Cheer mine in Chili gulch, near Mokelumne Hill, is being reopened under the management of G. W. Enright, who has the mine under bond representing Denver, Colo., capitalists. The shaft is 200 feet in depth, at the bottom of which a level has been run 30 feet in the gravel and the pay streak is found to be 6 feet in width. There is a 5-stamp mill on the property and steam power is used for operating the hoist and other machinery.

The Commodore G. M. Co., of Stockton, has been incorporated: W. H. Clary, E. W. S. Woods, S. N. Cross, J. M. Abell, W. H. Clary, Jr., Stockton. Capital, $100,000. This company will operate the Commodore mine, a mile northwest of San Andreas. W. H. Clary, Jr., is Supt.

Angels *Record*: At the Melones mine, at Robinson's Ferry, workmen made a find and took $2700 from one place. They were working in the tunnel being driven at that place and cut a stringer, in which they found the gold.——The Santa Ana mine, in Albany Flat, four miles south of Angels, started up recently and will employ thirty-five men.——The Ford M. Co., at San Andreas, has levied a 4-cent assessment to meet the expenses of development.——J. N. Lively is making arrangements to resume work on the Veritas mine.

San Andreas *Citizen*: In the recent forest fires L. L. Emery of the Rose Hill mines lost 1400 feet of flumes, which will be replaced. Mr. Emery is enlarging the Jesus Maria ditch to carry 2000 inches of water and building a dam at Jesus Maria creek, to divert the water from it and the Little Mokelumne and carry it to the reservoir. The ditch from the reservoir to the hydraulic claim will carry 4000 inches of water.——Redmond, Casey & Haven are reopening the Mahala mine, near Rich gulch.

Del Norte.

Crescent City *Record*: The copper mine known as the Avoca, on the southerly slope of Myrtle Creek hill, was prospected thirty-five years ago and was abandoned at the time of the general decline of copper. A defined lead crops out 1500 feet, which is prospected by a shaft to a depth of 40 feet, showing a vein of ore 5 feet thick. At the base of the hill, 700 feet distant, is an old tunnel run toward the lead. The tunnel is closed by a cave 150 feet from its mouth, but it was originally in 600 feet. It is stated that good ore was taken out of the tunnel, some of it native copper. The Avoca is owned by E. C. Catching and is nine miles from Crescent City. On the hill a few hundred yards above the Avoca and parallel with it is a lead recently located by Mr. Catching and L. W. Musick. The surface ore assayed 22% copper and $5.50 gold per ton. No development has yet been made.

El Dorado.

The Little Gem is half a mile south of Volcanoville on the ridge between the branches of Grizzley canyon. This quartz discovery was made a year ago by Root & Schultz. It afterwards passed into the hands of San Francisco parties, with Judge Bahrs as Supt. Men are grading for the mill, which will have four stamps of 850 pounds each. The mill and hoist will be run by water power, the pipe for which is laid. There will be 200 feet pressure. The shaft is down 60 feet. The ledge is perpendicular and is 20 inches wide.

Georgetown *Gazette*: The 2-stamp mill recently erected at the Demetre mine, three miles east of Georgetown, is in operation. It is run by steam power.

Mountain Democrat: Supt. Bind of the Blue Gouge mine has contracted for a new 10-stamp mill with four Huntingtons. The capacity of the plant will be equal to forty stamps. It is calculated to have the mill running by December 1st.

Fresno.

The Ohio State M. Co. has sold its mining machinery to a Fresno foundry. The company put nearly $25,000 in the bed of the San Joaquin river at the mouth of Fine Gold creek in an unsuccessful attempt to dam the flow and recover the gold in the pool.

Kern.

C. R. Merriam has in San Emedio canyon two veins of iron ore, one 55 feet, the other 75 feet, wide, separated by a 30-foot vein of marble.

Mariposa.

A. H. Ward and Captain Todd are arranging to reopen the old Hite mine, at Hite's Cove on the south fork of the Merced river. A diamond drill will be employed in this work. The mine was successfully worked for twenty years by the discoverer, John R. Hite, and subsequently by three other parties who have left noting in sight. The hanging wall of the vein is black slate (Calaveras formation) and in it occurs several large veins and a gray felsitic dyke. No crosscutting has been done in the hanging wall and it is thought that a new shoot will be discovered there.

Mono.

Bridgeport *Chronicle-Union*: At the Castle Peak (old Dunderberg) mine, it is reported that the ledge in the new tunnel has been struck, opening up 9 feet of good ore. A sawmill is to be put up, and men are logging. Next spring and summer will find it one of the liveliest mines in the county.——The Arnot-Par Value mine has been turning out good ore and the mill has been running day and night preparatory to closing down for the winter. A number of extensions have been taken up by Supt. Gilnes, J. Hays and F. Page, the entire ledge being seemingly as good as the original locations—the Arnot and Par Value.——The Cameron mine is also coming to the front, a 5-stamp mill having been bought. These mines are in the Green Creek district, within a short distance of Bridgeport. The Castle Peak is owned by A. D. Cullum of London.

Nevada.

The Coe mine, half a mile from the Idaho, near Grass Valley, has been sold to Denver, Colo., capitalists. For a number of years in the early days this mine gave employment to many men. Ten stamps were run for ten years. Litigation between the original owners caused the mine to shut down, and subsequently the machinery was removed. At times the mine has been worked by tributors, the ore paying from $25 to $50 per ton. It has a three-compartment shaft 550 feet in depth. The product of the Coe mine has been $500,000.

Grass Valley *Union*: A discovery has been made in the North Star mine of a new shoot of ore in the 500 drift. The ledge is 3 feet in thickness, in virgin ground; the company has a large scope of country to work, owning all the ground between the North Star proper and Central North Star and Wolf creek. A test of the ore is now being made in the North Star mill, and, if it comes up to expectations, a larger plant will be put in.——The Board of Supervisors of Nevada county have appropriated $500 to the county association to be used in furthering the interests of the mining industry.

Orange.

It is reported that placer gold has been found in the Santa Ana mountains about twelve miles from Capistrano, and numerous prospectors are in that section locating and developing prospects. J. Yaeger, who for years has been prospecting in these mountains, has numerous claims. There are large masses of intrusive rocks among the metamorphic formations and prospecting heretofore in this region has discovered ores of silver and gold with the sulphides of iron, zinc, copper and galena. As far as developed zinc predominates, it is a good field for the prospector however, though the ores are base and will require concentration.

Plumas.

Quincy *Bulletin*: H. C. Dickinson of Reno, Nev., and J. H. Lesher, H. Gobert and C. Seward of Genesee have bought the Crown Point mine, east of Quincy, from G. Brandt. Part of the purchase price has been paid. They will erect a quartz mill.

Oroville *Mercury*: W. E. Duncan Sr. has his hydraulic elevator ready for working. Its duty is to handle the big boulders which are in placer mining the principal source of expense. By means of this elevator huge rocks and stumps are removed and the use of derricks dispensed with. The elevator consists of an inclined plane or grizzly 40 feet long and 10 feet wide. A 6-inch stream of water under a 325-foot head forces the material up the incline, the finer material falling through and the coarser being driven over the dump. The fine material runs back down a solid plane under the grizzly and is washed in sluice boxes, set at an angle from the bottom of the elevator. A monitor is used to wash the material into the sump. Mr. Duncan uses another elevator at the point where the material leaves the sluice, thus dumping the debris far from his seat of operations.

San Bernardino.

The hills comprising the Calico range consist of rhyolite, breccia and tufa, intersected by large dykes of hornblende, andesite and liporite. In the breccias chiefly the silver-bearing veins and great silver ore deposits of the district occur. These rocks lie upon an upturned older crystalline formation, gneissoid in character, with small granite veins traversing it. In this older formation are veins of quartz, rich in gold but as yet undeveloped. Gold prospects also are found near Paradise Springs, fifteen miles north of Calico, and northeast of the old silver camp fifteen miles is a group of claims on which a large amount of work has been done. They are known as the Alvord mines. An interesting feature is that the gold occurs in crystallized lime rock and in limonite ore. The wall rocks of the gold-bearing zone are much altered, but presumed to be a type of diorite.

San Diego.

Los Angeles *Times*: The treatment of tailings from the Cedros Island ore at National City by the Stephens process is by means of a solution which consists of chloride of lime, nitric and muriatic acid, bromide of potash, salt and water. From tailings containing $8.23 per ton it is claimed 97½% is recovered at a cost of 24 cents per ton, and out of 7000 tons of tailings on the dump 2000 tons will go $10. The Cedros Island ores are unlike most California ores and contain, besides silica, pyrite, chalcopyrite, malachite, iron oxides, arsenic, free sulphur, gold, silver, lead and other minerals. The ores are base and complex.

Shasta.

(Special Correspondence). — Near Delta H. C. Woodrow & Co. of St. Louis, Mo., are developing a property on which they have a shaft 110 feet deep and a 375-foot tunnel on a 9-foot ore body. They employ three shifts.

In the Advance mine, near Delta, a San Francisco company have cut an ore body of high grade. They have introduced cyaniding and get 94% of the values.

M. Vreem has been shipping ore all summer to the Keswick smelter. This property was worked by lessees and abandoned; the owner and present operator resumed work, and in 20 feet struck a rich ore body, from which the present shipments are made.

At the Black Diamond copper property, near Stillwater, owned by the North California Investment Co., of which C. Dobbelstein is Supt., sixty men are at work.

At the DeLamar copper property, at Ydalpom, about twenty-five men are employed. As the buildings advance to completion to house the employes, the force will be increased.

In the Bowery Belle mine, near Shasta, ore is being shipped from an 8-foot ledge. The product is white quartz, in which gold is visible frequently. The property belongs to Kahny & Burgbacher of Redding.

Redding, Oct. 17th, '99.

R. B. Johnson of Seattle has transferred to A. P. Wass of Butte, Montana, and T. Donnelly of Shasta county, the Sulphur Creek placer claim, the Thompson placer mine, fourteen and one-half acres of mining land and a water ditch, all in Quartz Hill mining district.

The Coronado Copper M. Co., which owns the Coronado mine in Sunny Hill district, has let a contract to Swanson, Strandin & Sjulauder for 350 feet of tunnel, at $5 per foot. J. A. Kahny is Supt. of the mine.

Redding *Free Press*: T. Maupin of Gas Point reports that two prospectors have uncovered two veins of gold quartz on Bee Gum, the North Fork of Cottonwood creek, said to be the richest in that part of the county. Several minor strikes have recently been made on Bee Gum.——J. A. Wilson of the Alta gold mine, near Furnaceville, says the ledge crops for 1000 feet along the claim, and averages 3 feet in width. At the point of discovery Mr. Wilson has gone down 8 feet and from his statement the gold runs $40 to $60 per pan. He is opening the ledge in the ravine 200 feet from the original workings, where the ledge is equally rich.

Redding *Searchlight*: The Bullychoop mine, also known as the Frick & Davis property, near Ono, has fifty men at work. It is owned by a German company. The mine is north of the Cleveland Consolidated. The latter has been bonded to a Scotch syndicate, and fifteen men are at work cleaning and putting the same in repair. A mill will be be built. ——At the Sunny Hill mine, ten miles east of Bullychoop and the same distance from Ono, the owners have twenty men at work, a chute 450 feet long having been put in below the mine.

Siskiyou.

The quartz ledge has been found again in the Golden Star or old Spencer mine at Humbug, beyond the break of a couple of weeks ago. The vein is 32 inches in width. When first opened it paid $120 to the ton.

Tyer & Co., of Colorado, have bonded the mine and mill of the California & Oregon quartz mine on Corson creek, Klamath river, above the Anderson ferry, and are now developing the mine. A shaft has been sunk 100 feet, and a tunnel run 200 feet from the shaft. The 5-stamp mill on the claim will be utilized.

In the Salmon river section, at present water is very scarce, and several quartz as well as placer claims have been shut down.

The Commodore quartz mine at Barkhouse creek, Klammath river, has paid the past month between $8000 and $10,000.

Collins & Co. are building a wingdam in the Klamath river, near Oak Bar, and reported to be taking out good pay.

Two Oakland doctors are working a quartz ledge on Patterson creek in Scott valley, near the Sheba mine. They have ordered 60,000 feet of lumber.

Yreka *Journal*: The Siskiyou M. Co., working the Mabel mine in the ridge between Barkhouse on Klamath and Scott rivers, J. W. Martin Supt., has bought the Chamberlin & Timmons' quartz mill. The mill will be utilized in development work and prospecting, with a view of putting up a larger mill later, as the company has several quartz locations in the same vicinity on McKinney creek.——The shaft at the Nurse ranch, near Greenhorn, is down 85 feet. Supt. Page expects to reach bedrock soon, if water does not prevent. The water is increasing as the shaft is deepened, and may necessitate a steam pump.——Several new locations of quartz and copper ore have lately been made in the Preston Peak section, near the Oregon boundary, in Happy Camp district.——The King Solomon quartz ledge, at Salmon river, is reported as showing up paying ore. Heretofore it was considered low grade.

Tuolumne.

Supt. G. F. Dyer of the Draper gold mine, near Soulsbyville, reports a rich strike in the

bottom of the shaft at the depth of 350 feet. The compressor and drills recently bought are on the ground.

At Big Oak Flat new strikes are reported in the Mack and Longfellow mines. Some of the ore is very rich. The veins of this section commonly carry tellurium and gold, also pyrite, galena and blende, and rarely copper sulphide. There are numerous pocket claims about Big Oak Flat, and in some of them the slates in which the pockets have been found are also known to be gold-bearing. Nearly all of the dumps prospect well in free gold. This is the material which has been rejected as waste by the pocket miners. The only tools used in working these pocket mines are the usual mining tools and a hand mortar, pestle and pan. The slate zones containing gold will require milling machinery for their reduction. Thus far there is a scarcity of water in the district, but the ditch of the Merced Co., which passes along the hills above the flat, will remedy the difficulty. Big Oak Flat in the early days produced a large amount of placer gold and every bit of the original soil has been washed away, exposing a granite bedrock. This granite mass has an oblong form and is inclosed on all sides by slates and mica schists, excepting at the southeastern end, where a granitic dyke extends from the main mass in the direction of Groveland. The granite is fissured in a northerly and southerly direction by quartz veins, with many smaller veins running in various directions, often connecting with the larger veins. The rich mines now being developed on the northern side of the basin are in the granite at the surface, but pass into the slates in depth.

Sonora *Union-Democrat*: The Sunnyside mine is on the river hill of the Tuolumne, one mile south of the Marlow Diggings, a section in which but little development has been done. The claim is owned by Baker Bros. of Summersville and L. R. Ellis of Sonora. The croppings are 2 feet wide. At a depth of 40 feet the vein has widened to 4 feet of ribbon quartz. Assays average $14 per ton. The mine is to be developed by a crosscut tunnel, which will tap the vein in 125 feet and give 150 feet backs. The tunnel has been driven 30 feet.

Sonora *Independent*: The Greenhorn Gulch quartz mine, near the Tarantula, and one mile north from the Rawhide, has been bonded to Dr. G. F. Hunter and M. Page. The property has a shaft on the vein.——The Mt. Jefferson Co. at Groveland is making preparations for the 10-stamp mill.——The Mt. Zion, near Groveland, after a long idleness has resumed work.——The Green Spring mine, near O'Byrnes' ferry, is yielding rich rock. The property was relocated by the present owners last November and the rich ore struck in extending the tunnel in the old workings. The ledge is wide.——A 5-stamp mill is being built at the Free Lance mine, southeast of Sonora, near the Burger ranch. C. A. Meyer of San Francisco is the principal owner and P. R. Gardner superintendent.

COLORADO.

CLEAR CREEK COUNTY.

Maxwell & Hood, operating the west extension of the Griffith mine at Georgetown, have opened a solid body of high-grade ore. It is telluride and runs on picked assays over 200 ounces gold to the ton, carrying one-third of the value in silver. The streak is 8 inches wide. Other parts of the vein have been worked for the past two years by different parties, and regular shipments of 200 tons per month of $50 ore have been made. This is the first high-grade find in the vein.

The Harrisburg mine at Freeland is being worked by a Boston company, with a fine showing of ore in the shaft and levels. They are sinking the shaft to greater depth to prove that the split vein now worked by the Freeland people is the Harrisburg. If this proves correct, it means considerable litigation.

The Everglade and White Talc claims at Yankee hill have been sold for $10,000 to New York parties.

P. Gilene & Co., leasers on the Independence mine, in the East Argentine mining district, have had a millrun made on their ore. The first car returned 473 ounces silver per ton, the second class 137 ounces per ton. The streak of pay ore is 3 feet in width.

GUNNISON COUNTY.

The Granite Mountain Co. is operating properties at Tomichi, in White Pine district. Dr. D. P. Campbell of Cleveland, Ohio, is Gen'l Mgr. The Granite Mountain, formerly the Magna Charta tunnel, has been driven nearly 4000 feet and has cut 27 veins varying in width from 18 inches to 12 feet. Drifting has been pushed on some of the veins to the extent of 590 feet and on others from 50 feet to 200 feet. The mine is equipped with a compressor and seven Ingersoll-Sargent drills, Pelton wheel of 100 H. P., an 80 H. P. boiler, 50 H. P. electric plant, two dynamos and a large amount of other machinery.

Gunnison *News*: The Taylor Park M. Co., working both lodes and placers in this county, is installing a $15,000 plant of machinery, consisting of three air drills and an 85 H. P. engine. An ore body 2½ feet wide, which averages $100 to the ton, has been encountered in a winze sunk from the upper tunnel level, 325 feet. There is a plan to drive another tunnel 500 feet down the hill from the second tunnel. H. A. Watson of Colorado Springs is Gen. Mgr.

Crested Butte *Pilot*: After fifteen years of inoperation, due to litigation, the Ruby Chief group of mines, near Irwin, has been bonded and leased to a company of Illinois and Iowa capitalists, the lease being dated June 1st, 1900, through the efforts of S. C. Robinson of Cripple Creek.

LAKE COUNTY.

(Special Correspondence).—The shipment, from the R. A. M. amount to 100 tons per day consisting of iron sulphides, whose values are chiefly silver.

The Ibex, the big group on Breese hill, is making extensive improvements of a mechanical nature, thereby increasing the compressor, pumping and engine power. At present about fifty-five air drills are operated. Mgr. S. W. Mudd states that the property is shipping about 200 tons of ore per day. The Ibex mines are about 1000 feet higher elevation than those on Carbonate hill, and the ores are generally silicious in character, whose values, in the order of their importance, are gold, silver and copper. The formation here is considerably faulted and disturbed, and the operations, which extend over a large area, encounter various conditions.

In Big Evans gulch, north of Breese hill, the ores from the Dolly B., Resurrection and others possess much the same silicious characteristics as those of the Ibex, though in addition there are low values in lead.

The mines, generally, of Carbonate and Iron hills are pushing their new work into the sulphide stratum, though the carbonate contact above it still produces considerable of the characteristic carbonate ores for which the district was originally noted.

The Sedalia, adjoining the Resurrection, belonging to O. C. Bartholomew of Leadville and W. H. Picking of Bucyrus, Ohio, recently resumed operations. The shaft is 710 feet deep and from a drift at that level a winze has just been sunk 15 to 20 feet in solid ore, which runs high in lead carbonates, gold and silver. This property is on Little Ellen hill.

Supt. Carnahan states that the Resurrection is shipping approximately 6000 tons per month. The ores, which come from the 800-foot level, are oxidized, somewhat siliceous, carrying gold and silver, with about 12% of lead carbonates. A new shaft is being sunk at a point 1700 feet from the old shaft. It will be sunk to 900 or 1000 feet, and in time will be connected with the old workings. This property is near the head of Big Evans gulch.

The New Monarch, in the same locality, is being opened and is shipping twenty-five tons per day.

The successful operations of the Home M. Co. of Leadville are attracting wide attention. The officers of this company are: J. Harvey, Pres.; A. Sherwin, Vice-Pres.; A. V. Bohn, Sec. and Gen. Mgr.; E. Stevens, Treas. The controlling stockholders are Leadville men. The company owns no mines, its functions thus far being those of a lessee. As such, it controls the grounds of the Estrella M. Co., of twenty-six acres; the Bon Air, Star, Penrose, the Gray Eagle group and the properties of the Pocabontas Con. M. Co. The Penrose belongs to McDonald & Bulkley and comprises about nine acres; the Gray Eagle and Pocahontas groups belong to Smith & Moffatt of Denver. The Home M. Co. likewise controls 400 feet of the southwest end of the Orion claim, as well as the Alice placers, within the city limits. The properties thus controlled under long-time lease form a part of the down-town group of mines. Their operations at present are confined to three shafts, viz: the Penrose, Star and Bon Air, from which shipments amount to about 150 tons of ore per day, which rate Gen. Mgr. Bohn anticipates will be kept up.

The Pumping Association, through whose operations the down-town mines were unwatered, nominally maintains its existence, though each mining company interested does a certain amount of pumping, and at the end of each month the expense is adjusted on a certain basis, the Home M. Co., perhaps, handling two-thirds of the water.

The Mab mine is shipping about 5000 tons of ore per month from its 1000-foot shaft. The ores are all sulphide, carrying gold, silver and lead.

The Adams, Maid & Wolftone Co., lessees of the old Adams, Maid of Erin and Wolftone grounds, on Carbonate hill, are sinking a new shaft 4½x15 feet in the clear, which is now 750 feet and will be sunk to 1500 feet. They are preparing to put in heavy hoisting and pumping machinery at this shaft which will cost at least $150,000. From the various leases on the group about 3000 tons per month are being shipped, which includes carbonates, sulphides and zinc ores. The new shaft is on the Wolftone grounds. S. D. Nicholson is manager of both the Mab M. Co. and the A. M. & W. Co.

The Coronado, operated by the Coronado L. & M. Co., in which Admiral Dewey and Gen. E. S. Otis are said to be stockholders, is shipping ore from the 540-foot level, same being carbonates, rich in silver and lead. A new station is being put in at the 600 level, where a compound duplex pump is to be installed that will handle 500 gallons of water per minute. Preparations are being made for sinking 200 feet deeper into the sulphide stratum. A. Tracy is Supt. and H. J. Higgins Mgr.

On the Midas a new shaft has reached the 535-foot level, from which a drift is being made to connect with the Penrose shaft, the latter being expected to handle the water from the Midas.

The properties of the Morning Star Con. and the Evening Star M. Co., under the management of E. D. Dickerman, are being opened through fourteen different shafts in Carbonate hill. About 150 tons per day are being mined, part of which goes to the Colorado Fuel & Iron Co.'s steel works at Pueblo, and the remainder to the smelters, the greater portion of the whole being iron ores, though there are some carbonates of lead which come from near the surface. All the present shipments are from the upper contact.

The Greenback shaft, on Iron hill, has reached 1100 feet depth and is equipped with heavy hoisting machinery. A new shafthouse is to be erected. At present from twelve to fifteen wagon loads per day are taken to the smelter.

The R. A. M. management are driving a drift on the 1500-foot level to cut under the ore body, the principal shipments being from the 1400-foot level. The surplus water is pumped to the 500-foot station, from which it is carried out through the Emmett workings.

The Louisville, on Iron hill, ships sixty tons of ore per day—sulphide of iron and lead. A. L. Winch is Mgr. and C. W. Bean Supt.

The Ruby, in the same locality, under lease to J. Maxwell and associates, was originally a carbonate mine, but present work is for the purpose of opening the sulphide vein at 500 feet depth. A crosscut is being run at this level. A. G. Goodwill is in charge of the mine.

The A. Y. and Minnie, on California gulch, is working under lease to Douglas & Newton, who also operate the concentration mill. They mine 100 tons per day, the product being lead concentrate.

The Moyer mine, belonging to the Iron-Silver M. Co., employs 120 men. Mgr. T. E. Schwarz states that the mill, being remodeled, will be ready to operate by Nov. 1st. Fourteen new concentrators are being put in place in this mill.

The Yak tunnel, the property of the Yak M. M. & T. Co., which starts in California gulch, below the A. Y. and Minnie, has been driven a mile and a half toward the Ibex grounds, on Breese hill. This company controls the grounds along its line by ownership and lease, being a prospecting as well as a drainage and transportation proposition. The tunnel is 7x7 feet, having a grade of 5 inches to the 100 feet. At present the face is in gray porphyry. It will cut the Ibex grounds at 1300 feet depth.

The Denver & Rio Grande and the Colorado & Southern railways are showing activity in extending spurs to various parts of the district. A branch of the Southern comes in by the Maid of Erin grounds, through Stravhorse gulch, across Carbonate hill to the Yankee Doodle, thence to the Henriett. The Rio Grande, which has had its Breese hill and Evans gulch branch in operation nearly a year, is also extending spurs to other parts of Breese hill and to Iron and Carbonate hills.

The Union smelting plant, which was idle for years, started up a few days ago under the management of the American Smelting & Refining Co.

It is estimated that the present ore output of Leadville mines amounts to over 2000 tons per day. WASCOTT.

Leadville, Oct. 14th, '99.

(Special Correspondence). — The *Herald-Democrat* gives G. W. Cook as authority for the statement that Leadville district has produced about 2,000,000 tons of manganese iron ore, and that the September shipments of this kind of ore amounted to 20,500 tons. Col. Cook is president of the Keno Mining & Leasing Co., a producer of manganese, whose output is shipped regularly to the Illinois Steel Works. On the 16th inst. twenty-five cars of this material were shipped from Leadville over the D. & R. G. Railway and fifteen cars over the Colorado & Southern to Denver, whence a train of forty cars was shipped to Chicago to the steel works above named, the aggregate being 1200 tons. The train was decorated with banners, bearing statements and figures showing Leadville's production of manganese, and others advocating a duty of $1 per ton on foreign imports of this material.

Leadville, Oct. 16th, '99. WASCOTT.

The South Park road having reached the Catalpa-Crescent, the lessees propose to ship 200 tons per day from that property.

Leadville *Carbonate Chronicle*: The ore congestion in the Leadville district is now at an end. There are three smelters in blast and the fourth, with an additional capacity of 300 tons per day, will be in operation in a few weeks, when the Leadville smelters will handle 2000 tons of ore per day.——The Fanny Rawlings M. Co. propose to sink the shaft to a depth of 1000 feet. A part of the new machinery is already on the ground.——The N. & M. fraction is improving, recent assays showing 42 ounces silver, .21 of an ounce in gold and 4% copper.

MINERAL COUNTY.

Creede *Candle*: For the current week the ore shipments from Creede were 158 cars—3470 tons.——Anderson & Martin have shipped a car of lead and zinc obtained from the creek below the Ridge mine.——W. Skinner has a contract to clean out the shaft of the Phœnix mine, in Phœnix Park, which has been leased to W. Boyle.——The retimbering of the old shaft on the United mines is completed to the water and the pumps and pipe line are being put in.——The Creede Co-operative is shipping forty to forty-five tons per day, the ore principally coming from the seventh level, where the vein is 4 feet wide and has been the same in quality and quantity since found. At this level the ore carries more gold than in any of the levels above. Most of the ore is being concentrated.——The diamond drill is boring toward the Last Chance shaft, which will be tapped at its bottom and drained by the latter part of next week, after which the drills will bore from the Last Chance into the Amethyst mine.

SAN JUAN COUNTY.

Silverton *Standard*: Syfer & Ray located a claim Sept. 28th near the Silver Wing mill, at the mouth of Picayune gulch. They have opened a good-sized vein of lead, running, assay tests, 100 ounces of silver. They expect to ship a carload of ore soon.——In the Red Mountain mining district the weekly shipments are: Congress, 8 carloads; Barstow, 2 carloads; Enterprise, 1 carload. —— The Treasury Tunnel, under Mgr. Hammond, has put in power drills, with 600 tons of coal housed for winter.——At Chattanooga the Elmira M. & M. Co., operating the Elmira property, formerly the Silver Ledge, are shipping one carload of concentrates daily.

SAN MIGUEL COUNTY.

Work has been suspended on the Meldrum tunnel near Telluride by orders of the head office at Glasgow, Scotland. The tunnel is in 2800 feet.

Telluride *Journal*: The Liberty Bell, in Cornet Creek basin, in the spring built a 10-stamp mill, by which it was demonstrated that it could successfully treat the product of the mine; ten stamps were added and later the capacity was doubled by the addition of twenty more, making forty. Recently the company began the erection of forty more stamps, which will give them a capacity of 300 tons every twenty-four hours. They have located the waters of Mill creek and will build a power plant at the lower end of the stream, below San Miguel, and generate power for their own plant. There is water to develop 300 H. P. for the greater part of the year in this stream. This power will be conducted to the mill and used for all purposes there, instead of the water power they now employ. A cyanide plant is to be built for treating the tailings from the 80-stamp mill, tests showing $1.50 per ton can be saved by this treatment, that now goes over in tailings.

Telluride *Examiner*: The new Smuggler-Union mill building at Pandora is enclosed and the work of putting in the batteries is under way. It will have sixty stamps of 1050 pounds each, ninety drops per minute, and it will be equipped with concentrating apparatus, made up of Frue and Triumph vanners and double-decker Wilfley tables, which will give an additional milling capacity of 200 tons every twenty-four hours.

Telluride *Examiner*: A large tonnage of ore from the Klondike property, in Ophir district, is being treated at the Suffolk mill. The owners, Van Endert and Roberts of Telluride, are conducting experiments and working the property with a small force. The ore averages $10 per ton, though a great deal of it has run $20.——The Liberty Bell management is experimenting with the cyanide process for the treatment of the tailings. If the experiment proves successful, the facilities will be increased to handle the entire tailings from the plant.

TELLER COUNTY.

(Special Correspondence). — It is learned from a reliable source that negotiations are pending, and likely to be consummated by Nov. 1st, '99, whereby there will be a consolidation of four corporations, viz: the Florence & Cripple Creek Railroad Co., Golden Circle Railroad Co., Midland Terminal Railroad Co., Metallic Extraction Co., La Bella Mill, Water & Power Co. and the Colorado Trading Co. The new company now formed to take over all the interests involved will be known as the Denver & Southwestern Railway Co., which will either build a new line of road from Cripple Creek to Denver or form connection with a new line that is to be built by another company. The deal, it is claimed, involves the purchase by the new company of all the interests of Messrs. Moffatt and Smith in the F. & C. C. Railroad, the Metallic Extraction Co.'s cyanide plant at Florence, Colo., and the power plant of the La Bella M. W. & Power Co. at Goldfield. The combination will control the transportation of the district and, to a large extent, the electric power, and will be a strong factor in the reduction of ores. It is claimed the promoters of the new company are the capitalists interested in the Midland Terminal Railway Co.

Fifty brick buildings are in course of construction at Victor; it is claimed most of this building is being done with Victor money and very little with borrowed capital. The town, which was destroyed by fire last August, will soon be rebuilt wholly with brick and mortar.

The La Bella M. W. & P. Co., at Goldfield, is preparing to put in an additional engine for generation of electric power. The steel smokestack of this plant is 200 feet high and 9 feet in diameter.

The problem of obviating the disastrous effects of lightning on the electric equipment of Cripple Creek district is receiving attention by electricians, and experiments are being made, the utility of which can be judged better later on.

The Portland M. Co. have been figuring of late on the projection of a drainage tunnel, and they may select a site near Marigold, several miles down the creek. At present they are handling a large volume of water with pumps, which is expensive and burdensome. WASCOTT.

Victor, Oct. 10th, '99.

(Special Correspondence). — The enormous increase of the ore tonnage of Cripple Creek district since September 1st has congested the smelter, mill and transportation channels to a serious extent. It has resulted in the shipment to the mills and smelters of train loads of ore, making a tonnage greater than the capacity of those plants, and as a consequence a great many railroad freight cars have remained tied up because they could not be unloaded promptly. It was reported on the 7th inst. that about 200 cars of ore were at the yards of one of the reduction plants which could not readily be unloaded and released. It will be seen that this caused some of the roads temporary embarrassment, making a shortage of cars. In the meantime published accounts of friction between the reduction plants and railroads, and between the miners and railroads, in which first one party and then the other is represented as making a "bluff" to effect certain results, are believed to have little foundation in fact. That some friction exists is evidently true, but it would seem to be the unavoidable consequence of the ore output of the district suddenly outgrowing existing facilities for treating it. But this condition will doubtless soon be overcome by the same kind of energy that enabled the mines to create it. WASCOTT.

Victor, Colo., Oct. 12th, '99.

(Special Correspondence).— Ore shipments from the Independence mine, at Victor, for September, amounted to 3023 tons, of the value of $252,000, or $86.88 per ton. It is claimed the ore shoots have widened, showing larger bodies of ore on the fourth level. In May the ore averaged 4¼ oz. gold; in June 3.85 oz.; in July 3.88 oz.; in August 3.95 oz. per ton.

Victor, Oct. 14, '99.

Denver *Republican*: The Nellie V. G. M

Co. has been incorporated. The Nellie V. claim and the War Eagle claim are involved, and $110,000 cash was the consideration. The capital stock is $1,500,000. The two claims owned by the new company are located on Squaw mountain, 700 feet north of the Gold Coin mine, at Victor. The Nellie V. has produced $85,000. The property has lain idle for three years.——It is reported that a strike has been made in the Roxanna Co.'s property, in Squaw gulch, near Victor. The find has been made in the shaft which is being sunk in the gulch. The company is controlled by the Smith-Moffatt syndicate. The shaft on this property is within 150 feet of the Dolly Varden.——Lessees operating the Electric, of the Cadillac Co., report that they have struck stringers from an ore body in the crosscut they are driving at a depth of 45 feet. This crosscut was driven through a basalt dyke, with the expectation that on the other side of it they would find ore. They are nearly through it, and the stringers coming in.

IDAHO.

LEMHI COUNTY.

Boise *Statesman*: A recent discovery in the Black Bird district is owned by J. P. Clough and J. Sims. They have a claim in the center of a copper deposit. The ledge is 300 feet wide and it has been located continuously for three miles. Clough & Sims have crosscut the ledge at shallow depth, finding it is 300 feet in width. The ore averages 6% copper and $3 a ton in gold. Eastern capital has invested extensively in this new district. The G. & C. Exploration Co. have secured bonds on five groups there, comprising over 100 claims.

SHOSHONE COUNTY.

Spokesman-Review: Since the beginning of the year twenty-six mining companies have been incorporated in the Cœur d'Alenes. Of these nineteen are at work; two, recently incorporated, have not yet commenced operations, and of the other five nothing is known beyond what is shown by county records. Eleven of them were organized prior to April 29, but the riot on that day put such a damper on the formation of new companies that, except two, which were then in the process of formation, no more were incorporated until July 3. Since then they have come regularly, September being credited with six, while the first nine days of October added three to the list. In nearly every instance enough treasury stock has been taken by local parties to furnish a working capital sufficient for present needs. The promoters' stock is pooled and consequently there is little of it on the market. There are more men at work in the Cœur d'Alenes to-day than there ever were in the days when the miners' union controlled the camp—probably 200 to 300 more than when the attempt was made to stop operations at the Bunker Hill last April.

Mullan *Mirror*: Mgr. J. S. Olin of the Hunter states that work on a 200-ton concentrator at the Hunter is to be commenced within thirty days. Lumber for the new flume has been ordered. There are 1500 tons of ore on the dump at the mine and development work is going forward. The tunnel is in 1800 feet, and from tunnel No. 5 a shaft is down 160 feet. From the bottom of this shaft to the surface at the upper workings is 900 feet.

KENTUCKY.

The Queen City Mining & Manufacturing Co. has been organized in Cincinnati, which will mine zinc within 100 miles of Cincinnati. The subscribed capital is $25,000.

MICHIGAN.

HOUGHTON COUNTY.

A proposition is being agitated that contemplates a large mill, built at a central point in the copper country, to do custom stamp milling business for the benefit of the large number of new mines now being opened. New mines could become producers in a small way as soon as the work of opening them was begun, and would thus be put in a position to partially pay for their own development, and the percentage of mineral in their rock could be determined early in their career.

During September the Quincy copper mine produced 1,588,000 pounds of copper.

MISSOURI.

JASPER COUNTY.

D. H. Moffat and associates of Denver, Colo., have been investing in Joplin zinc fields. Mr. Moffat a short time ago bought the lease of one mine, paying $15,000 bonus.

MONTANA.

GRANITE COUNTY.

Philipsburg *Mail*: J. T. Pardee has sold to P. A. Fusz, Pres. of the Granite-Bimetallic Con. M. Co., his placer ground in Basin gulch, consisting of thirty-four acres, the consideration being $20,000. During the past four years thousands of dollars' worth of gold dust has been extracted by a few men during thirty days in each year. Mr. Fusz last April bought the placer mines owned by Allen & Spees, and later bought the claim adjoining on the north, owned by S. Watson, for $6000; also the adjoining ground on the south, owned by Con brothers.

SILVER BOW COUNTY.

J. A. and M. H. Murray have transferred to the Anaconda Copper M. Co. their interest in the Findling lode claim north of the city limits of Butte. Consideration was $25,000, and surface area conveyed was two acres.

NEVADA.

STOREY COUNTY.

An important industry promises to develop in the working of the so-called waste dumps of the more important Comstock mines. On the Confidence ground there is a large amount of quartz which contains gold and silver, and a mill erected at this point could also handle the Alpha dump to the north. It would take several years to reduce these dumps. The Yellow Jacket dump is also known to contain a great deal of low-grade ore. The Overman tunnel dump in Lower Gold Hill consists largely of quartz known to contain value. The large dumps of the Caledonia, Mides, Uncle Sam, Mary Ann, Trojan and Seg. Belcher and old Overman contain sufficient value, it is thought, to pay well with the new cheap power. Besides these there are numerous other dumps containing sufficient gold and silver to make their treatment profitable by the improved methods of to-day with the electric power.

The pumping operations on the Comstock have succeeded in lowering the water materially within the past week. Following is the latest official telegram:

VIRGINIA, Nev., Oct. 19th, '99.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 111 feet 2 inches below the 1050-foot level station. No. 2 elevator has been running continuously. JOS. R. RYAN.

WHITE PINE COUNTY.

There is a copper deposit six miles west of Ely, on which nine claims have been located. The deepest shaft is 70 feet, in solid copper ore, several other shafts and holes showing the same results. There are no veins or ledges, but a solid body of copper ore covering acres of ground. The values are said to run from 12% to 30%.

NEW MEXICO.

GRANT COUNTY.

The Hanover Copper Co., with a capitalization of $1,000,000, has filed articles of incorporation at Santa Fe, to operate mines in this county.

OTERO COUNTY.

A corporation has been organized to work the dry placers of the Jarillas. Dry washers have been bought for the purpose.

SIERRA COUNTY.

The Sierra county placers during September produced $3000 in gold.

OREGON.

BAKER COUNTY.

Seattle *Mining Record*: A rich strike was made recently in the Pocahontas Belle, near Baker City. The pay streak is 18 inches wide, with free gold in pyrite. The property is owned by C. Buzzard and T. Rinehart, formerly of Cripple Creek, Colo., who have refused an offer of $80,000 for the claim.——The Spokane capitalists who recently purchased the Copper Queen, on Powder river, made the first payment of $30,000 last week. A smelter will be built.

Sumpter *American*: The Cougar mining property, near Granite, is getting ready for extensive operations. All of the machinery is on the ground. Mgr. Larkin has, it is said, 7000 tons of ore on the dump. They expect to run only 70 tons a day for the first two or three months, and later to put on 100 men and treat 200 tons of ore daily.——The Thornburg placers, on the North Fork of the John Day river, nine miles west of Granite, have been bonded to Denney Bros., of Denver. Elmer Thornburg will continue to direct the operations under the general management of W. S. Duncan. It is stated that the property has been bonded on a basis of $23,000 and $3500 paid. The new company has put in two derricks for handling boulders and are driving a tunnel through the rim rock and will make an upraise to sluice out a large area of pay dirt which has heretofore not been touched.——Thirty men are working at the Magnolia mine, near Granite, grading for the new mill and framing timbers. The work is in charge of Millwright McLane, who built the Bonanza mill. Last week the workmen on the grade uncovered a 20-foot ledge, which panned free gold. W. L. Vinson bought this property a year ago for $45,000. He made the second payment of $5000 on his Magnolia bond, on the 6th in Baker City.

JACKSON COUNTY.

Ashland *Record*: In the vicinity of Hornbrook, Roberts & Co. continue to employ sixty men. This mine has kept ten stamps running on high-grade ore for eighteen months, averaging twenty tons per day.——Laflesh & Miner have seventeen men at work in their mine and mill.——Rose & Nikirk commenced crushing ore October 2d, in their new mill on Ash creek.——Doney Bros. tapped a heavy flow of water in their mine and are compelled to suspend until a pump can be put in.——H. Mattern has bought from C. Harness a half interest in the Ohio mines for $2000.

SOUTH DAKOTA.

LAWRENCE COUNTY.

John Greenough has driven a 1400-foot tunnel on his Reserve claim on Green mountain and has developed a valuable shoot of ore in the lower quartzite, which lies at the base of the Cambrian. On the north slope of Green mountain this stratum of quartzite contains galena and carbonate ores carrying values in silver and gold. The eruptive rocks of the same locality also are gold-bearing in numerous places, as in the old Huxley and Empire mines.

At an expense of $35,000 the shaft in Ruby basin, which was started by the D. & D. Co. two years ago, has under the ownership of Con. Golden Reward Co. reached quartzite at a depth of 590 feet. Drifting has already started east and west from the bottom of the shaft. The encountering of ore at this point on the belt means a great deal, for if such ore shoots are opened as are exposed in the Tornado and Union mines the construction of large plants by the Golden Reward Co. in Deadwood is assured, as it will be demonstrated that the silicious ore bodies extend for 16,000 feet through this company's properties.

UTAH.

BEAVER COUNTY.

Mgr. Farnsworth of the properties of the Horn Silver at Frisco says that the most interesting features at present are those in the copper-bearing shoot, so long neglected and from which a large part of the company's earnings are now being derived. The shoot has opened 8 feet of ore that averages 25% copper.

IRON COUNTY.

Tribune: The owners of the Johnny mine received for the last shipment to Salt Lake $2260 per ton. The new whim is in place on the Johnny and hoisting will be increased.——The Ophir, at a depth of 225 feet, has struck a body of rich ore, which carries gold and silver, 5% copper and 2½% lead.

JUAB COUNTY.

The cleaning out and catching up of the ore body recently uncovered in the Blue Bird, at Diamond, discloses 5 feet of silver and lead ore. The intention is to install a set of jigs. The strike was made at a depth of 325 feet.

At the Shoebridge Bonanza, Tintic, the pumps are going, water is being raised and the jigging of ore that has been stacked upon the dump for many years has commenced. The management is sacking high-grade lead and silver ore below.

Mgr. McIntyre of the Mammoth reports concerning the strike of high-grade gold ore that they occur at irregular intervals, while the entire ore body carries gold value. Sinking of the shaft, now at a depth of 1800 feet, will be resumed.

The shaft on the Dragon Iron mine at Tintic is down 460 feet, and will be provided with a cage, to be operated by a small hoist designed for it. At the 400-foot level the management has ordered drifting to commence which will take them 350 feet below the quarry, from which a great volume of iron ore is being mined.

Another strike is reported in the Grand Central at Mammoth in new ground, in Silveropolis territory.

Salt Lake *Tribune*: At a conference between the management of the Centennial Eureka M. Co. and the representatives of the American M. & S. Co. in Salt Lake on the 15th inst. a contract was agreed upon in which the American Smelting Co. will receive from the Tintic mine 100,000 tons of ore of the "first class"—the gross valuation of the tonnage specified in the contract being $4,000,000. At the conference were Bert Holden, managing director of the mining company; C. E. Allen, local manager, and J. W. McNeill, local manager for the United States M. Co. Representing the smelting interest were T. R. Jones, district manager, and H. Lyne of Denver, the latter the general contracting agent for the American Smelting Co.

SAN JUAN COUNTY.

The Big Indian group, on the southern slope of the La Sal mountains, has for three months been in the hands of New York parties, who had an option on the property for $500,000, which expired a few days ago, and the owners have resumed possession of the property and are making preparations for development. The mine is one of the largest copper propositions in Utah, though but little development has been done on it. The plans of the company include the erection of a plant for the reduction of the ores, and a force of men will be employed all winter. The erection of the mill will be commenced in the spring.

Mercur *Mercury*: A. Caldwell, who has interests in the Lasalle copper district, has bonded a group of his claims to Eastern parties for $40,000. Mr. Loomis of Colorado Springs is running a tunnel on a group of claims adjacent, is in 1400 feet and has cut the main copper-bearing vein, which is 93 feet thick and consists of pay ore from wall to wall. He intends to put up a fifty-ton concentrating plant.

SALT LAKE COUNTY.

The Bingham tunnel is approaching the 2000-foot station, and is advancing at the rate of 11 feet a day.

In the Sunnyside group, at Bingham, a discovery has been made in the new tunnel, where the management has uncovered a body of silver-lead ore, the assays from which show 67.6% lead and thirty-six ounces silver, with a small amount in gold. The ore occurs in a vein 8 feet wide.

The development of the shoot of high-grade copper, gold and silver ore recently encountered in the tunnel of the Bingham Copper & Gold M. Co., has begun. It has been followed several feet beyond the line of the tunnel.

A shipment of pig copper from the Highland Boy mine to the eastern refineries, consisting of two carloads, 120,000 pounds, valued at $20,000 represented a trifle over half a week's run.

The Morning Star group of claims, joining the Highland Boy and Zelnora at Bingham, have been bought by J. S. Kennedy of Boston for $200,000. The transaction was promoted by M. R. Hunt, Gen. Mgr. for the Last Chance Co. of Bingham. The Morning Star lines are 300 feet from a point in the Highland Boy, in which the management are stoping ore, while experts state that within its lines are 1200 feet of the Highland Boy vein.

Salt Lake *Tribune*: One more new furnace added to the set at the Germania smelter was blown in Saturday, and T. R. Jones, district manager of the amalgamated plants, thinks it looks as if a further increase in the capacity of the smelters will be necessary. With the blowing in of this new furnace at the Germania, and with two at the Mingo, the two smelters will this month handle 21,000 tons.——Upon the return of O. P. Posey, general manager for the Bingham Copper & G. M. Co., at Bingham, from Boston, definite information concerning the proposed smelter will be announced.

Salt Lake *Tribune*: The valley plants operated by the American Smelting & Refining Co. have eight furnaces in blast, running at maximum capacity. Six are in operation at the Germania and two at the Mingo, the combined plants handling 9000 tons of ore per month, employing 600 men. While the ores of the Old Jordan and Galena, the Old Telegraph and Niagara, owned by the United States M. Co., have been withdrawn from the market, their places have been filled by new producers and the increased output of the old ones. In addition to the ore reduced at the custom smelters, 6000 tons a month are smelted in the Highland Boy (Utah) smelter.

SUMMIT COUNTY.

At the old Park mine in Silver City the raising of ore has recommenced and in a few days another shipper will have been added to the list. In early days the Park was productive of a great deal of high-grade ore which was hauled sixty miles before the railroad was reached and then treatment charges were high. The sulphides were then encountered and for many years the property was practically abandoned. About a year ago the ground changed hands and the exploration of lower levels begun under the management of C. E. Loose. A short time ago ore was found.

TOOELE COUNTY.

In Deep Creek district, S. Crismon, B. and O. Young and F. Little are driving on their group at Clifton, and at 160 feet have broken into a body of copper-lead ore carrying silver and gold.

L. Martin, representing J. F. Woodman, is at the Cane Springs mine putting it in condition for winter work. For over three years it milled gold-bearing ore.

A carload of ore has been shipped from the Wilson group at Wilson Springs that runs high in copper and lead.

The Clark concentrator, now building at Ophir by W. A. Clark on the properties of the Ophir Hill Con., purchased by him during the season for $75,000, will have a capacity of 100 tons of ore daily with the present volume of water. The construction is under the direction of E. W. Clark.

WASHINGTON.

FERRY COUNTY.

A strike has been made in the San Poil at Republic. The south drift has widened to 8 feet and an average assay of 5 feet of ore was $104.

The new camp at Bolster is the scene of numerous new finds and prospectors are going there. It is on Meyers creek at the foot of Buckhorn mountain.

SNOHOMISH COUNTY.

Everett *News*: The sale of the ten claims composing the Bonanza Queen group, near Silverton, by J. F. Bender, A. Sutherland, N. Lockwood and others to J. B. Gallagher and others of Butte, Mont., is announced. The consideration was $25,000 cash, $62,000 to be paid December 1, 1900, $62,500 to be paid April 1, 1901. J. B. Gallagher has been the representative of Marcus Daly for fifteen years and it is reported that the purchase is in his interest.

WISCONSIN.

DOUGLAS COUNTY.

It is reported that a company is being organized with a capital of $2,000,000 to develop the Cuilligan copper property, one of the oldest in the Copper range.

FOREIGN.

AUSTRALIA.

The Mount Lyell smelters from July 27th to August 23rd, inclusive, treated 21,314 tons of ore for an average of: Copper, 3.46%; silver, 3.10 ounces per ton; gold, .09 ounce per ton. In addition there was treated 2237 tons of purchased ore. At the converters there was produced during the same period 829 tons of blister copper, containing copper 820 tons, silver 64,520 ounces, gold 341 ounces.

Melbourne *Standard*: The returns for the Lake View Consols mine for July were: Stone crushed at battery, 6893 tons—4726 ozs.; tailings cyanided, 3380 tons—1370 ozs., 19 dwt; slimes from filter presses, 2837 tons—1119 ozs., 8 dwt.; treated by new sulphide plant, 356 tons—1027 ozs., 16 dwt.; sulphide ore treated in Eastern colonies, 760 tons—22,230 ozs., total, 30,473 ozs., 19 dwt.; total number of tons ore treated, 8009; total value of gold, £124,500.——The fifty-two tons of sulphide ore sent to the Broken Hill Proprietary Co.'s Works, Port Pirie, for smelting yielded 657 ozs. of gold, an average of 12 ozs., 13 dwt. per ton——The Sulphide Corporation reports for July. Central mine, Broken Hill, ore milled, 4222 tons; concentrates produced, 930 tons, containing 29.1 ozs. of silver per ton, 63.3% lead, and 10.6% zinc. Cockle Creek works, bullion produced, 360 tons, containing 18,017 ozs. of silver and 515 ozs. gold ——The Central mine at Broken Hill is down 670 feet in the Kintore shaft. At this depth clean sulphides, worth 13.6 ozs. silver, 18.8% lead, and 22% zinc, have been struck.

BRITISH COLUMBIA.

The Payne mine in the Slocan has been developed during the summer so that an output of 2000 tons of ore per month could be made. The Payne is worked through adits and produces galena and carbonate ores. In 1898 it shipped 14,000 tons of ore.

One of the richest strikes ever made in Moyie has been made in the No. 1 tunnel of the Lake Shore mine, where 12 feet of solid galena ore was struck. This tunnel was being driven to strike the same ore body which was encountered in the No. 2 tunnel, but it was not thought that a large quantity of ore would be found at such a short distance in from the surface—75 feet.

A rich strike has been made at the Ward mine, Cariboo, in which San Francisco capitalists are interested; $1000 a day is being taken out.

Spokesman-Review: The Number One and Josie will begin shipping fifty tons daily. The ore will go to Northport. The vertical shaft in Number One is down 400 feet and at the 200 and 300 levels an ore shoot 4 feet wide has been opened 300 feet long, and its farther extent is unknown. Drifting to the vein is

in progress at the 400 level.——At the Josie the main shaft is down 500 feet and is now being overhauled for the electric hoist.——Rossland has nine shipping mines, including the Number One and Josie. The others are the Le Roi, War Eagle, Center Star, I X L, Iron Mask, Evening Star and the Virginia. Their total output, including the daily shipments of 200 tons from the Le Roi dump, will make the output of the camp 1000 tons per day.——The Evening Star has closed down and employes dismissed. It is said that the close-down is the result of a disagreement among the stockholders. The Evening Star Co. is a Spokane corporation. It has exhausted its treasury stock and recent development has been paid for by shipment of ore.

Rossland *Miner*: A rich strike on the Oro Donero is reported.——The main vein on the Referendum on Forty-Mile creek after a four-year search has been found. A shaft had been sunk 50 feet and a crosscut run 103 feet, where the ledge was met and crosscut and found to be 2½ feet in width. The crosscut was run into the hill and the ledge was found 60 feet below the surface. The formation is schist and the vein cuts the formation at right angles. Another vein has been found on the Referendum, 22 inches wide, which is parallel with the ledge just found and is 100 feet from it. The property is to be opened to the 200-foot level. In the meanwhile the intention is to install a 5-stamp mill. There is ore enough in sight, Supt. Littlejohn says, to keep the mill in operation for some time.—— The returns from the Northport smelter of Le Roi ore shipped from the mine for the first half of last month show as follows: 4249 tons shipped, giving 1735 ounces of gold, 3827 ounces of silver and 51 tons of copper, the total estimated gross value being $51,000.

CANADA.

In the zinc region north of Rossport, on the north shore of Lake Superior, good locations have been made near the Zenith mine, which was purchased a year ago from McKeller Bros., of Port Arthur, by men who put miners to work on the property during January, February and March. The ore was sacked and hauled out with sleighs twelve miles to Winston siding on the C. P. R. From there it was shipped to Belgium for treatment and netted $22 per ton. The result of the three months' work showed a gross return of $73,000. Negotiations are under way for the sale of the property for $230,000. There is said to be a quarter of a million dollars of ore in sight from the work of last winter. The Zenith has an ore body varying from 6 feet to 30 feet wide, all zinc blende.

Toronto *Gazette*: The Sultana mine in the Lake of the Woods district has been sold to a company known as the Sultana Mine of Canada, Limited, with head offices in London, England. The capitalization is $1,340,000. The manager of the mine is W. M. Strong.

LOWER CALIFORNIA.

The San Fernando copper mine, below San Quintin, has been bought by Denver capitalists. The price is reported at $175,000. The purchasers are represented by E. C. Humphrey of Denver. The San Fernando group of mines was worked years ago by French capital. The deepest workings in the San Fernando are 470 feet, with copper ore running from 25% to 40%. Work begun two or three weeks ago has reduced the flooded lower levels to operating condition. It will be necessary to develop water, as the mine is in an arid district. A smelter is to be built at the mine, operated by oil fuel from Los Angeles.

L. A. Wright, Mgr. Republica gold mine in Lower California, states that the 10-stamp mill lately put up at the mine will be replaced by a 30-stamp mill. A cyanide plant will also be put in to work tailings. Col. Boynton and R. Surbridge, president and vice-president of the Republica Co., who recently visited the mine, have returned to New York.

MEXICO.

Nogales *Oasis*: J. A. Naugle, manager of the Sonora railway, and G. H. Robinson, general attorney for the same corporation, at Hermosillo, have bought of A. Graff and F. C. Hartmann, in the interest of the Southern Pacific Co., the coal properties in the Barranca region for $125,000, United States gold coin. ——C. Meeker of Lafayette, Indiana, has recently bought of Bentley & Rawson of Minas Prietas the Admiral Dewey mine, near Willard station, ten leagues from La Colorada, from P. & S. Penelli of La Colorada, and C. Bernard of Hermosillo, the Esmeralda mine, and from H. Prickett of Nogales, and associates, the Sevillana mine, making a group of mines including seventy-two pertenencias. The price stated is $75,000, gold, for the group. The Dewey is copper, the Sevillana is lead and silver, and the Esmeralda, which is an extension of the other two, has both ledges. On the Sevillana is a shaft 300 feet deep, also a 60-foot shaft. On the Esmeralda are old, abandoned Spanish workings. Mr. Meeker has ordered a gasoline hoist.

SOUTH AFRICA.

The Government has turned over the Ferriera mine to the directors on condition that work is to proceed. The stock exchange is closed.

TASMANIA.

The whole of the shaft of the South Lyell, 11x4 feet, is in sulphide ore without a particle of gangue in it, bulk assays going 4½% of copper and 3 dwt. of gold.——The North Lyell Consolidated No. 3 tunnel is composed of gray schist, heavy mineralized, with quartz leaders carrying a little copper.——Assays from the Glen Lyell have been made with the following result: From open cut: copper, 10.6%; silver, 10 dwt., 12 grs; gold, 15 dwt., 15 grs. No. 2 adit, copper pyrites: copper, 20.7%; silver, 1 dwt., 7 grs; gold, a trace. South crosscut; copper, 5.3%; silver, 12 grs; gold, 19 grs.

Industrial Notes.

—Another railroad is to be built between Sacramento and Stockton, Cal.

—In Mazatlan, Mex., there has not been a failure or a fire for fifteen years.

—There is no economy in paying low wages, for cheap pay secures cheap work.

—Deposits in the San Francisco, Cal., savings banks amount to $117,324,597.

—Durango, Mexico, wants to borrow $2,000,000, to be expended in local improvements.

—The assessed valuation of the State of Montana, exclusive of railroads, is $136,000,000.

—Los Angeles, Cal., will now sell its recently authorized water bonds to the amount of $2,090,000.

—Santa Barbara Co., Cal., is shipping large quantities of beans for coffee manufacture in San Francisco.

—The United States of Colombia want to borrow $14,599,500, with which to replace its paper currency with silver.

—Beef on the hoof sells at $7 a hundred at Chicago—the highest October price since 1884. British war orders indicate further advance.

—The Edward P. Allis Co. of Milwaukee, Wis., recently advanced the wages of their employes 5%, requiring a monthly addition to their payroll of $15,000.

—The Transvaal war will interrupt a profitable and growing trade in mining machinery sent from the United States, but which in any event will be renewed.

—The Canadian-U. S.-Alaskan boundary dispute has been temporarily arranged by a line drawn across Chilkat pass, delimitated by the river and mountain top.

—A dollar never saw the day when it would buy more food, clothing, transportation and other necessaries of life than now. And a dollar never saw the day when it could earn less than now.

—Contracts have been made with ten steamers to carry ore from the Lake Superior iron docks to Cleveland, Ohio, next season at $1.25 a ton against 60 cents this season. This means that iron ore will sell at fully $2 a ton advance over the prices of the present year.

—The first steel plate ever made in Colorado was rolled at the new plate mill at the Bessemer Steel Works, Pueblo, on the 11th inst. It is a 78-inch mill and the first day's product ran 72 inches. The capacity of the mill is 100 tons per twelve hours for ¾-inch plates and twenty-five tons for ten gauge plates.

—The Columbia & Western extension of the Canadian Pacific Railway is nearing the terminus at Midway. The average cost of the present system has been $30,000 per mile, or $3,000,000 for the entire road. For two miles along McRae creek, the roadbed is cut through for a height of 50 feet. The cost of that section was $200,000.

—From New York to Valparaiso, on the western coast of South America, via the Straits of Magellan, is 8460 miles; via Colon and Panama it is but 4572 miles; from New York to San Francisco via the Straits of Magellan is 13,090 miles; via Nicaragua it is 4867. The commerce of the west coast of South America now amounts to over $100,000,000 annually. Of this sum but $15,000,000 is with the United States. The imports of Chili, Peru, Ecuador and Bolivia amounted in 1897 to over $50,000,000; of this amount less than $5,000,000 was from the United States.

—H. S. Pritchett, Supt. United States Coast and Geodetic Survey, goes next season on the U. S. steamer Pathfinder to Alaskan waters to survey the islands of the Aleutian group, near Unimak pass. The islands, Mr. Pritchett says, have not been correctly located on Government charts and maps. Several islands of the Aleutian group, lying between fifteen and twenty miles apart, near Unimak pass, have been selected as a field for the use of wireless telegraphy. By this means Mr. Pritchett expects that the difference in latitude of the islands will be determined accurately.

—The following figures illustrate the changes which have occurred in the railway system of the United States in the last eighteen years:

	1880.	*1898.*
Miles of railway	93,262	186,810
Miles of track	115,647	245,239
Miles of steel rails	33,680	220,804
Miles of iron rails	81,967	24,435
Number of locomotives	17,949	36,746
Number of passenger cars	12,789	25,844
Number of freight cars	539,255	1,284,807

There are five and one-half times as many miles of steel rails as in 1880; the mileage of iron rails has decreased 70%, to a little over 24,000, and will soon disappear.

Commercial Paragraphs.

RICHARD A. PEREZ, assayer and analytical chemist, of Los Angeles, Cal., has moved to 120 North Main street, Los Angeles.

H. D. & H. W. MORRIS have removed from their former location, 223 First street, to room 194 Crocker building, San Francisco. They continue as sales agents for the Chrome Steel Works of Brooklyn, N. Y.

PARKE & LACY CO., 21 and 23 Fremont street, San Francisco, are sole agents for Ingersoll-Sergeant rock drills and air compressors, Knowles pumps and Pulsometer pumps, and Bullock diamond drills.

THE Western Chemical Co. of Denver, Colo., has built on a larger scale the works recently destroyed by fire, and will have a monthly capacity of 1,000,000 pounds of sulphuric acid. The Western Chemical Works reports a deservedly large trade, its chemically pure product now being shipped everywhere.

Personal.

LOUIS JANIN is in Salt Lake City, Utah.

THOS. EWING is at the Sheeptrail mines, in northern Arizona.

T. C. ARCHER is Supt. for the Mountain Copper Co. at Keswick, Cal.

W. H. LLEWEWELYN, a New York mine operator, is in San Francisco.

BENJ. CRAWFORD is Mgr. "Morenci, Arizona, Copper Mines, Ltd."

W. L. WATTS has returned from Los Angeles, Cal., to San Francisco.

W. S. KEYES has returned to San Francisco from Montana, Utah and Nevada.

WM. MCDERMOTT has returned from San Francisco to Salt Lake City, Utah.

D. B. HUNTLEY of De Lamar, Idaho, is temporarily sojourning in San Francisco.

W. B. WILSON, formerly of Colorado, is the Supt. of the Le Roi mine, Rossland, B. C.

RALPH D. WANN has organized and is in charge of the El Paso Assay Co. at Victor, Colo.

A. L. COLLINS succeeds C. W. Miller as Gen. Mgr. Smuggler-Union mine, Telluride, Colo.

T. A. RICKARD of Denver has gone to London, Eng. He will return to Colorado about Nov. 20.

CURTISS H. LINDLEY of San Francisco has gone to the Cœur d'Alenes, Idaho, on professional business.

ALEX. BURRELL, Mgr. of the Drum Lummon mine at Marysville, Mont., has returned from Leadville, Colo.

GEO. T. RIVES, Gen. Mgr. Golden Cache Con. M. Co., has returned to Lillooet, B. C., from San Francisco.

J. W. GIROUX, for the past two years Supt. Gladiator mine, Mayer, Ariz., goes to the Bradshaw mountains.

L. R. MEAD, Sec. Risdon Iron & Locomotive Works, San Francisco, has returned from an Eastern business visit.

H. W. FAIRBANKS has returned to Berkeley, Cal., from an extended geological reconnoissance in Vancover Island.

PROF. A. VAN DER NAILLEN has returned to San Francisco from an extended scientific itinerary through Europe.

PROF. S. B. CHRISTY, of the University of California, has been elected Pres. Alameda Co., Cal., Miners' Association.

H. T. SCOTT of the Union Iron Works, San Francisco, goes to Washington, D. C., next month on Government business.

FRANK L. BROWN, Pacific coast Mgr. American Steel & Wire Co., has returned to San Francisco from Los Angeles, Cal.

PH. DEIDESHEIMER has returned to San Francisco from a professional trip to Big Oak Flat mines, Tuolumne county, Cal.

E. M. RAY, formerly of Cripple Creek, Leadville and Aspen, Colo., is in charge of the Bassick mine at Silver Cliff, Colo.

I. C. JACKLIN, who has charge of the De Lamar cyanide plants in Utah, has been investigating the ores of Republic, Wash.

SAM'L J. HENDY, of the Joshua Hendy Machine Works, has returned to San Francisco from a business trip to Eureka, Nevada.

G. W. BORROWE, consulting engineer of the Bechuanaland Exploration Co., South Africa, returns from San Francisco to Buluwayo this week.

WM. L. MCCAGUE, formerly with the Victor Sampling Co., is now Supt. of the sampling works of the National Gold Extraction Co. at Goldfield, Colo.

W. D. CORNISH, Pres. Oregon Short Line and Vice-Pres. Union Pacific, will soon be Vice-Pres. Oregon Railway & Navigation Co. and the Oregon Short Line; E. H. Harriman will succeed him as Pres. of the latter road.

W. B. VANDERLIP JR., who for three years past has been investigating placer deposits in Siberia for the Russian government, with headquarters at Vladivostock, is in San Francisco, Cal. He returns to Siberia in February.

IN the event of a positive declination on the part of Lieut.-Gov. Neff to accept further reelection as Pres. California State Miners' Association, Hon. E. C. Voorhies of Amador is looked upon by many as a suitable man for that position.

A. EKMAN, in charge of the California mineral exhibit at the Paris Exposition, is in the State Mining Bureau at San Francisco, superintending the packing and shipment of specimens secured. His Paris address will be 8 Place de l'Opera.

J. F. BURNS, J. F. Champion, S. D. Nicholson, J. Winchester, F. Woods, W. S. Buckley, S. V. Newell, W. D. Brainard and H. P. Lillibridge are the ten Colorado mining men chosen delegates to the California Miners' Association convention to be held in San Francisco October 23d.

Books Received.

"*Stories of Our Mother Earth*:" 220 pp., octavo, profusely illustrated; H. W. Fairbanks, Ph. D.; written for little folks but interesting to children of larger growth. There is not a dull line in the twenty-eight chapters, and the statements are geologically correct. "The Story of Petroleum," "The Work of the Wind," "Where Quicksilver is Made," "How Islands are Formed," are interesting and well told. Wittaker & Ray Co., San Francisco.

"*The Fireproofing of Steel Buildings*;" J. K. Freitag, C. E., 319 pages, octavo; treating exhaustively on the construction of modern buildings and methods of rendering them capable of resisting severe attacks of fire and water with a minimum of repairs after the fire. Illustrated. Published by John Wiley & Son., New York City; $2.50.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING OCTOBER 10, 1899.

634,568.—INSULATOR—C. N. Beal, S. F.
634,680.—RUBBER HEEL—C. M. Berry, S. F.
634,844.—ANIMAL TRAP—C. C. Bowen, Los Angeles, Cal.
634,845.—ANIMAL TRAP—C. C. Bowen, Los Angeles, Cal.
634,846.—ANIMAL TRAP—C. C. Bowen, Los Angeles, Cal.
634,609.—STUMP BURNER—J. O. A. Bredemeyer, Seattle, Wash.
634,612.—PUMP FOR GASOLINE MACHINES—E. J. Crawford, Campbell, Cal.
634,446.—TYPE WRITER ATTACHMENT—F. W. Dobbel, S. F.
634,574.—PROPELLER—J. S. Grant, S. F.
634,728.—LOCOMOTIVE ASH PAN—T. W. Heintzelman, Sacramento, Cal.
634,464.—LAMP BRACKET—B. F. Kent, Eugene, Or.
634,529.—GAS ENGINE—A. Lee, New Whatcom, Wash.
634,737.—LAND ROLLER—J. W. Newman, Plainview, Or.
634,584.—MANGLE—W. O'Connor, Oakland, Cal.
634,638.—OFFICE INDICATOR—C. V. B. Reeder, San Jose, Cal.
634,544.—HAY PRESS—E. J. Shirley, El Modena, Cal.
634,594.—RATCHET DRILL—C. S. Stafford, S. F.
634,781.—BOOK HOLDER—P. A. Veilex, La Canada, Cal.
634,840.—PUMP—F. B. Warring, San Jose, Cal.
634,655.—NEEDLE—Carrie A. Whitney, Los Angeles, Cal.
634,598.—TRUNK BINDER—N. Whittlesey, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PUMP FOR GASOLINE GAS MACHINES.—E. J. Crawford, Campbell, Cal. No. 634,612. Dated Oct. 10, 1899. This invention relates to apparatus which is designed for the manufacture of gasoline or hydrocarbon gas, and has for its object the connection of a generator, an air pumping mechanism and means for automatically regulating said mechanism. It consists of a double walled tank and a double walled cylinder open at the bottom and closed at the top with the walls of the cylinder embracing the inner walls of the tank. There is an air inlet pipe within the cylinder having an upwardly opening valve which admits air as the cylinder rises and cuts off the flow of air as the cylinder descends. A hydraulic motor is vertically disposed within the double walled cylinder and has a stem and piston connection therewith. An air pipe leads from the interior of the double walled cylinder, a water supply pipe with branches leads to points above and below the piston, valves in the branch pipe and levers connected with the stems of the valves. The supplemental cylinder and plunger rod extends from the same having one of the valve levers connected therewith so that the valves are operated in unison.

RATCHET DRILL.—C. S. Stafford, assignor of one-half to J. H. Blakeway, all of San Francisco, Cal. This invention relates to improvements in ratchet drills. It consists essentially of a hollow head with a handle by which it may be turned, a stationary ring fitting within the head having a central sleeve through which the drill spindle and socket piece pass. Beveled pinions are journaled radially within the stationary ring and ratchets having beveled gears attached to them to engage the pinions upon opposite sides. One of said ratchets has a key or feather which engages a corresponding key-way in the drill spindle and pawls are pivoted upon the head or handle engaging the ratchets, stops are employed against which the opposite sides of the pawls contact to alternately prevent one ratchet from turning, while the other is allowed to move freely. In conjunction with this is a feed screw spindle and socket piece in which it is turnable, said socket having a ball-bearing disk and race-way as its head and corresponding race-way in the yoke and balls fitted in said race-way.

Recently Declared Mining Dividends.

Homestake M. Co., regular 25 cents, and extra 25 cents; payable Oct. 25. Total, $7,933,750.

Amalgamated Copper Co., $2 per share; Oct. 16.

American Smelting & Refining Co., $1.75 per share; payable Nov. 1st.

American Zinc M. Co., $1 per share; Oct. 12.

Anaconda M. Co., Montana, $2 per share; payable Nov. 1.

Parrott M. Co., Montana, $1.50 per share; Oct. 12.

Mercur G. M. Co., Utah, $50,000; Oct. 20.

Bullion-Beck, Utah, $10,000; Oct 14.

Deer Trail No. 2, Washington, $2500; payable Oct. 25. Total, $42,500.

Grass Valley Exploration Co., California, $7500; Oct. 20.

April Fool M. Co., Nevada, $5000; Oct. 20.

A New Arizona Gold Mine.

TO THE EDITOR:—The King of Arizona gold mine is one of the largest properties of its kind in Arizona. The mill recently erected is of a type not commonly in use. The ore is crushed dry and treated by the cyanide process without amalgamation, principally because of the necessity for economy in the use of water. The mill is working perfectly, making a very high extraction, and less than 35,000 gallons of water are required for the treatment of 100 tons of ore per day. The company had previously hauled its ore to be treated at a 5-stamp mill at the Gila river, thirty-five miles distant. Drinking water was brought a distance of twenty-two miles. This made the development of the mine very expensive. Water in ample quantity has been found in one well four miles from the mine, and in another twelve miles distant. These holes were bored in the gravel, in the valley, and the water was struck at 1000 feet and 500 feet depth, respectively, and is piped to the mine. The ore is trammed from the mine to the mill by hand, and upon being dumped into a bin passes through a Gates crusher, is elevated to revolving screen of ¼-inch mesh, then passes through a set of slow-speed Gates rolls (Argall type). From these it is again elevated and screened when it passes to three sets of high-speed rolls of the same pattern which crush to 30 mesh.



KING OF ARIZONA MILL, YUMA COUNTY, ARIZONA.

The pulp is dumped into six steel vats 6 feet high and 50 feet in diameter and goes through the usual process of cyaniding, which in this case requires from eight to ten days time. The vats are sluiced out and the water used over again. Two 80 H. P. boilers and a 75 H. P. Corliss engine furnish the power required. The ore is principally hard porphyry, with considerable quartz, calcite, and heavy spar, and requires fine crushing. Notwithstanding the fact that there is a great deal of high-grade ore, the values are easily recovered, as the gold is extremely fine and well disseminated. The ledge occurs in porphyry and outcrops for over 2000 feet, varying from 12 to 30 feet in width. It is now a producer, and with an output of 100 tons a day it will take front rank with the leading producers in the southwest.

Gila City, Oct. 7th, '99.

LEAD ORES are reported as being shipped from Guaymas to Germany as ballast. Sailing vessels arriving at that port with merchandise often find it difficult to secure a full return cargo. The ore has to be transported a long distance to Guaymas at large expense, but it is estimated that at the present price of lead it will pay, as it costs little to ship it. Two small vessels have been loaded with high-grade ore carrying a small per cent of silver. The ore is taken from a mine near Buena Vista. The large lead deposits are seventy-five miles farther east. A German company is making the experiment.

Calkins' Cupel Machines.

F. W. Braun & Co., of Los Angeles, Cal., are making and selling three styles of machines that are of interest to assayers everywhere, as the makers claim that these machines will make perfect cupels, quickly, easily and cheaply, and each assay office can have by their use just the kind of cupel required. The three varieties are known as the Automatic, the Table, and the Wall machine. The Table is herewith illustrated.

Fig. 1 shows the Table pattern cupel machine with tray holding the properly moistened bone ash in position for filling the mold.

Fig. 2 shows Table cupel machine after the compression has been made and before the plate forming the bottom of the mold has been slipped away from under the mold or ring in which the cupel is compressed.

Fig. 3 shows the Table cupel machine after the plate forming the bottom of the ring or mold in which the cupel is formed has been slipped away from under the mold, thus permitting the cupel to be expelled through the mold and into the hands of the operator. After having expelled the cupel, the plate, or bottom of the mold, is slipped back under the mold, and the bone ash on the tray is pushed into the mold until the mold is even full, when another cupel may be made by going through the operations above described. F. W. Braun & Co., Los Angeles, Cal., will send an illustrated circular to any one interested therein.

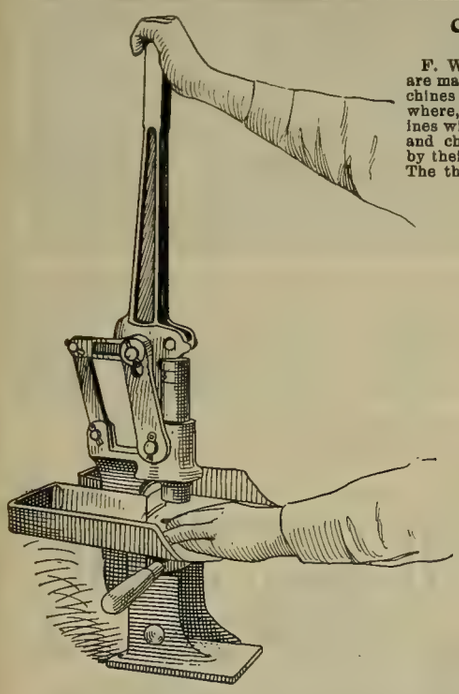


FIG. 1.

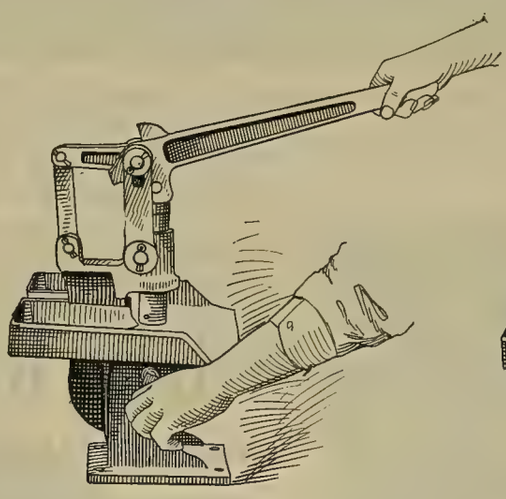


FIG. 2.

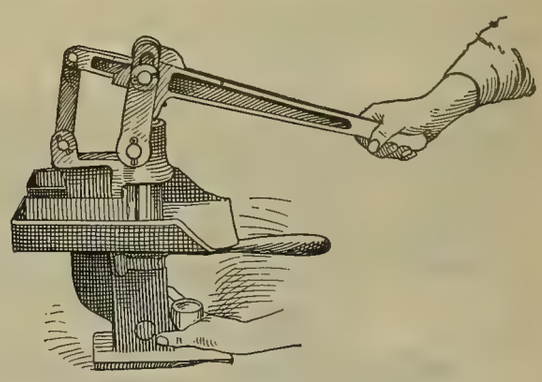


FIG. 3.

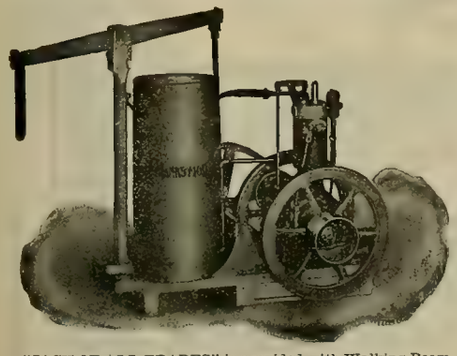
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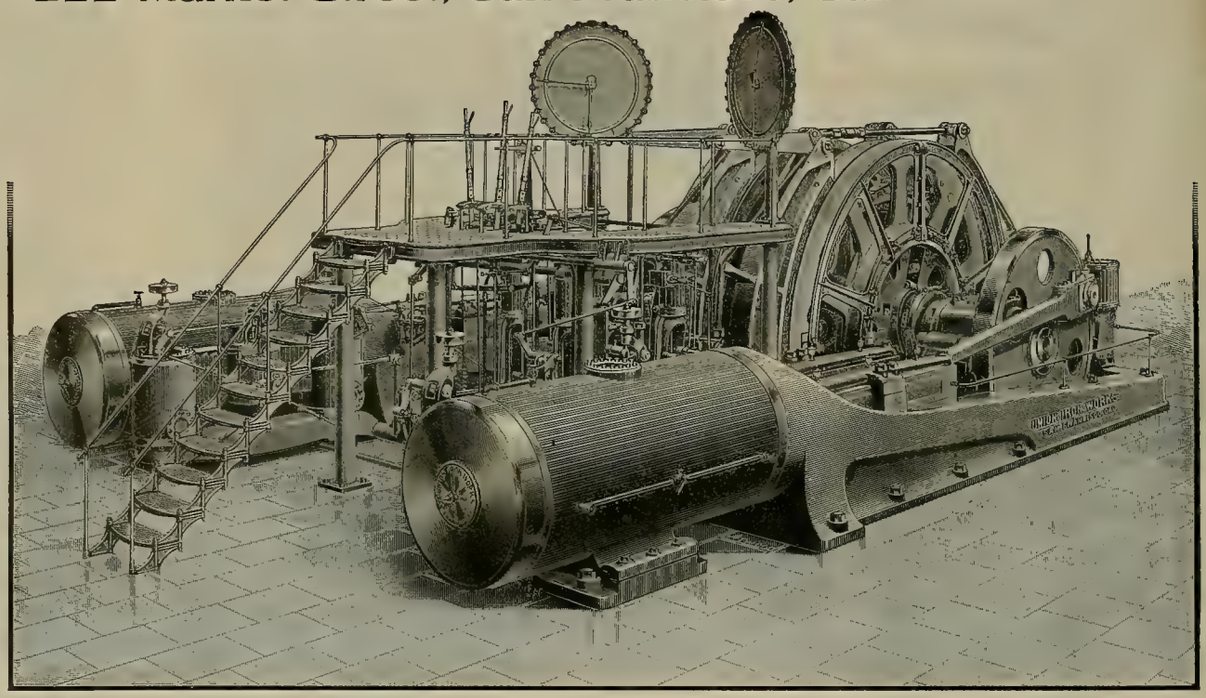
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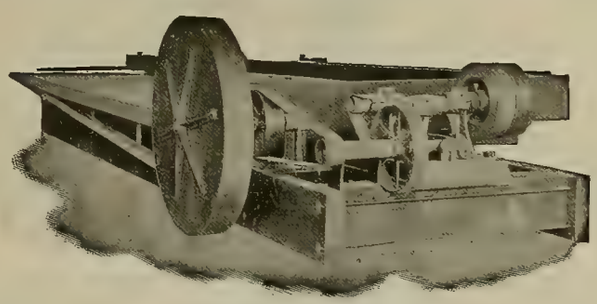


The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety. Shaft hollow forged steel of ample strength and stiffness to withstand any strains; reciprocating parts of steel and are as light as consistent with the duty required; cylinders of the "overhung" type, weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations; cylinders steam-jacketed, fitted with valves provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed; bed plates modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.

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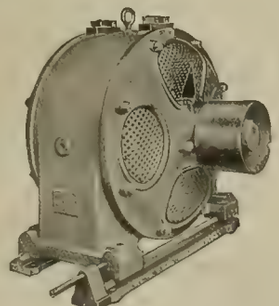
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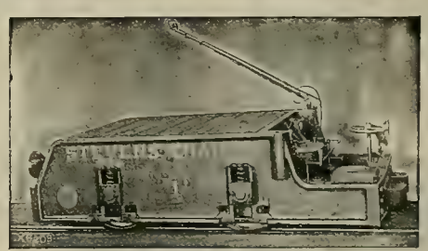


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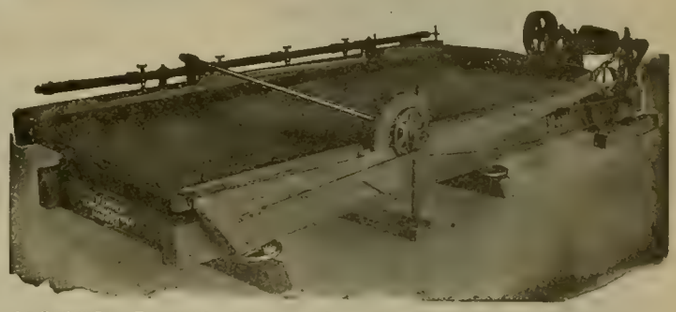
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Manufactured Under U. S. Patent No. 632,892; Dated Sept. 12, 1899.

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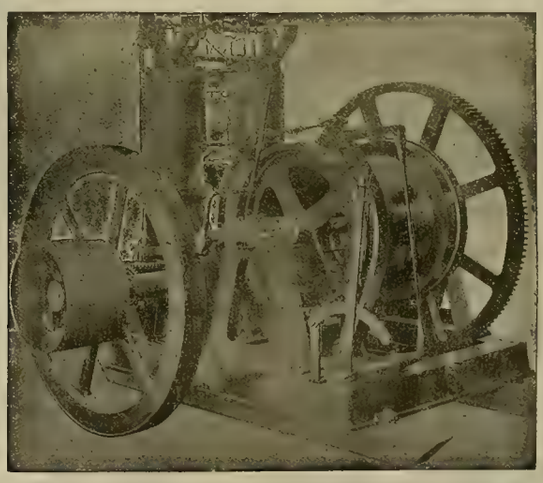
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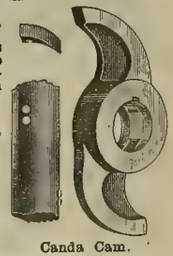


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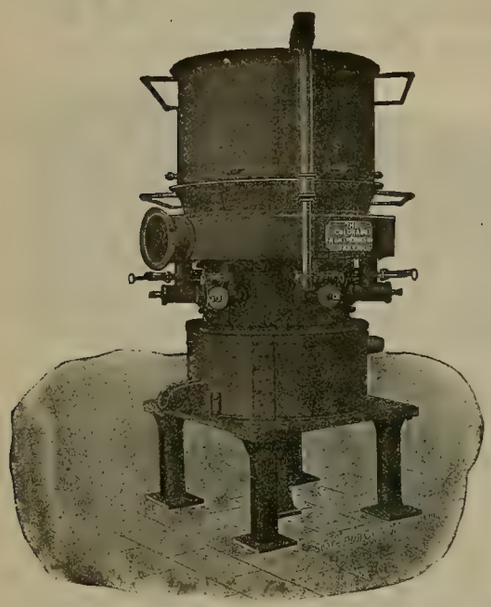
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(SEE PAGE 471.)

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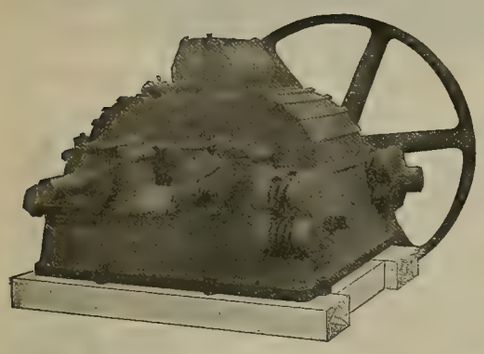
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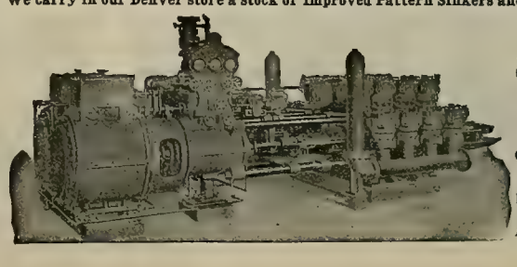
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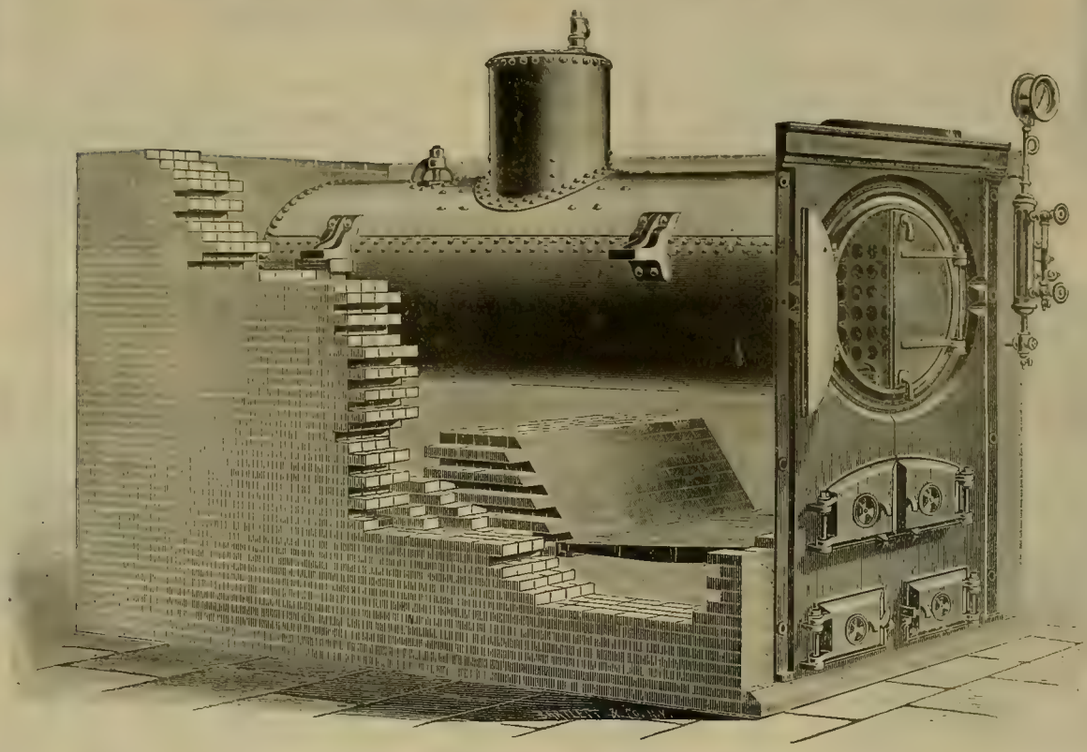
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The longitudinal seams of the shell are double-riveted, and the domes of No. 4 and larger sizes double riveted to boiler. The edges of the plates are planed, and the calking is done by Connery's patent concave system.

Special attention is given to the bracing, which is a most important item in boiler construction, and enough braces used to insure a large factor of safety.

SPECIFICATIONS OF "STANDARD" BOILERS.

NUMBER OF SIZE	1	2	3	3½	4	5	6	7	7½	8	9	10	10½	10¾	11	12	13	14	15	15½	16	17	18	19
H. P., as Usually Rated	10	12	15	20	20	25	30	35	40	40	45	50	60	65	60	70	80	90	100	110	125	150	175	200
Diameter of Boiler...in ins.	30	30	36	36	42	42	44	44	44	48	48	54	54	54	60	60	60	66	66	66	72	72	78	84
Length of Tubes used...in feet	7	8	8	10	8	10	10	12	14	12	14	12	15	16	12	14	16	15	16	18	16	18	18	18
No. of Tubes 3 in. diam.	20	20	28	28	38	38	46	46	46	52	52	64	64	64	82	82	82	98	98	64	120	84	88	108
Sq. Ft. Heating Surface..about	151	185	220	288	305	376	440	526	611	591	687	708	880	940	885	1028	1172	1296	1377	4 *tbs.*	1660	4" *tbs*	4" *tbs*	4" *tbs*
Length of Grates.....in inches	36	36	36	42	36	42	42	48	54	48	54	48	54	54	48	54	54	54	54	60	54	60	60	60
Diameter of Dome..... "	18	18	20	20	22	22	22	22	22	26	26	30	30	30	32	32	32	36	36	36	36	36	36	36
Height of Dome..... "	20	20	22	22	24	24	24	24	24	28	28	34	34	34	36	36	36	40	40	40	40	40	40	40
Thickness of Shell ..... "	¼	¼	¼	¼	9/32	9/32	9/32	9/32	9/32	5/16	5/16	6/16	5/16	5/16	11/32	11/32	11/32	3/8	3/8	3/8	7/16	7/16	7/16	7/16
" Main Heads "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	1/2	1/2	1/2
" Dome Shell. "	9/32	9/32	9/32	9/32	9/32	9/32	9/32	9/32	9/32	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
" Dome Head "	3/8	3/8	3/8	3/8	3/8	3/8	3/8	4/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Diam. of Smoke Stack.. "	14	14	16	16	20	20	22	22	22	24	24	26	26	26	28	28	28	30	30	30	34	36	40	44
Length of " ...in feet	28	28	28	35	28	35	35	40	50	40	50	40	50	60	40	50	60	60	60	60	60	60	60	60
Wt. of Boiler & Britchen..about	1900	2300	2600	2900	3500	4000	4300	4900	5500	6000	6800	7000	8200	8600	9000	9900	11000	12700	13000	14700	16000	17300	21000	25000
Wt. of Boiler Fixtures.... "	1500	1600	1700	1950	2200	2500	2600	2700	3000	3400	3500	3600	3800	3800	4000	4500	5000	5000	5000	5000	6000	6200	7000	8000
Wt. of Boiler & Fixtures ..about	3400	3900	4300	4850	5700	6500	6900	7600	8500	9400	10300	10600	12000	12400	13000	14400	16000	17700	18000	19700	22000	23500	28000	33000
Wt. of Flush-Ended Boiler with four Wall Brackets.....about	1800	2200	2500	2800	3300	3900	4300	5000	5500	5700	6500	7000	8000	8400	8600	9700	10500	12000	13000	14700	16000	17400	21000	24700
Wt. with Full Front and Fixtures.....about	4400	4900	5300	5800	7000	7700	8400	9000	10000	10200	11500	12000	13500	13900	14500	16000	17000	19000	20000	21700	24000	25000	30000	35000

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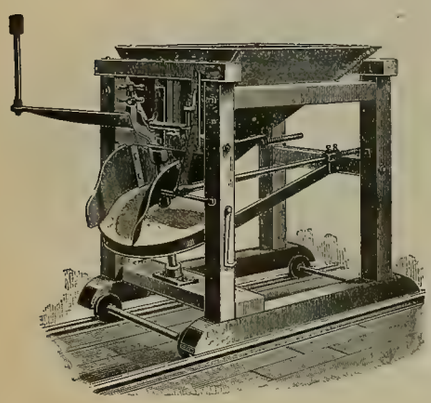
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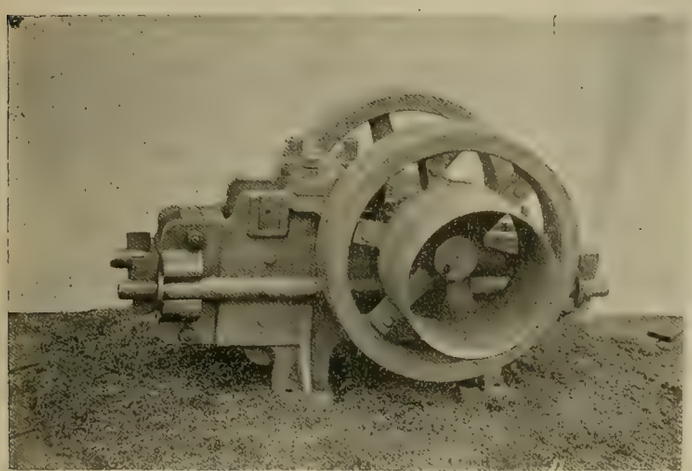
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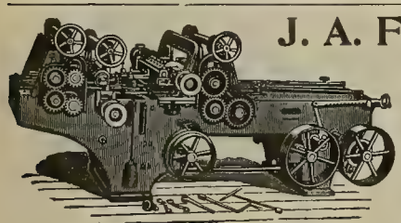
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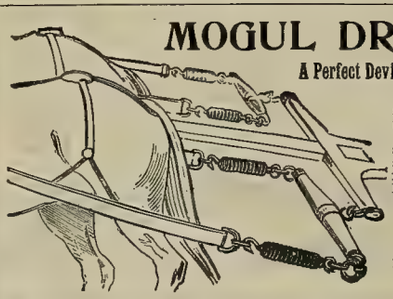
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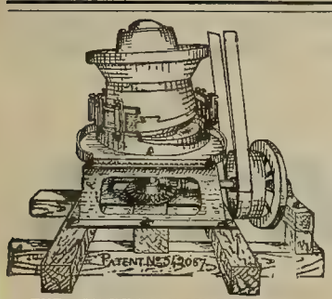
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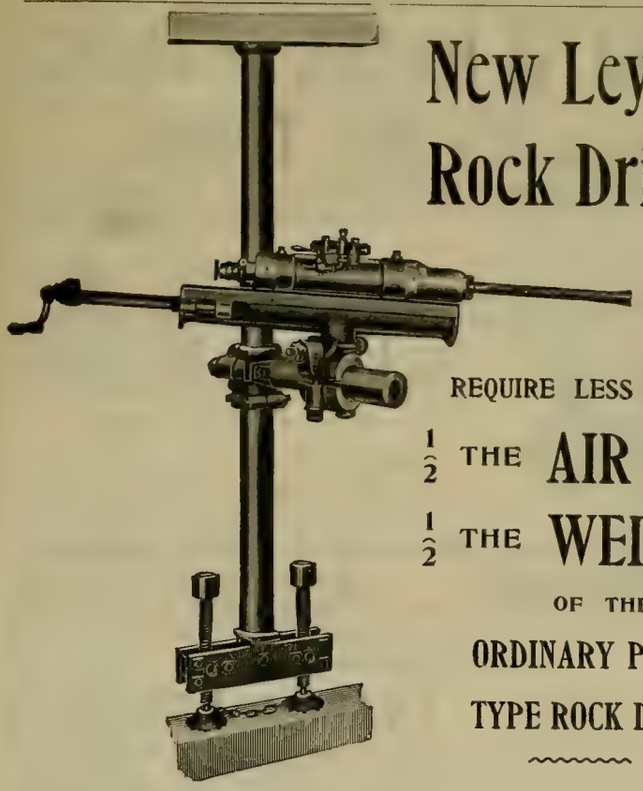
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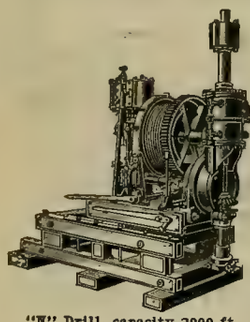
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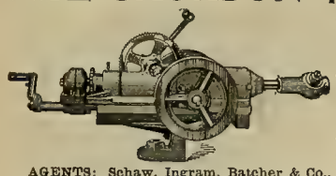
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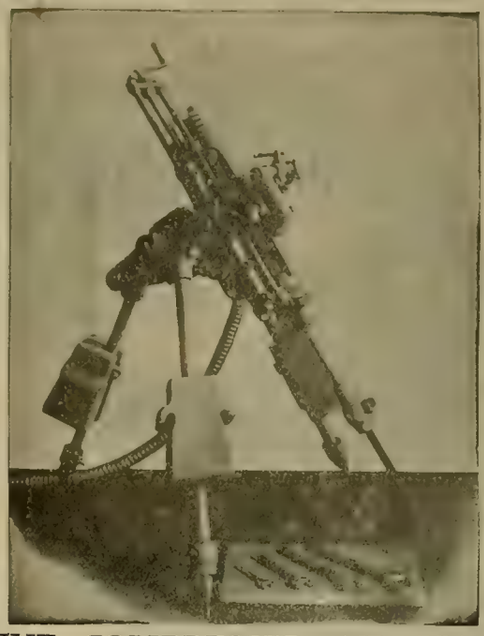
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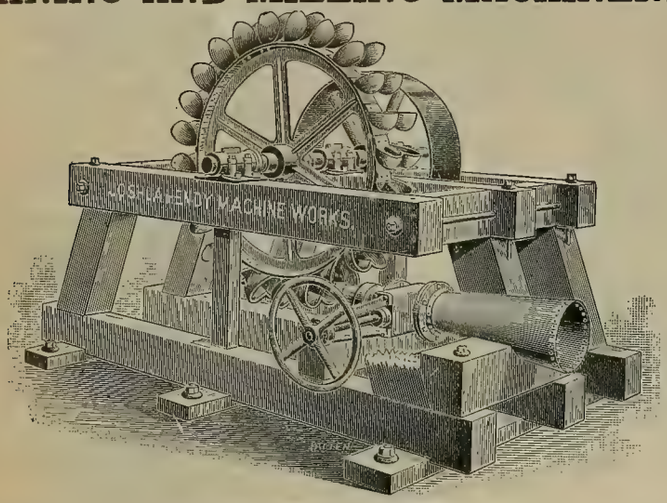
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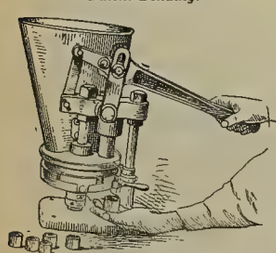


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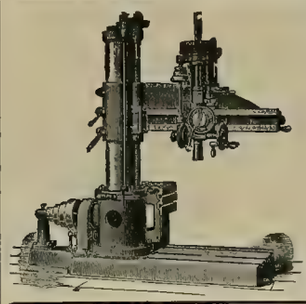
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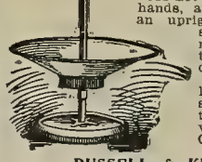
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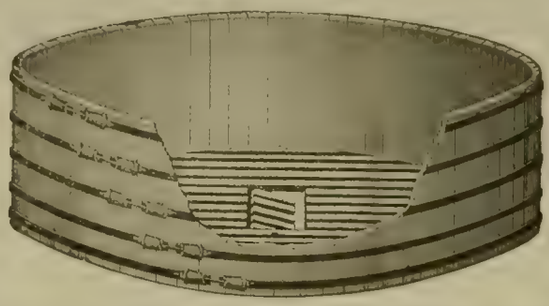
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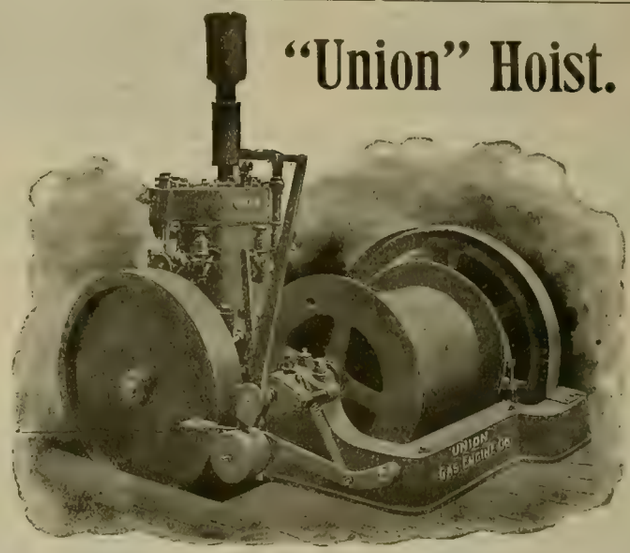
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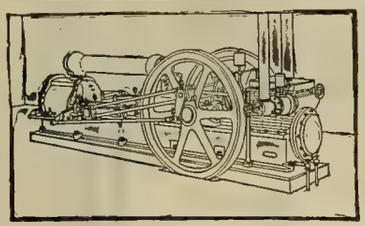
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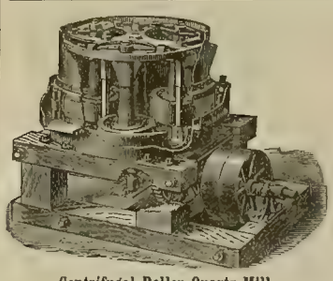
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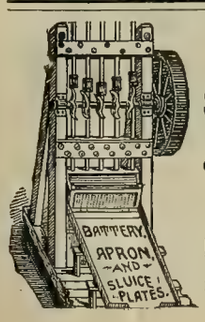
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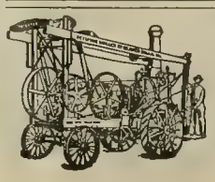
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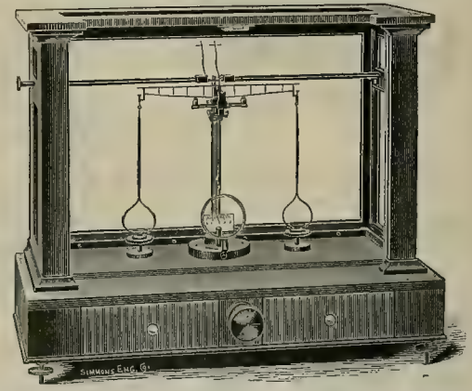
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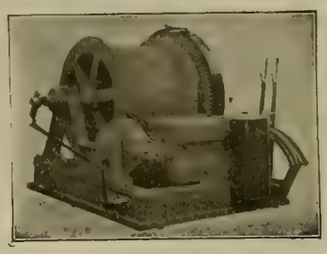
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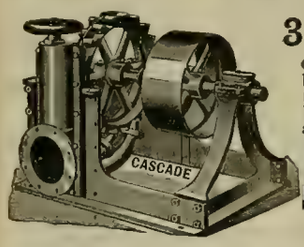
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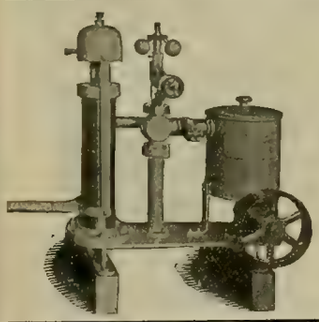
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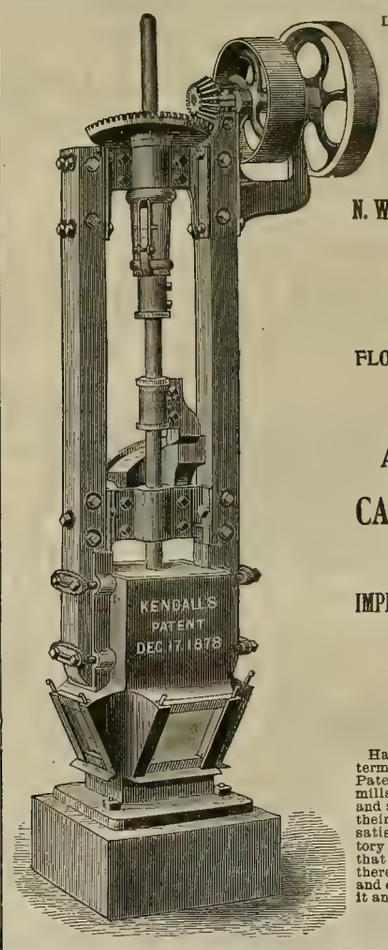
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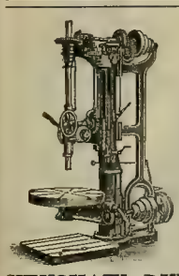
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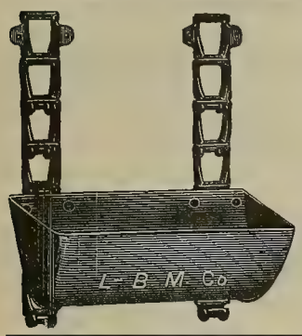
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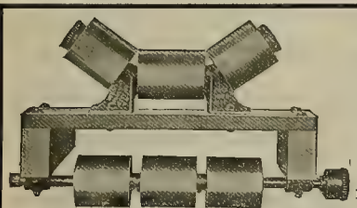


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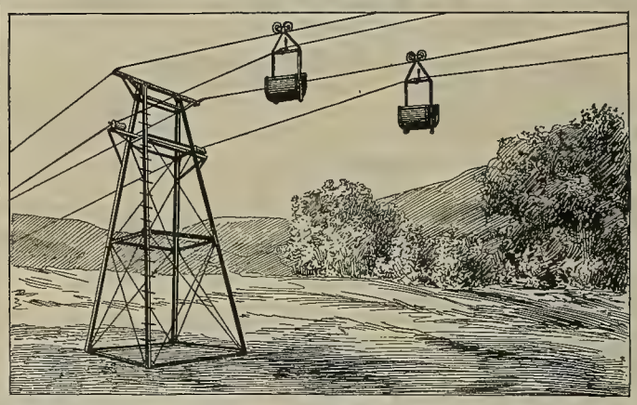


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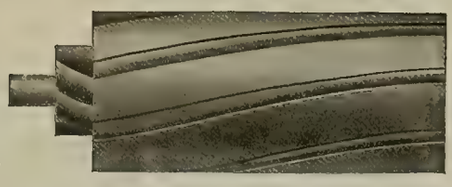
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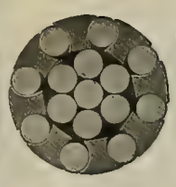
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Best and Cheapest Pump for Irrigating and Drainage Purposes.

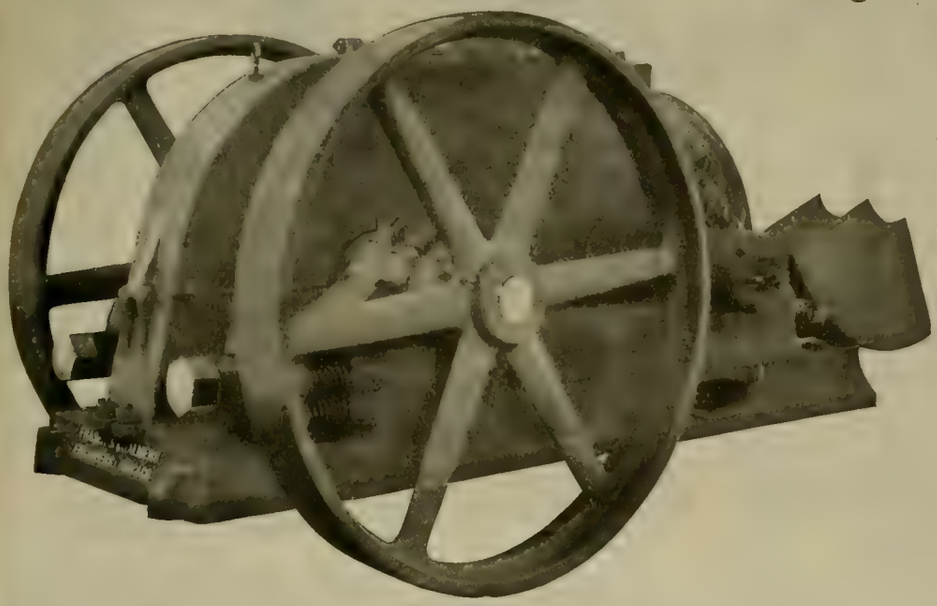
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COMPLETE LINE
Elevating, Conveying & Power Transmission Machinery.

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Send for Catalogue.

FRASER & CHALMERS, CHICAGO, ILL., U. S. A. LONDON, ENGLAND. Mining Machinery.



HIGH AND MEDIUM SPEED ROLLS of superior design,

STAMP MILLS,

SMELTING FURNACES,

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HOISTING ENGINES.

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Estimates on Request. General Agency for GREEN BLOWERS. FRASER & CHALMERS.



WOOD'S DEEP WELL
PROPELLER PUMP
For Deep or Shallow Lifts.

CAPACITY 100 TO 15,000 GALLONS PER MINUTE.

A simple screw propeller pump without valves or complicated parts. Fits into oil well casing of from 6 to 12 inches diameter and larger, the pump occupying but this space in shafts and in wells without pits dug to water level, and may be operated on an incline or vertically. Specially adapted for sinking purposes, pumping out sumps and river bottoms, and for handling large quantities of water economically and successfully. In writing, state work required.

Catalogue and Estimates Cheerfully Furnished.

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THE NATIONAL Feed Water Heater.



800,000 Horse Power Sold.

Delivering Water to the Boiler at 210 degrees F. Thirty Sizes from 5 to 4000 Horse Power. Made of the Best Seamless Drawn Brass or Copper Tube, with Hard Brazed Joints. Unsurpassed for SIMPLICITY, EFFECTIVENESS and RELIABILITY. Send for Catalogue.

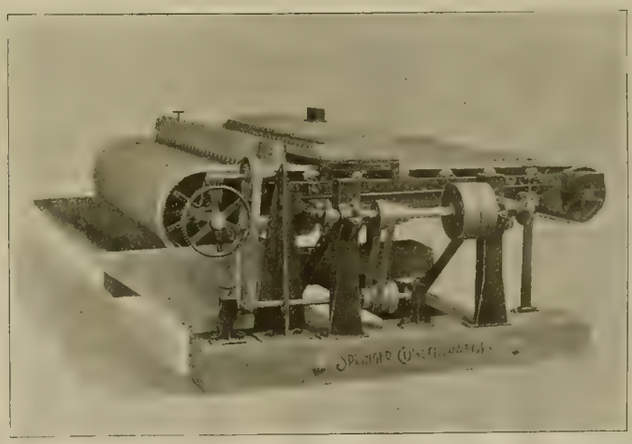
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THE SPRINGER CONCENTRATOR.



The best 6-foot rubber belt machine in the market. You will see at a glance that this Concentrator embraces all of the best qualities of other good concentrators, besides many adjustments and improvements which none of the others contain. This machine is shorter than any other concentrator. See report of Supt. Lowring of Utica mine in "Mining and Scientific Press" of Jan'y 14, 1899, wherein he out three 12-foot Frue vanners down to 8 feet in length and got a saving of 8 cents more per ton from the 8-foot than from the 12-foot machine after a thorough test of a run of thirty-five days. This is the strongest, simplest, most durable, less wear and tear, and takes less power to run than any other. It has only one-half as many pieces in its construction as in some concentrators. All belts are tightened by sliding boxes, and the shaking frame can be raised or lowered and leveled while running at full speed. Weight only 1500 pounds, thus a saving of one-half in transportation. This Concentrator is now running from Alaska to Mexico, and giving the best of results. All mining men should see thir Concentrator before purchasing any other. Price for 6-foot rubber belt machine, f. o. b., $400. Address all correspondence to

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THE
PNEUMATIC PROSPECTOR.

Size 6x11x14 in. Weight only 10 lbs.



PACKED FOR MOVING.

NO WATER NEEDED.

Gives a clean prospect from placer ground or free-milling ore by compressed air. The operation is purely mechanical. No chemicals, no quicksilver; no black sand remains with the gold. Will do work equal to careful panning.

THE PNEUMATIC SEPARATOR.

Weight 160 lbs.

Has a capacity of 20 to 30 cu. yds. of gravel per day. Will save fine and coarse gold and nuggets of any size, comparatively free from black sand. Will do better work under favorable circumstances than a sluice box. Indispensable for dry countries.

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The Original Cyanide Process.

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MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

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for California north of and including Mono, Madera and Merced counties; also for State of Nevada. Samples assayed and fully reported upon. Particulars upon application.

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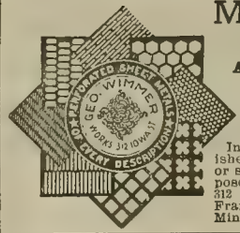
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Perforated Sheet Metals. Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

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Mining Screens
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Diagonal Slot,
Straight " "
Burred "
Round Holes.

In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.

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(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. ☞Extra sizes and lengths made to order on short notice

611 and 613 Front St., San Francisco, Cal.

Market Reports.

SAN FRANCISCO, Oct. 19, 1899.

SILVER.—London, 26 11-16d; New York, 57⅞; San Francisco, 57⅞; Mexican Dollars, 47⅞@48⅛; New York exchange, sight, 10; telegraphic, 15 cents premium.

Secretary Lyman Gage, while in Denver, prophesied a rise in the price of silver and advocated the coinage of the dollar coined by England and the Mexican dollar coined by the Mexican Government in the Orient. He said that such a dollar need not be made legal tender in this country, but that it would circulate freely in our new possessions. He says that he will present a bill to this effect in the next Congress.

LEAD.—New York reports dull, $4.57½ bid, $4.62½ asked; brokers' price, $4.40.

Local, pipe, 7¼@7¾c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6½c.

COPPER.—New York reports Lake very quiet at $18.25; brokers' price, $18. Local—Mill copper plates, 23¾c.

The copper market appears weak, and has fallen a fraction within the week. Most of the large mines have disposed of their product for the present year. The copper market will be influenced by the price made by Calumet & Hecla at its next sale.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11½@20c per pound.

TIN.—Dull, $31.50 bid and $32 asked; pig, 36@39c per lb.

The tin market has been quiet lately. Most of the recent fluctuation is apparently due to manipulation of speculators.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $47; export, $42@42.50; carload lots, special rates.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 66s per ounce; New York, $17.75; San Francisco, $17.25.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ℔ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¼@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1½c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CORDAGE.—

	Sisal.	*Manila.*
1¼-in. cir. (7-16 dia. and upward	13½	16
12-thread (⅜ dia ....)	14	16½
8 and 9 thread (¼ and 5-16 dia.)	14½	17
Bale Rope (3 and 4 strand)	13½	16
Bale Rope (2, 6 and 8 strand)	14	16½

In quantities not less than 10,000 lbs.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 18, 1899.

9:30 A. M. SESSION.

200 Belcher	22c	500 H. & N.	39c
200	23c	100 Overman	21c
200 Bullion	04c	200	20c
1750 Challar	34c	800 Potosi	50c
400 Con. Cal. & Va.	$1 70	450	49c
300 Crown Point	17c	500 Sierra Nevada	64c
200 Gould & Curry	36c	100 Yellow Jacket	28c
800 Hale & Norc's	40c		

2:30 P. M. SESSION.

300 Belcher	20c	150 Hale & Norcross	38c
300 Best & Belcher	33c	600	37c
200 Challar	32c	300 Mexican	29c
200	31c	300 Ophir	82c
100 Con. Cal. & Va.	$1 60	200 Potosi	47c
350	$1 65	100	46c
600 Crown Point	16c	600 Utah	11c
900 Gould & Curry	36c		

Mining Stocks and Securities for sale. Purchaser guaranteed against loss. Correspondence solicited from people wishing to buy Stocks and Securities, and also from brokers and others who are able to dispose of Stocks and Securities.

Address **E. N. BREITUNG,**
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S. O. Graham. J. H. Garrett. J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
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Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
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All the oil lands of the Union-Consolidated Oil & Transportation Company have been bought by us.
WE HAVE OIL LANDS
In Merced, Contra Costa, San Mateo, Santa Clara and Colusa counties. Oil in 60 days our experts claim. Shares now at $5 for a limited time only. Particulars on application. New York references.
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For Sale in Lots to Suit.
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FOR SALE—CYANIDE PLANT,
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Plant in full running order, with all latest improvements. Address JOHN S. MacBETH, Equitable Building, Denver, Colorado.

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And other Chemicals for Mining Purposes.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.

No dust. No ashes. Cheap, effective, economical, portable and automatic.
SEND FOR PRICE LIST TO
W. HOSKINS, 81 South Clark St., Room 58, CHICAGO, ILL.

ACCOUNTANT.—Expert accountant, now employed by one of the largest mining companies in Colorado, wishes to make a change to lower altitude on account of his wife's health. Am familiar with all the details of a mining office. Best references. Address H. A., Mining and Scientific Press.

WANTED—For Eastern syndicate, developed and paying gold mine; no limit as to price. FOR SALE—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

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Mining Engineer and Metallurgist Desires Position as Superintendent.
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Address F. VALENTINOV, Apartado Postal 814, City of Mexico.

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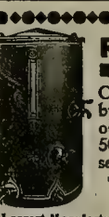
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Machine Men,	3.50
Miners in shafts,	3.50 to $4 00
Carmen,	2.50 to 3.00
Shovellers,	2.50
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Apply to THE SILVER-LEAD MINES ASSOCIATION, Sandon, British Columbia.

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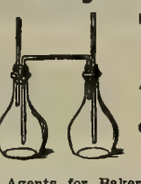
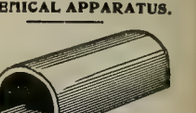
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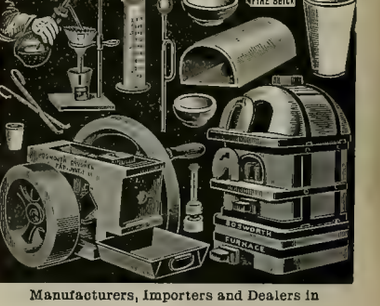

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Send for Catalogue 38.

Mines for Sale.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FOR SALE.
Gold Properties in Various Stages of Development.
Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

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63 First Street, San Francisco, Cal.
Manufacturers and Importers of
Assayers' Material,

FURNACES, SCALES, BALANCES, WEIGHTS, ETC.
ALSO, MINE AND MILL SUPPLIES, CHEMICALS AND CHEMICAL APPARATUS.
Agents for Baker & Adamson's Chemically Pure Acids. A full stock always on hand. Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.

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We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.
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LEVER UP, Oil Dropping; LEVER DOWN, Oil Shut Off.

Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?
In stock by all Jobbing Supply Houses.
Manufactured only by
THE WM. POWELL CO.,
Cincinnati, O.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 2. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

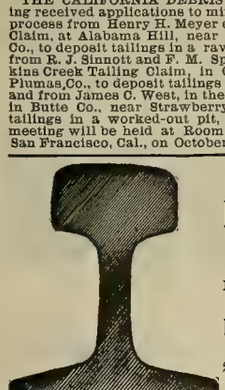
STOCKHOLDERS' MEETING.

Notice of Stockholders' Meeting of the Oneida Gold Mining & Milling Company.

In accordance with a resolution passed by the Board of Directors of the Oneida Gold Mining & Milling Company, a meeting of the Stockholders of this company will be held at 2 o'clock in the afternoon on TUESDAY, the 24th day of October, 1899, at its principal office, Room 24, No. 320 Sansome St., San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars in Four Hundred Thousand Shares at the par value of Five Dollars each. JOSEPH H. MOOSER, Secretary.

Dated San Francisco, Cal., Sept. 8, 1899.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Henry H. Meyer et als., in the French Claim, at Alabama Hill, near Downieville, Sierra Co., to deposit tailings in a ravine below the mine; from E. J. Sinnott and F. M. Spencer, in the Hopkins Creek Tailing Claim, in Goodwin Township, Plumas, Co., to deposit tailings in Hopkins Creek; and from James C. West, in the Eagle Gulch Mine, in Butte Co., near Strawberry Valley, to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 30, 1899, at 1:30 P. M.



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Assessment Notices.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of October, 1899, an assessment (No. 9) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of November, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 21st day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 16th day of September, 1899, an assessment (No. 20) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of October, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 15th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 13th day of September, 1899, an assessment (No. 1) of Two ($2) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, No. 310 Pine street, rooms 15 and 17, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of October, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 28th day of November, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. W. PEW, Secretary.

Office—No. 310 Pine street, rooms 15 and 17, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of September, 1899, an assessment (No. 13) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of November, 1899, will be deliaquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1899, an assessment (No. 33) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, 10th floor Mills building, San Francisco, California.

ANDES SILVER MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of October, 1899, an assessment (No. 49) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of November, 1899, at 1 o'clock P. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of October, 1899, an assessment (No. 8) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

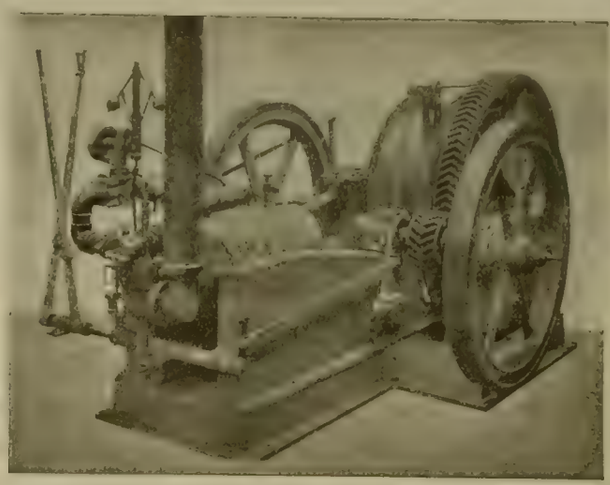
Any stock upon which this assessment shall remain unpaid on the 11th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

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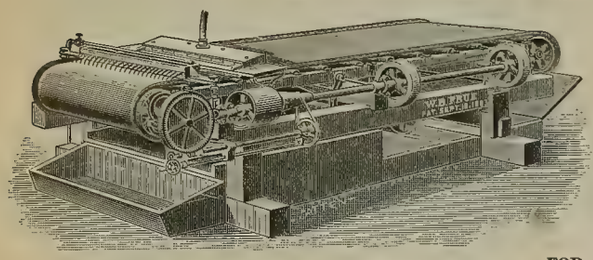
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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

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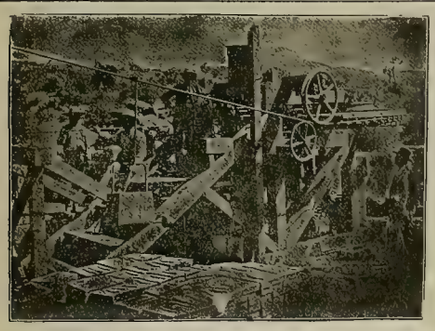
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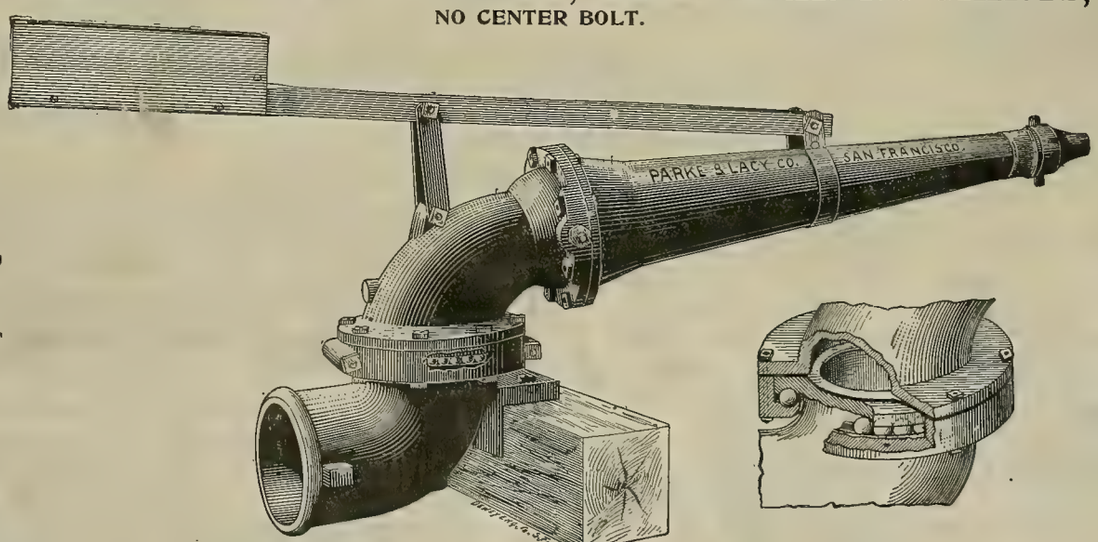
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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2051.—VOLUME LXXIX. Number 18. SAN FRANCISCO, SATURDAY, OCTOBER 28, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Mines and Scenes in British Columbia.

Among the numerous beautiful sheets of water in British Columbia is that known as the Upper Columbia lake. These lakes, some of them merely the widening of a river, are all picturesque and form one of the most pleasing features of that scenic region. Within two miles of Upper Columbia lake a number of locations have been made on a series of quartz ledges, all of which are similar in character. There are several groups of claims, prominent among which is the Thunder Hill, which is described by the Provincial Mineralogist in his last report. The group consists of four claims, on which over $12,000 had been expended in development and improvements, not including a tramway from the mines to the concentrating mill, two miles distant. The main workings expose a vein 100 feet wide. An interesting fracture has taken place across the strike of the ledge, with a displacement of 50 feet. Where the ends of the broken ledge abut there was found a concentration of galena, from which a large amount of ore has been taken and to treat which the mill was built. Galena is disseminated through the ledge, but nowhere else in as great quantity as at the fault referred to. Auriferous pyrite also is found, but not abundantly. The concentrator is built on a steep sand bluff overlooking Upper Columbia lake. It is equipped with rock breaker, crushing rolls, jigs, buddles and all necessary devices for concentrating the ores of the mines.

Lake Windemere, in the East Kootenay division, is formed by a broadening of the Columbia river and is a beautiful sheet of water, navigable for small vessels. One of the accompanying engravings is that of the lake steamer Duchess at a landing.

The engravings giving views of the Thunder Hill concentrator and of Lake Windemere form a striking contrast with the wild mountainous scenes depicted in the remaining engravings. That of Mt. Thomas is reproduced from a photograph taken from the Pretty Girl mine, which is situated on the head of Boulder creek at an altitude of 9250 feet and 3000 feet above the canyon. The summit of the mountain, snow-capped and treeless, rises several thousand feet higher.

Even more wild and forbidding is the illustration of Spillimachene mountain, buried in snow and surrounded by deep chasms, from the depths of which comes the thundering roar of a rushing mountain torrent. Yet even on this mountain the prospector has built his monuments and opened veins rich in galena and copper. Ore from the Hidden Treasure, on this mountain, returned 53% copper.



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MOUNT ST. THOMAS, BRITISH COLUMBIA.



THUNDER HILL CONCENTRATOR, BRITISH COLUMBIA.



STEAMER ON LAKE WINDEMERE, BRITISH COLUMBIA.

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J. F. HALLORAN.....Publisher

San Francisco, October 28, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Middle Fork Spillimachene, B. C.; Mount St. Thomas, B. C.; Thunder Hill Concentrator, B. C.; Steamer on Lake Windemere, B. C., 485. General View of Cyanide Plant at Taylor Mine, El Dorado Co., Cal.; Tailings Pile and Disintegrator, Taylor Mine, El Dorado Co., Cal., 489. Wm. C. Ralston of Calaveras Co., Cal., 490. Latest Mining and Metallurgical Patents, 491. A Chamber in the Aspen Mine, Colo., Timbered with Square Sets, 493. The Wurdemann Automatic Dividing Engine, 493.

EDITORIAL.—Mines and Scenes in British Columbia, 485. The Advantages of Sorting; The California Miners' Association; Miscellaneous, 486.

MINING SUMMARY.—495-496-497.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 510.

MISCELLANEOUS.—Concentrates, 487. Method of Working at the Taylor Mine Cyanide Plant, El Dorado County, Cal., 488. California State Miners' Association, 489-490 The Hoosac Tunnel Fan Tested; A Direct-Current Power Transmission, 490. Latest Mining and Metallurgical Patents, 491. Progress in Ore Reducing Machinery; Mining in Aspen District, Colorado; Modern Instrument Makers and Tools; If Private Property, No; Government Property, Yes, 493. The Influence of Forests Upon Storage Reservoirs; New Demand for Aluminum; Ammonia as a Fire Extinguisher; Draining Wet Tunnels, 494. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 497.

WHEN experimenting with metallurgical processes it is better to endeavor to adapt the process to the ore than to search for an ore adapted to some pet process.

THE paying of unearned mining dividends is a reprehensible practice that usually ends disastrously. It is noticed that there are mines in the market today declaring regular dividends which are not earned, though the public is led to believe that they are.

MINING is an industry that thrives in almost every land. For years the hardy advance guard of this great industry have been pressing farther and still farther northward until they are now winning success on the edge of the arctic circle, and they are looking beyond it. For centuries the lands of the temperate and the tropical zones have yielded their mineral wealth to the tireless workers, who still continue to find new fields in the unknown wilderness of Africa and in Oceanica.

A CONTINUANCE of the war in South Africa for any considerable period will no doubt result in widespread commercial disturbances for the reason that the sudden discontinuance of one-third of the gold output of the world cannot but have its effect. No doubt it will materially affect the zinc mining industry also in the United States by a falling off in demand from South Africa of zinc for cyanide operations, it being doubtful if the necessary demand from other directions will equal the loss in the Transvaal.

ELSEWHERE herein appears a contribution on The Progress in Ore-Reducing Machinery, which is a brief resume of advancement in this direction during the past fifty years. While all mining engineers are agreed that the stamp as applied to the crushing of ores is not perfection itself, still it is the most simple machine in use for this purpose, and it is doubtful if it will be generally supplanted. That rolls are superior to stamps for the crushing of heavily sulphureted ores which are to be concentrated is generally understood, but that any one method of crushing ore of all classes will come into universal use is doubtful, for the reason that ores of various character require different treatment. Stamps will probably not be replaced by other devices for crushing hard, free-milling gold ores or any ores which do not slime abnormally, and rolls will come into more general use for crushing heavily sulphureted ores, while a combination mill, including the ball mill, will find its field of usefulness as well.

The California Miners' Association.

Elsewhere is given a summary of the transactions of the eighth annual convention of the California State Miners' Association. To publish all of what was done and said would transcend the limits of the entire twenty-eight pages of this issue.

The California Miners' Association is unique. It is not the first California Miners' Association, but it has longest held together, has done most for the mining industry, and gives promise of future value. It is looked to by other similar organizations, and its transactions and record are cited as models or guides for similar action. It has the best skill in the State or on the coast at its constant command. Mining lawyers, mining experts and skilled miners, practical men, professional men, State and national officials, men of brains, experience and knowledge—all serve the Association and give of it their valuable time without pay. Men who would courteously decline to take up a matter concerning mining within their province for less than a retainer of $1000; men with large business interests, requiring their constant personal supervision, will, at the behest of the Association, leave their homes, pay their own expenses, and toil for two days and part of two nights preparing reports, or drafting resolutions, or securing necessary funds, or information, or give expert advice, or do whatever else is delegated to them by the Association, with no thought of asking or expecting any financial return. Men of affairs also gladly give their time to furthering the interests of the Association in a variety of ways, with no expectation of advertisement therefrom or personal reward. This is the unique part of it: that the Association has constantly been able to secure high-class service without pay, and with the constant understanding that no one is to make anything out of his position.

There are things in this world that can not be bought, and the California Miners' Association is able to get free of any charge what would annually cost it $100,000 were ruling rates for such high-class work to be charged. It spends a little money; it has collected and paid out about $50,000 in its seven years of existence, and is in funds. The Association is purely voluntary; it is not even incorporated; it has no source of income but voluntary contributions, a nominal assessment of $1 per year from each member, and contributions from merchants, manufacturers and others who realize what such an organization means to the mining industry.

The Association has steadily declined to mix up in politics, to shoulder any one's responsibilities, to take up any one's troubles, or to put any one into position. It has steered clear of entanglements that might wreck it, and, while it has made some mistakes, has done so much, and, throughout, acted so wisely, as to merit general commendation. It has no organ, no one to be taken care of, and with enlightened selfishness tries to get the best out of every man, to the end that the general good shall be subserved. Its life will be in exact proportion to its usefulness, and if the miners of California should decide that it is no good to them, or not run in their interests, its subsequent days would be very short. Its chief danger would lie in the possibility of getting away too far from its original purpose, in ignoring the immediate needs of the men who make up its membership, or of trying to spread itself over too large and ambitious a programme. So long as it is run by miners, for miners, and in the interests of the mining industry, it will prosper, and deservedly.

The annual meetings are only public and prominent yearly manifestations of its existence. The yearly conventions are for consultation, reports, elections, and that renewed enthusiasm always resulting from personal contact of zealous workers in a common cause. But the real work goes on unceasingly, continuously; never hasting, never resting, it works on through its officers and committees without cessation, and much of the prosperity of the mineral industry of the State is due to its existence, influence and example.

In South Africa the English signal corps are to try wireless telegraphy in instances where the wires have been cut by the Boers. If this can be accomplished successfully it will practically render the cutting of telegraph wires on land useless.

The Advantages of Sorting.

Undoubtedly much of the rock put through quartz mills does not contain sufficient value to pay for its crushing, while encroaching upon the capacity of the stamps which might be employed in crushing pay rock. The question for the mine manager to determine is: does the rock being sent to mill contain waste, and, if so, how and where shall it be gotten rid of—underground or on the surface?

In some mines the barren rock occurs in large masses, interstratified, as it were, with pay rock, and the conditions are such that the waste may be left standing, as pillars, which to some extent help in supporting the ground. In others this cannot be done, and the waste must be mined together with the ore. Here, again, the question of sorting must be determined by existing conditions. If the waste occurs in large blocks, these may be rejected by the miners—who usually are able to distinguish the difference between waste and ore—and used as filling. If, on the other hand, the waste breaks small and, from necessity, becomes intimately mixed with the ore, then the sorting would be more effective, expeditious and less expensive on the surface, where boys or cheap men might be employed in this light work. Where this is necessary, the cost of tramming and hoisting has to be taken into consideration.

As a general proposition, all rock which, having reached the surface, contains sufficient value to pay even the cost of milling, or near it, should be crushed, as being less expensive than sorting. Where large amounts of ore are crushed and the tailings are subsequently cyanided, the crushing and after treatment of waste rock amounts to a large sum in the course of a year.

In the case of a 100-stamp mill crushing 400 tons of rock daily at a cost of 40 cents per ton, if 10% be waste, containing no value, then the cost of crushing this waste would amount in one year to $5840, bringing the cost of crushing the 360 tons of pay rock daily to 44+ cents per ton. If the cyanide process be subsequently employed in the treatment of the tailings in bulk, an additional expense is entailed in direct proportion to the cost, as in the mill, so that it becomes evident that the management can afford to expend the amount of the cost of crushing the additional waste rock in sorting it out, for it will result in ultimate gain in subsequent treatment.

On the Rand in South Africa, during July, the 5930 stamps in operation there crushed 804,000 tons of ore, though 1,009,000 tons were delivered at the mills. The difference, 205,000 tons, was waste, and represented 20.3% of the entire amount raised. To have crushed this additional amount while securing the same capacity on pay rock in the mills would have required an additional 1200 stamps.

Generally speaking, it pays to sort ores going to mills where crushing is done on a large scale at low cost; but where ores are shipped to custom mills and smelters, where transportation charges and treatment are high, the reasons for careful sorting are obvious.

AN energetic and observant miner in Arizona has discovered that some copper prospects on Castle creek in that Territory "are on the fault fissure which runs from the copper mines of the Grand canyon of the Colorado through the United Verde, the copper mines of Bigbug, the Ajo, and on to the French copper mine on the Gulf of California." In having made so valuable a discovery it seems unfortunate that he did not look farther and he might have as easily reached the conclusion that the northward extension of the same belt took in the Paradox mines in Utah, the Grand Encampment, Wyoming, and the copper mines of Butte, Montana. To believe this would require no great stretch of such an elastic imagination as that possessed by this discoverer.

IN view of the approaching convention to be held in San Francisco, Cal., on Nov. 14, for the purpose of considering that important topic, "the conservation of water," the article written by Jas. D. Schuyler, which appears on page 494, is of more than ordinary interest. The annually recurring drought in the State of California suggests that some active measures be taken to restrain and conserve at least a portion of the billions of gallons of flood waters that now, for the most part, flow away and are lost.

Concentrates.

A FLASK of quicksilver contains 76½ pounds, and is worth at present prices about $47.

WAGES of employees at the Ontario mine, Park City, Utah, have been raised 25 cents per day.

THE shipment of nitrate from the Chilean mines, it is said, will reach 30,000,000 quintals this year.

THE new Osceola mine, owned by the Calumet & Hecla Co., on Lake Superior, is said to be the largest new mine opened on the lake in recent years.

WHEN the manufacture of aluminum was first commenced in Pittsburg, Pa., it sold for $17 per pound. Its present price is 31 cents per pound.

THE noise and other discomfort attending a steam escape can be obviated by the use of an exhaust head, supplied by any dealer in steam fittings.

THE United States Geological Survey corps is at present compiling a topographical map of the Bingham and West Mountain, Utah, mining districts.

THE city of Chicago has 1000 miles of electric railway, 250,000 incandescent lights, 10,000 arc lights and 20,000 H. P. supplied from central stations to small motors.

PROSPECTORS searching for ideal conditions, or for conditions in a new country similar to that with which they have become familiar elsewhere, are often disappointed.

IN concentrating ores, the more valuable the concentrated material the more care should be taken to secure a clean and complete separation of the valuable from the worthless portions.

SOLDIERS returning from the Philippines who are from the mining regions of the United States unite in saying that there is gold in the islands, but none of them claim them to be very rich.

A WIDE AWAKE MINER at Butte, Montana, is said to have discovered a fractional piece of ground adjoining the Parrott ore-house in the heart of the Butte mineral zone, and located it under Federal laws.

A NUMBER of instances of the discovery of rich veins of ore by crosscutting have been recently announced. The importance of crosscutting in mines either old or new should not be underestimated.

LEADERS of the miners' union in the Slocan, B. C., mining district have endeavored to induce from mine managers a guarantee to miners working on contract a minimum wage rate of $3 50 per day. This has been refused.

THE confidence in the value of the California gold mines at great depth is evidenced in the large amount of money being invested in sinking deep vertical shafts and in their equipment with heavy modern machinery.

ACACIA has been found to make good mine timbers when the trees are thirty or more years of age. For some purposes redwood makes a superior mine timber, being enduring and not suffering materially from decay.

LARGE quantities of water in a vein are not an indication of valuable ore bodies, though they often prove the necessity of liberal assessment. Some very profitable mines are comparatively dry while some extremely wet ones never have paid anything.

ALL the silver smelted in Russia is extracted from argentiferous lead ores. All the gold produced in Russia contains silver. Silver smelted by private individuals is subject to a tax, reduced in 1887 from 15% to 3% for freehold and 4½% for leasehold works.

STEEL cement is now made from furnace slag, which, after going through certain processes, is combined with other ingredients, with the result of a cement that has exceptional strength and durability, being especially suitable for heavy foundation work.

IN the early days of mining in Leadville solid masses of silver chloride (horn silver) weighing many pounds were taken from mines on Fryer hill. In southern Yavapai county in 1890 a number of lumps of horn silver were picked up in placer mines by Mexicans.

THERE is a tendency in mining regions where water is sufficiently abundant to utilize the power which the water will furnish and transmit it by electricity for operating machinery, dispensing with fuel and the direct application of power by impact wheels.

A VERY high heat has been obtained in the reverberatory furnace by means of the petroleum blast, but this method has not, as yet, been successfully applied to the manufacture of iron from ore, though natural gas has been used for this purpose with success in Pennsylvania.

THE mining camps of Pioche, Nevada and Tombstone, Arizona, each had a similar experience with regard to water. Down to about 1100 feet the mines were dry, and below that level, in each instance, the water was so abundant that mining operations were partially suspended.

WITHIN recent years the discovery of rich deposits of gold, silver and other ores in quartzite has attracted more attention to rocks of that character. Usually these ore deposits in quartzite are accompanied by dykes of eruptive rock. There are important exceptions to this, however.

IT is thought by some competent mining engineers that the tunnel talked of for draining the mines of Leadville, Colo., which would start at Malta, is not a good business proposition, as it would be 30,000 feet in length and would not reach to as great a depth as the deepest mines in the district.

THE relative age of ancient river channels is usually determined by their position and often by the character of the volcanic cap. Unless the course of the channels intersect, it is not always possible to determine the relative age. Usually the channels which have cut to the greatest depth are the latest, but there are exceptions to this.

WOLFRAMITE often occurs associated with tin ores, and in this relation is found in the Black Hills of South Dakota, where it occurs in the granite dykes with cassiterite. It was formerly called by Cornish miners mock lead, they believing from its great weight that it contained lead. It occurs in numerous localities in the United States. In Connecticut, in Fairfield county, the wolfram ore occurs as wolframite, scheelite and wolfram ochre at contact of crystalline limestone and gneiss, in a vein 3 to 5 feet thick.

BY business men advertising is not done on the basis of doing a favor to the publisher, but is looked upon as an investment that is expected to yield a profit. Careful thought and consideration are given to the claims of a paper before the judicious advertiser pays it money. The value of an advertisement is to be determined by the results.

WHILE most of the mines thus far worked in the Cripple Creek district of Colorado occur in andesite breccia, and many of the veins are associated with phonolite dykes, some of the richest veins of the district are found in the underlying granite, notably those of the Independence mine, indicating the depth to which these veins may go.

THE Newhouse tunnel, being driven at Idaho Springs, Clear Creek county, Colo., will be, when completed, five miles in length. It is expected to intersect in its course 1140 veins, and will reach the California vein at a depth of 2400 feet, the shaft of that mine being down 2300 feet. The tunnel is 12x16 feet. It is being driven with power drills.

THE zinc and lead fields of southwest Missouri, southeastern Kansas, and extending into Arkansas, occur in what is known as the Ozark uplift, the outline of which covers an area of about 50,000 square miles. It is 320 miles in length and from 200 to 250 miles in width. Its geological structure is that of an elevated plateau bounded by monoclinal folds.

ORE deposits in sedimentary formations such as limestone, sandstone, shales, and quartzites are nearly always connected by fissures which extend to great depth. In some cases these fissures are occupied by intrusive dykes and often they are not, but careful inspection will generally discover that the ore deposit has direct connection with a fissure or a fissured zone.

BEFORE a mill is ordered or an addition to one already in place is made, there should be enough ore in sight to justify it. If it is intended for custom work it is just as essential to know that the ore is available in the camp as though the mill were built for a single mine. It is equally essential to know that the process by which it is intended to work the ore is applicable to it.

THE necessity for a cheap process to treat the lead, zinc and copper iron ores still exists. The spelter made from these complex or mixed ores is inferior to that made from pure zinc blende. A process of separately concentrating the zinc from the other sulphides is also required. Zinc blende is not as heavy as the sulphides of lead, iron or copper, yet is most difficult to separate from these ores when associated with them.

A NEW use for copper has been found in electroplating hulls of iron vessels. The United States Government in 1895 plated the hull of the sea tug Alliance with copper. A few days since this vessel was placed in dry dock and her hull, upon examination, was found wholly free from marine growth, in consequence of which the engineers have recommended that all the other vessels of the navy be treated likewise.

METAL-BEARING veins often occur at the contact of a dyke and a sedimentary rock, as porphyry and limestone. In some instances the ore occurs wholly within the limestone, as a replacement of the original mineral, and in other cases the mineral is wholly confined to the dyke. In either case it would be termed a contact vein. Most of the veins of the Salt Spring Valley district, in Calaveras county, Cal., are in the form of massive quartz replacing a dyke rock of the diabase type.

LENGTHY tunnels run for drainage and transportation of ores are only advisable when it is known that the values to be recovered justify the expense. Where mines opened through shafts have proven rich, and operations were suspended owing to heavy influx of water which could not be otherwise controlled, a tunnel to drain and ventilate the mines becomes a necessity and is a good business venture if not driven too far below known valuable ore bodies.

THE idea that numerous small stringers of ore will lead to large bodies of mineral is not always sustained by development of the stringers, though such condition is not uncommonly found to obtain. The Bimetallic shaft near Philipsburg, Montana, was sunk in a marshy spot in the granite. At this place there were a number of small iron-stained seams, which were recognized as an extension of the Granite Mountain vein. At a depth of 65 feet a rich vein of ore opened several feet wide, and this shoot produced millions of dollars.

AS A GENERAL principle in concentrating ores very fine crushing should be avoided in all cases, as the sliming of ores, which is an inevitable result of such fine crushing, renders it more difficult if not impossible to collect the finely divided material. In ores in which the mineral occurs in finely disseminated particles the ore may be granulated to a condition which will admit of a partial concentration by jigging with relatively small loss, as compared with the results of concentrating the same material after having been reduced to slimes by over-stamping.

A METHOD of separating nickel from copper-nickel ores and mattes is by smelting the mixed sulphides of iron, copper and nickel with an alkaline sulphide, or with acid saltcake. When tapped the sulphide of nickel settles to the bottom, with a small proportion of tin, copper and iron sulphide, while the sulphides of iron and copper, with a very small proportion of sulphide of nickel and a large portion of the salts of the alkali used form a distinct upper layer which is easily removed. By retreating the bottoms a still further separation is effected, until ultimately pure nickel sulphide is obtained.

AT the Black Hawk mines in San Bernardino Co., Cal., large masses of stratified limestone are found crushed into millions of fragments, the most of them being less than 3 inches in diameter, and in certain zones the rock has been granulated by compression and movement. These zones are gold-bearing, the gold occurring with a finely disseminated dust-like hematite iron. In some of the claims the iron is found concentrated into bunches and veins and is rich in gold. The entire region has been subjected to an extensive system of faulting, which has had a marked effect on the topography of the country. Lying out on the desert plain four miles from the Black Hawk mines is a nearly flat limestone formation, in which the rock is crushed in the same manner as that at Black Hawk. In the latter case the limestone contains chloride and bromide of silver with some lead. Some of these ores contain several hundred ounces per ton, but no large body of ore has been found at one place.

THE Dutch word "Witwatersrand" means literally "White Water Range," applying to a strip of territory a few hundred miles long and a few miles in width, which, seventeen years ago, was considered a worthless ridge. In 1883, however, gold was discovered. In 1884 the value of the gold production was about $50,000; the production of 1888 was about $5,000,000; that of 1890, $10,000,000; 1894, over $20,000,000; 1895, over $40,000,000; in 1897, about $55,000,000; in '98, about $75,000,000. The mines can only be successfully worked by the use of costly machinery, and while extremely productive where machinery has been used, they are not of such character as to make hand or placer mining profitable. The Boers own that country, the British want it, and the fight is now on.

IN the early days of California the claims on Stockton Ridge at Mokelumne Hill were 16 feet square, at first, and each claim holder undertook to sink a shaft. As the distance to bedrock varied from 50 to 250 feet, it soon became apparent that no one could reach the pay gravel under the circumstances. Numerous companies were formed and adjoining claims consolidated and in this manner the ground was worked. Even then the shafts were so close together as to often seriously interfere, as the scores of old dumps on the hills still testify. On top of the ridge shafts were sunk fifty years ago 250 feet deep, which are as good to-day as when first made, and not a stick of timber was used in them. The shafts are circular, 4 feet in diameter and are sunk through rhyolite tuff.

IN granular crystalline rocks, like granite, veins are often found breaking free from the walls which in depth are found "frozen." The reason may usually be found in the fact that the wall rocks have become altered or to some extent decayed, which causes the wall to part freely from the vein. In depth this condition does not obtain, and the ore shows no disposition to break free from the wall. In the deepest workings of such mines, however, there may be found places where the rock separates freely and there may even be a gouge seam, while other portions are frozen. This is due to the fact that the rocks are divided by fissures into great angular blocks and that these blocks have independent movements producing gouge seams along one portion of the vein while none are found on other portions.

THE world's production of tin is about 77,000 tons, of which Cornwall produces 5000 tons, or about 6%. The Straits Settlements lead in the production, with nearly 49,000 tons, or 61%; the Dutch East Indies contribute 19% and Australasia 8%; 80% of the world's total supply of tin comes from a comparatively small area, and is almost entirely in the hands of Chinese miners. In the early 60's Cornwall was producing about 10,000 tons of tin per year—about 50% of the world's total. The Cornish output then completely controlled the tin market; now the far East, with 80% of the total production, has become the dominant factor. The world's production of tinplates is about 725,000 tons per year; tinplate is sheet iron covered with from 2% to 8% of tin; hence, the total consumption of tin in the manufacture of tinplates is about 20,000 tons.

A NEW pneumatic cyanide process, known as the Johnson process, consists of expressing the water out of the slimes, obtained from the mills by means of a filter press, displacing the moisture and soluble cyanocides in the filter cakes formed in the press, by cyanide or potassium solution. The press is opened and the cakes of slimes dropped into a vortex mixing vat, containing cyanide of potassium solution, which is arranged so that air can be drawn into the vortex, facilitating the working of the cyanide. After the proper amount of cake and cyanide solution have been placed into the mixing vat, the agitator having been previously set in motion, the gold is brought into solution. The slimes are passed through a valve into a second receiver and forced into the leaching press. The gold leaves this press in solution and is run over boxes containing fine zinc, precipitating the gold in a metallic form. The cyanide containing gold that may be left in the filter cakes is displaced by pure water.

THE Mount Morgan mine in Victoria, Australia, one of the richest gold mines in the world, was described several years ago by R. L. Jack, Provincial Geologist, as being the result of a deposit of silicious sinter from thermal springs, which also deposited the gold. Since making this report, Mr. Jack has made a number of inspections of the mine at intervals of four or five years, and still insists that his original theory was correct. All American geologists and mining engineers who have examined this remarkable ore deposit fail to agree with Mr. Jack, and describe it as a quartzose rock—quartzite in part, impregnated by auriferous sulphides bearing gold. The ores are not susceptible to amalgamation and are treated by the chlorination process. The ore is dried in rotary ovens, crushed fine, roasted and then deposited in tanks provided with false bottoms and gravel filters and the chlorine gas turned in. The gold is recovered from the solution by passing through charcoal filters. This ore deposit has produced about $40,000,000.

AT the De Lamar mine, Mercur, Utah, the mill daily treats 500 tons ore, the oxidized ore going direct to the tanks, after crushing: the clayey ores are dehydrated in one roasting furnace, and the arsenic, antimony and sulphur removed from the baser ores in others, before cyaniding. The solution from the leaching tanks, of which there are ten, 25x50 feet by 5 feet deep, passes to three storage tanks, each 20 feet in diameter and 12 feet deep. From these it is drawn into the three precipitating tanks, 14 feet in diameter by 8 feet deep. Here zinc dust is added and the solution agitated by the admission of compressed air at the bottom of the tank. The solution is then pumped out through a filter press, and goes to the sump tanks to be used over again. The solution is not allowed to settle before pumping out, the idea being that by lessening the time of contact with the zinc in the tanks is secured maximum precipitation with a minimum loss of cyanide. There are five 18-frame filter presses, the frames being 24 inches square: the pipe through which the solutions are drawn off is 8 inches above the bottom of the precipitating tanks, so much of the precipitate accumulates in the bottom of the tanks and is cleaned up without going to the filter process. The strong solution used contains about 0.3% KCy; the zinc consumption amounts to about one-fourth of a pound per ton of ore treated.

Method of Working at the Taylor Mine Cyanide Plant, El Dorado County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by PROF. E. F. GROPELLO.

At the Taylor mine the ore is composed of highly oxidized iron pyrites which have been accumulating for years as a product of the concentrating plants of a 40-stamp mill, but too low in value to be either shipped to the smelters or chlorination works. The analysis shows: Iron pyrites and sand, 97%; copper, arsenic, antimony, 3%. Many ways have been tried during the last few years to work these concentrates by cyanide in its various methods of application, but proved unsuccessful.



GENERAL VIEW OF CYANIDE PLANT AT TAYLOR MINE, EL DORADO COUNTY, CAL.

Difficulties of different characters were the cause of previous failures. First: The very high consumption of cyanide. Second: The quick fouling of the solutions. Third: The undue consumption of zinc. Fourth: The unsatisfactory precipitation of the gold from its solution. All of these causes resulted in an unsatisfactory extraction of the value and a high cost of treatment. The causes and remedies of the various difficulties having been carefully studied and experimented with by the writer, the following plant and method of treatment was at last concluded upon and gave satisfactory results.

The plant consists of twenty leaching tanks 20 feet in diameter and 2 feet deep, a false bottom and two discharge doors being provided for each tank; three sump tanks respectively 16 feet, 9 feet and 7 feet in diameter and 3 feet deep; three solution tanks, respectively 10 feet, 8 feet and 6 feet deep and 8 feet in diameter; five zinc boxes 12 feet long and 18 inches deep.

The plant is also provided with a No. 2 centrifugal pump and a pulverizer.

The leaching tanks are made of No. 20 galvanized iron, riveted and soldered, and painted inside.

The solution and sump tanks are made of No. 22 galvanized iron, riveted, soldered and painted as above.

The galvanized iron, which, I believe, has found here for the first time its employment in the construction of cyanide tanks, is a very suitable material, being light, easily worked, and cheap as compared with ordinary steel, iron or wooden tanks.

The concentrates are in a pile, above the plant. Having stood for years exposed to the oxidizing power of atmospheric agencies a high decomposition took place, causing them to cake in hard iron lumps which were found impervious to the cyanide solution.

A cheap method of pulverizing the sulphurets had to be resorted to as they carried too much moisture to allow the use of rolls.

A cylinder consisting of two opposite steel plates, 30 inches in diameter, connected with two rows of steel bars, 12 inches long, so as to form a round cylindrical cage, with an end central feeder, has proven when driven at 600 revolutions a minute a very satisfactory pulverizer to cheaply get the material to the desired condition.

The concentrates are taken with an ordinary mining car from the pile to the pulverizer, the right amount of lime being fed into the pulverizer in connection with the charge so as to neutralize the acidity: as much as 600 pounds of lime to a charge of about twenty tons being sometimes necessary.

The pulverizer, by way of a discharge door, fills a car below, which is then dumped into the tank. The tank once filled water is allowed to percolate from the bottom till the charge is covered.

The water is then allowed to stand on the pulp for about three hours so as to permit a complete soaking of the mass. This time expired, percolation is commenced through the bottom discharge pipe, new water being allowed on top. Two or three days are needed to wash out all the soluble iron salts and neutralize the acid, the pulp losing at times as much as 13% of its weight during the preliminary treatment.

The charge being washed thoroughly and giving a decided alkaline reaction is then allowed to drain, vacuum being applied to assist percolation. At the end of the operation the pulp is about 14 inches deep. It is then shoveled over in the tank, using big square shovels, so as to bring the bottom in contact with the air, oxidizing the ferrous hydrates formed during the alkaline wash into the corresponding ferric salt practically unattacked by cyanide.

This done the first cyanide solution (.05 of KCy to the ton) is applied and allowed to stand on the pulp for about twenty-four hours, after which a very slow percolation is started, through a special set of boxes, sump and solution tanks.

The first solution proves to be full of impurities and often shows the presence of alkaline sulphides. These are eliminated by the use of soluble lead salt. Iron salts of complex and variable composition are also found, but the excess of lime mixed with the pulp in the presence of such a small amount of KCy, slowly precipitates the iron salts, some of which, being carried by the solution into the settling tank, are seen to quickly change into ferric hydrates and settle to the bottom. Thus the KCy which had been rendered inert by the solution of the iron is partially regenerated. The solution, being cleaned of all objectionable impurities, is then turned into the main zinc boxes, sump and solution tanks.

This treatment takes from three to four days. After the third day of treatment, if the charge does not show an even percolation or extraction (four samples each of a different section of the tank being taken and assayed), the pulp is shoveled over again in the way already mentioned.

This done, a solution of .10% of KCy to the ton is allowed to percolate through the charge for about fourteen days, when the extraction falls down to such a small amount that it reaches the limit of profitable working.

The pulp is then washed and sluiced out, the tank being ready for a second charge. The addition of small quantities of Na_2O_2 during the percolation has proved to notably increase the extraction. Owing to the high decomposition of the concentrates and a great amount of sewerage matter settled through them, coming from a stable above the pile, a very heavy foam sometimes arises in the zinc boxes, causing a quick consumption of zinc and very imperfect precipitation. This action is stopped by adding on top of the charge pulverized quicklime, which in time will clear the solution of the organic matter.

A very unusual phenomenon appears as soon as the solution is over $1.50 in value to the ton, and over .10% strong in KCy. When this point is reached a quick dissolution of the zinc with a great evolution of hydrogen takes place; but if the value of the solution falls to less than $1.25 to the ton, no such phenomenon appears, even if the strength of the solution is brought up to .25% of KCy to the ton. This point is characterized by a very good precipitation in connection with a small consumption of zinc.

Alkaline sulphides form continuously during the percolation period. To free the solution from this obnoxious salt two ways are employed.

By strengthening the solution to over .10% of KCy to the ton a quick dissolution of the zinc is caused, the zinc eliminating the sulphides; but if the sulphides are formed in such quantity as to require a too great quantity of zinc a soluble lead salt is used.

The chemists must be extremely cautious so as to see that zinc and sulphides are kept in the right balance in the solutions as both are useful, the sulphides to prevent a fouling of the solution by zinc and other metals, the zinc to limit the excess of sulphides. By carefully following the method above described, the writer succeeded in having his solution, after treatment of over 1100 tons of concentrates, quite as active in dissolution of gold as when first used fresh.

During the course of the treatment, having once purposely omitted putting fresh zinc shavings in one of the boxes, after several days I noticed that the completely coated zinc not only was inactive as a gold precipitator but gold already caught in the boxes would slowly get into solution again, so as to bring the solution which assayed $1.10 a ton entering the boxes to over $6.00 when leaving them. I attributed this phenomenon to the fact of having steel, iron, antimony and arsenic in the solution, which metals would naturally act toward copper, gold and silver as zinc does toward them, precipitating iron, antimony and arsenic by a simple interchange. Of course, to reach this point no free zinc must be available in the boxes.



TAILINGS PILE AND DISINTEGRATOR, TAYLOR MINE, EL DORADO COUNTY, CAL.

California State Miners' Association.

The California State Miners' Association began its eighth annual convention at Golden Gate Hall, San Francisco, Cal., on the 23rd inst. The committee on credentials announced that 572 delegates were entitled to seats. The delegates were welcomed by the Mayor of the city. Lieut.-Governor Neff, the president of the Association from its first organization, made the following address:

Gentlemen of the State Mining Convention: When, in November, 1891, a few pretty well discouraged ex-hydraulic miners met at Auburn, Placer county, to consider some plan by which to call the attention of the people of California to the condition of their industry, and to appeal to them for assistance in its rehabilitation, it was with a sort of "last hope" spirit. They had been, so to speak, the "under dog" for years. The Government, the State, the counties, the courts, the people and the press had been against them and the further prosecution of their work. Their mines had been forcibly closed, and the ditches, reservoirs, pipe lines and plants were as useless as the gravel claims, worse than valueless, and idle like the men themselves. Millions of dollars were tied up in the investments, and hundreds of millions locked up in the untouched deep gravels throughout the hydraulic mining counties. With vigorous, active and wealthy antagonists, held high in public favor, it seemed—and was—a gigantic task to attempt a partial reversal or even gain the ear of those who might render assistance to the impoverished miners of the mountains.

They had enemies even among themselves—men who were surreptitiously conducting operations which were under the ban of the law, and thus still further aggravating to renewed opposition those who felt that their rights were being infringed.

Those miners at Auburn were only a few of that numerous band that had been fighting their cause for years, with antagonism on all sides, finally to meet disaster and apparently permanent defeat in the courts. Even the suggestion of an attempt at renewal of operations was met with a howl of opposition.

But these miners of Auburn builded better than they knew. They were destined to set the cornerstone and lay the foundation of an institution which not only threw its protecting ægis over them, but over those engaged in all branches of the mining industry. It was destined to bring within its lines so vast a number of earnest men of kindred pursuits, that their requests demanded attention, and could not be ignored by people, State or nation. The merchant, the manufacturer, the lawyer and the statesman gave their moral, professional and financial aid to again put upon a proper basis the industry which had caused the settlement of the Golden State of California, and had built it up to its proud position among its sister States.

All this resulted from the quiet, almost retiring, little meeting in Placer county, where a very few of the many still had a stray gleam of hope to lead them on. Almost with fear and trembling, they prepared and issued an address to the people of the State, setting forth their condition and appealing for popular and legislative aid. It was modest; it was just; it conceded the rights of others. Far from being aggressive in any way, it so plainly and conservatively stated the miner's case that it received immediate attention—the first time this had been the case for years. The wording of this address had much to do with what was subsequently accomplished.

With this address was issued also a call to all the miners in California to meet in convention in San Francisco, and the valley men and farmers were also invited to take part in the deliberations. Among other acts of that convention was the formation of this organization—the Miners' Association.

The very moment that convention met and commenced its deliberations began also a change of sentiment on the part of the people and the press. It was seen that the convention was a conservative body asking for justice—the legal authority to work their property only where this could be done without injury to any other interests. The means of doing this were pointed out, and the people and the press lent their assistance. All the public bodies of this and other cities of the State officially endorsed the miners' plans, and the Legislature adopted a memorial to Congress which induced that body to lend a willing ear.

In the end a measure was passed by which the great hydraulic mining industry of the State came under Federal protection, and gradually mine after mine was legally started up, until now several hundred are in operation that were at that time closed down.

It is true, the work is restricted so that the output is smaller than formerly, but this was to be expected under the circumstances, though no one's rights are now infringed, so we can have no cause of complaint on that score.

With the passage of this measure reopening the hydraulic mines of the State the active work of the California Miners' Association with this particular feature was, for the time, ended the Government having taken the protection of these mines into its own hands. But before that period it became apparent that the mining industry needed many reforms in other directions, and it became our duty to attend to these. Some persons, however, still labor under the misapprehension that this is purely a hydraulic miners' association, and that little attention is paid to other industries. Nothing could be further from the truth. The most crying need at the time of our organization was the reopening of the hydraulic mines; but, that once accomplished, the other branches of the mining industry have constantly received earnest attention. Even at the time of the issuance of the call for the first convention, attention was called to the unjust rulings of the Land Department against the miner, and to the encroachments of corporations on the public mineral lands.

Among its other work this Association has secured appropriations from State and Federal Governments in aid of the mining industry; has secured the passage of several favorabl · Acts by the State Legislature; has assisted materially in several mining exhibitions; worked with the Transmissisippi and Mining Congresses; caused the Land Department of the Government to act more favorably toward the mining interests; brought forcibly to the attention of Congress the encroachments of corporations on the public mineral domain, so that this will shortly be stopped; inaugurated the movement for the conservation of water in California, and that looking to the appointment of a Cabinet officer with a Department of Mines and Mining; helped revise certain State laws; and, perhaps more than all, has created and fostered a public sentiment favorable to the mining industry of California and to the miners themselves.

All these matters appear easy to enumerate, but they have not been easy of accomplishment. It has taken earnest thought, serious discussion and hard work to get successful results from any of them. Several matters are still pend.ng to which we have given our attention for many months and which must occupy us still further. In fact, all of our permanent committees have work in hand of the utmost importance, as you will learn from the reports of the respective chairmen.

The brief reminiscence in which I have indulged should have contained the names of many men who have been identified closely with our Association and who have labored late and early in our cause, but they are so many in number that I cannot even attempt to mention them.

I can scarcely believe that there has ever before been an association of mere voluntary membership, a large portion of which is only indirectly interested in the results sought, where there has been so large a number of persons who have been willing to give their time and thought for the good of all, without compensation of any kind. To this day no man in any office of this Association, or otherwise connected with it, has ever received a cent for his services. Have we needed legal advice or active service from our good friends, the attorneys, it has been freely and cordially given and we have never received a single bill. Can any other association of the magnitude of this and with such necessity for legal advice, show such a record for its lawyer members? There is never a meeting of the Executive Committee but what we need their services, but they are always freely given, with no thought or expectation of fees. All honor to the brethren of the bar, say I, as they deserve our hearty and sincere thanks.

The merchants, manufacturers and citizens generally have been more than generous with their contributions, and the funds thus donated have enabled us to fight our battles in a manner that could not have been accomplished with the funds from the mere membership dues. These funds have always been contributed generously and freely.

In fact, to the money thus donated not only are we indebted for what we have been able to do, but actually for our prosperous existence to-day. It is but just to mention this, since these gentlemen's names are more prominent on our subscription lists than among our lists of officers and committees.

To the press of this city and of the entire State we are also indebted for many favors. It has very fairly reported our proceedings at all times and has promptly called attention to any of our measures before the Legislature and Congress, generally approving and urging their adoption. In fact, ever since the organization of this Association the press of California has taken a lively interest in the miners' movement, and has done everything it could to enhance and benefit the mining industry. As to individuals who have given us assistance, mere mention of their names is impossible in the time at disposal.

There are several matters which the members of this convention must earnestly consider and by their resolutions indicate the course the miners of the State should pursue. You are the representatives of a hard-working and busy class of men who cannot give attention to the details of all these matters, and they look to this body in a great measure for guidance.

In the first place we should continue to urge before Congress the so-called Mineral Lands bill, upon which we have already expended so much labor. In the face of the bitter opposition of those who are benefiting by the present condition of affairs, and the adverse influence in high official quarters, we have already accomplished much. It was with difficulty we could at first obtain even a hearing in Congress on this subject, but finally only a technical point prevented the passage of the bill. It is highly probable that this pending measure will pass the next time it is considered by Congress, but we must spare no efforts to see that it does. Week by week, month by month, year by year, sees the domain of the prospector narrowed, contracted and lessened in space, throughout the mining States by the present policy of the great corporations who are claiming—and taking—what the law never gave them and never intended to give.

Even while the question is pending, thousands and thousands of acres of mineral lands are passing by railroad title into hands which compel the miner to pay for what the Government expressly saved for him to open and develop without cost.

We must redouble our efforts, hold on to what we have gained and earn for ourselves the thanks of the mining community for saving its heritage intact. Congress will do the right thing when the facts are properly presented. It is for us to make this presentation of facts and obtain that justice which is the pride of the American citizen.

Then we want that Department of Mines and Mining and that Secretary of Mines in the Cabinet of the Nation. Why last year the miners of this country dug out of the ground mineral products of the value of over seven hundred millions of dollars, and that was over sixty millions more than in the previous year. Why should not an industry with such a growing substantial record have some representative in the councils of the Nation? Talk about the need of protecting our industries! Here is one of great magnitude absolutely unprotected. It is unprotected, I say, from the assaults of the great railroad corporations; from the sinister attacks of officials in the Departments; from the very ignorance of Congress itself. Whatever attack may be made upon it in the shape of unwise laws and adverse legislation, there is now no man to say Nay. There is no one to advise the President on the subject, and it is an industry which is scarcely recognized in Government councils.

The systems of obtaining titles to mineral lands, of patenting them, of representing them annually, are confusing, unsatisfactory and far behind those of other countries and behind the age. The confusion existing in the State and national mining laws are such that it is hard to settle principles even with learned judges, able advocates and skilled experts. The Land Department overturns the judgments of the lower courts and even the Acts of Congress themselves, and these backed up by so-called decisions of Secretaries of the Interior stand for years as law until overturned by accidental cases submitted to judicial determination.

Why should we not have a Secretary of Mines and Mining to pass upon and adjudicate these matters relating to mineral lands instead of a Land Commissioner and Secretary of the Interior with so much on their hands that they scarcely have time to find out what a mine is, much less what the miners need? Why should some man who is from an agricultural community, with his sympathies and experiences all in that direction, sit in judgment on the property interests of the vast number of hardy men who are digging their living from rugged mountains of the western side of this continent? And they dig this seven hundred millions yearly in the face of adverse legislation; in the face of active opposition and passive ignorance; in the face of antagonistic practices and customs, with no one to present their case in the tribunals of the Nation. Let us have a Secretary of Mines and Mining, we say! Let the machinery of passing on and giving title to mineral lands be taken from the pres·nt pigeon holes, and let a Department which understands mines and mining take hold of mines and mining!

We want relief from the present burdensome system, and we want it badly and quickly. We must keep constantly agitating this subject, and our brother miners in all the other States will back us up. These are national matters on which I have thus far spoken. But here at home in our own fair State, where most of our work lies, we have important problems to help solve. It was this Association which first suggested that some general plan be urged for the conservation of water, aside from that in vogue among the private mining and ditch companies. Their experience has shown what can be done by individuals, but vastly more can be accomplished by public assistance and the adoption of a general system. The experience of the past two years has shown what a vital necessity this is for the general welfare of the producing classes, the miner, farmer and manufacturer. Even in the "dry" years there is plenty of water in the high mountain regions could it but be conserved for use during the rainless months. The climatic features peculiar to this State require that the people unite in carrying out some thorough system which will enable us to control the flood waters and not allow them to pass off as useless, when we so badly need them later on.

During the past summer and the previous one, mines and mills have suffered an enforced idleness and hundreds of miners have been thrown out of work simply because scant provision had been made to hold back the waters from the melting snows. And this condition of affairs must be frequently repeated until a remedy is applied. There are plenty of immense reservoir sites in our magnificent mountains and there is plenty of water. Nature has provided us with both but man must do his share if he expects to get the benefit. It is our duty to co-operate in this movement in every way, both as an association and as individuals. The mere adoption of resolutions on this or any other subject accomplishes little unless backed up by hard work and hard coin. Resolutions will not build dams but work and money will. This is the most important problem the miners of this State have yet to solve. It is true some of our mining and ditch companies have built some of the largest ditch and reservoir systems in the world, but this work has only commenced as compared with what has yet to be done.

And now another thing, and one of no small importance either. It is evident that this Association has got to go back to first principles and take up the fight of the hydraulic miners again. And we have got to take it up vigorously, too. The Caminetti law, for which we all fought so hard and which has accomplished so much, is in danger, and with it the whole hydraulic mining industry of California once more. Our old opponents, who never were very well satisfied with the debris question being taken out of local hands and placed in those of the Government, want again to be in a position to have something to say in this matter. Their old weapon, the injunction, has been brought out and put into the hands of the men who formerly wielded it so disastrously and with such dire effect.

This time it is to be used, not only on the miner, but on the very Government itself. Not only do they question the right of the hydraulic miner to mine, but they question the Government's power to give him the right to do so, even under the manifold restrictions of the law especially provided by Congress for the purpose. It had been supposed when the Government Commission of Engineers, appointed by the President of the United States for this object, granted a miner a license to hydraulic, after stipulating the circumstances under which he could do this, and supervising and inspecting his impounding works, that this particular miner was free from further molestation, unless the commission itself saw fit to alter its views upon his infringing any of its rules.

It seems, however, that some zealous opponents of ours take an entirely different view, in the hope, possibly, of a return to the old system, with all its many evils, except to the few who found a way to benefit themselves in some mysterious manner. At all events, they are trying by legal process to close down several mines, which are now and have been operating under Government license and Government inspection, and upon which the required impounding works have been placed by permission of and under supervision of the California Debris Commission.

This, in effect, is a blow at the very principle of the whole system under which we are at present working. It attacks the constitutionality of the Caminetti Act, by questioning the right of the commission appointed under that Act to grant a license for mining by the hydraulic method.

Now this is a matter which the Association has got to fight whether it wants to or not. Understand me clearly, however. In my opinion it is not our duty to take up the litigation of every mine or miner thus attacked. It is not our province to fight every individual battle. But it is our duty and province to defend the Caminetti Act, for which we stand sponsor, and to see that its principles are upheld and its constitutionality confirmed. Beyond this we, as an Association, cannot well go. If, by judicial determination, it is unhappily found that the Caminetti Act is not constitutional, then we must ask Congress to give us a measure to the same end which will stand the test of the courts. These hydraulic mines have got to be worked, and they will be in some way, whether under the Caminetti or some other law. We do not want to injure anybody's interests or infringe upon anybody's rights. We have proven by several years' experience that it is possible to work these mines without material injury to any man, any river or any land. And this once having been proven, the few enemies of the hydraulic mining industry might as well understand at once that the nation, the State and the people will stand by the miners and let no small coterie of persons seeking for self-aggrandizement interfere with them in any way whatever.

We have got to back up with our influence, our attorneys, and our money the men who are making a fight for the validity of the Caminetti Act. But we have not got to take up all the individual suits. We must concentrate our efforts on a test case, probably the Red Dog suit, as this seems to be the initial one, and our attorneys advise its defense as the one which will settle the question for all the others, just as the old North Bloomfield suit settled the other famous one—and settled us. This is my individual opinion, but we have plenty of skilled attorneys to advise us properly in this matter.

It is proper that I, as your presiding officer, should say a word in behalf of those who have assisted me in conducting your affairs.

My young colleague, Mr. Ralston, who none of us will ever get over calling "Billy," even after he gets bald and gray, has ably filled the office to which you elected him, and has done whatever has come to him with the energy and activity which is his habit.

Mr. E. H. Benjamin has made an active and energetic secretary, and performed even more than the duties of his office. The work alone of "stirring up" the different contributors who wrote the articles for the souvenir book for the American Institute Mining Engineers and of arranging for the entertainment of that body while in this State was enough work for one man to do in a year, without anything else. Mr. Benjamin deserves the hearty thanks of the Association, and I want to remind you that all of his services have been performed without the slightest compensation.

Mr. Hendy has served us satisfactorily as treasurer, also without compensation, and has kept our accounts properly and in good shape.

On behalf of the Association I want to publicly express gratitude to the chairmen of the respective standing committees for the work they have performed. They are: Mr. A. H. Ricketts, chairman of the Committee on Mineral Lands; Mr. B. N. Shoecraft, Committee on Mineral Exhibit to Paris; Mr. A. Caminetti, Committee on Dams; Mr. Tirey L. Ford, Committee on Department of Mines and Mining; Judge John F. Davis, Committee on Legislation; Andrew Carrigan, Committee on Finance; John M. Wright, Committee on Jetties and Dredging; and J. M. Gleaves, Committee on Conservation of Water. As you all know, the chairmen usually have to do most of the work, and the rule has not failed this time. In the case of several of these committees there has been a great deal of hard work and it has not been shirked or postponed, I am happy to say.

The members of the Executive Committee have had frequent meetings in order to conduct the regular business of the Association according to custom. Generally speaking, these meetings have been well attended and the members have carefully considered all matters coming before them.

This is the last convention in which I shall occupy the chair, which I have filled, through your courtesy, ever since the organization of the California Miners' Association. Nominally, I have had the direction of the affairs of the Association for some years past, but, while I have had many excellent advisers, this is really the first time I have ever been allowed to have my own way. I mean when I am at last permitted to retire to the ranks so that some younger and more active man may preside over your deliberations. I am afraid it would take too many words to adequately express to you all the kindly sentiments I feel toward you, or the thanks I have deep in my heart for the consideration and help you have given me during my terms of office. Like most of the rest of the members of this Association, I have been connected with the mining industry for a great many years. My feelings and sympathies are all for the miners and their work, for I am one of them myself, though my actual work with the pick and shovel is done. I feel, too, that I ought to thank you gentlemen on behalf of my own county for your extreme courtesy in permitting old Placer to have one of her representatives so long as your presiding officer, when there are so many other mining counties with so very many able delegates.

The future of this organization is one of hope and of usefulness. There is much for us all to do, and more will come before us. As far as my experience has shown, I feel certain that the right man will come to the front when we need special services. There are plenty of able men among our members and they all cheerfully "stand in" with whatever work is to be done.

It but remains for me to again thank you for all your courtesies to me.

Reports from various standing committees were heard and a committee on resolutions was appointed by the chairman. For the first time in the history of the Association the committees had upon them representatives from other States. The Committee on Resolutions was composed of twenty-nine men, among which were representatives from Nevada, Washington, Oregon, Montana, New Mexico and Colorado. Telegraphic greetings were received from official representatives of the American Institute of Mining Engineers, which held its seventy-sixth meeting in San Francisco in September.

Reports of officers and committees were heard on the morning of the second day. The secretary's report showed that the expenditures aggregated $15,-610 94, and that there was a present balance of $3,-706.33. U. S. Senator Perkins addressed the convention, pledging the entire California congressional delegation in continued effort in all matters looking to general aid, and suggesting that the miners give expression to their desires in that regard. Ex-Congressman Pence of Colorado gave some practical advice as to how a Secretary of Mines and Mining could be secured. Congressman de Vries of the Second Congressional district followed.

A committee was appointed on revision of the Association's constitution and by-laws.

The Committee on Legislation reported that the immediate interest of the Association in legislation is a demand for the rehabilitation of hydraulic mining, the segregation of mineral from agricultural lands in railroad land grants, the creation of a Department of Mines and Mining, and the conservation of mountain waters.

The Committee on Mineral Lands reported that owing to the failure of Congress to pass the bill no progress had been made.

The Committee on Jetties and Dredging reported that the work of the committee was subject to the work of erecting dams, as provided for by Federal and State appropriations, which subject would be covered by the report of the Committee on Dams.

The Committee on Resolutions made report as follows:

WHEREAS, The California Miners' Association was organized primarily for the purpose of devising a method whereby the great industry of hydraulic mining, which has in the past added hundreds of millions of dollars to the permanent wealth of the State, could be resumed without injury to agricultural and other interests; and

Whereas, The Act of Congress of 1893, known as the Caminetti Act, in the opinion of this Association is a just law and provides a perfect system of impounding debris and a full protection of all interests involved; therefore

Resolved, That the California Miners' Association stands by the

existing United States law regulating hydraulic mining in California, and hereby pledges its continued, hearty and unfaltering support to the upholding of the said law.

Resolved, That we appreciate highly the efforts made by the National Congress and the Legislature of this State to secure the passage by each of those bodies of that measure known as the California Mineral Lands bill; that we earnestly urge upon the Congress of the United States that such efforts may be continued at its coming session, to the end that the California Mineral Lands bill may become the law of the land, and be the means of preventing the further absorption by corporate interests of an area of land of great value to the prospector and the miner; that we do hereby respectfully urge upon the Speaker of the House of Representatives of the United States and the House Committee on Rules that a day be set for the consideration of this bill at the coming session of Congress.

WHEREAS, The establishment of a national executive Department of Mines and Mining is a matter of grave concern to the mining industry of the United States; and

Whereas, United effort upon the part of the friends of the mining industry throughout the country is necessary to the permanent procurement of the necessary legislation by Congress in that behalf; and

Whereas, The miners of Colorado, through the press of that State, have requested the Governor of Colorado to call a convention of miners from the several mining States of the Union, to be held at the City of Denver, for the purpose of organizing and carrying into effect a concerted plan of action in behalf of such Department of Mines and Mining; therefore, be it

Resolved, That the California Miners' Association, in annual convention assembled, does hereby cordially endorse the calling of such a convention, and that the Association further expresses the hope that such convention may be called at a reasonably early day.

Resolved, Further, that the Secretary of this Association immediately communicate these sentiments to His Excellency, the Governor of Colorado, with the assurance that this Association is at all times ready and willing to do whatever it properly may in relation to the matter referred to in the foregoing resolution.

WHEREAS, The mining industry of the United States, with an output of nearly a thousand millions per annum, has assumed such vast proportions as to demand at the hands of the National Government such care as cannot be given to it by the several States in their separate and independent fields of action, therefore,

Resolved, That it is the duty of this Association to use all legitimate means at its command to secure the creation and establishment of a National Executive Department of Mines and Mining, with a Secretary at its head, who shall be a member of the President's cabinet.

Resolved, That the California State Miners' Association again directs public attention to the necessity for a concerted movement toward the proper conservation of the waters of the State, and is in hearty accord with any effort looking to that end; that it tenders its assistance and support to the federated organizations meeting to consider that important matter on the 14th prox., and desires to cordially co-operate, that storage of water may be adequately secured throughout California. The California Miners' Association started this movement one year ago, and gladly affiliates for this purpose with any and all practical movements toward advance in a subject of such surpassing importance to the entire State and every industry therein.

Resolved, We favor the preservation and development of our natural resources by the construction of storage reservoirs by the Federal Government for flood protection and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction, as recommended in the report of Colonel Hiram M. Chittenden, and we urge the adoption of the recommendations of this report as to the construction of storage reservoirs in the arid regions as a part of the national policy of internal improvements.

WHEREAS, Although in the opinion of this Association the State Mining Law of 1897 was repealed, yet in order to remove any uncertainty upon the subject among the miners of this State,

Resolved, That the Committee on Legislation is hereby instructed to prepare a bill for presentation to the Legislature at its next session repealing in clear and explicit terms the Mining Act of 1897.

Resolved, That the Legislative Committee of the Miners' Association of California is hereby instructed at the next session of the Legislature of said State, to secure the passage of an Act amendatory of an Act of the Legislature of said State, approved March 29th, 1872, which shall be in substance as follows:

SEC. 1. Every person who shall feloniously steal, take and carry away, or attempt to take, steal and carry away from any quartz, placer or other mine or mining claim, or from the dump or dumps or ore bins thereof, tunnel, sluice, undercurrent, riffle box, sulphuret machine, quartz mill, smelter, or any other works for the reduction of gold-bearing ore, earth or quartz, any gold dust, amalgam, quicksilver, or gold-bearing ore, earth or quartz, the property of another, shall be deemed guilty of grand larceny, and on conviction thereof shall be punished by imprisonment in the State prison for any term of not less than one year nor more than fourteen years.

SEC. 2. This Act shall be in force from and after its passage.

Resolved, That we respectfully request action by Congress on the subject of opening Pyramid Lake and Walker Lake Indian reservations (Nevada), situated in the mineral regions, for the purpose of permitting, under such rules and regulations as the Department of the Interior may prescribe, prospecting for minerals therein, and the holding and patenting of claims.

Resolved, That the Legislative Committee to be appointed at this session of the California Miners' Association be and are hereby instructed to prepare and report to the next annual meeting of this Association the draft of a bill to be presented to the Legislature of this State, making mandatory a record of all mining claims within this State.

WHEREAS, Many of the States of the Union have enacted laws relating to locating, holding and working mining claims on the public lands of the United States, and have prescribed various conditions and regulations as necessary thereto, which are not included in or provided for by the laws of the United States; and,

Whereas, These local laws and regulations differ in the different States and thereby cause much confusion and uncertainty; and,

Whereas, It is desirable that there be one uniform system of mining laws throughout all the States; now, therefore, be it

Resolved, First—That it is the sense of this convention that one complete and uniform system of laws, rules and regulations relating to locating, working and holding mining claims on public lands of the United States should be provided for by the National Government.

Second, That the Congress of the United States be petitioned to take such steps in the matter as will secure the above desired result.

Resolved, That with a view to adding interest and value to the annual meetings and reports of this Association, the President is directed to obtain from members of the Association specially qualified therefor, at each annual meeting thereof, at least three papers upon scientific and practical subjects of interest to the mining industry, which papers shall be read in full or by title before the Association, and shall be published in the proceedings of the Association.

Resolved, That this Association holds itself greatly indebted to the public press of San Francisco and the mining counties for the assistance it has given not only to the Association, but to the mining industry of California during the past year.

Resolved, That this Association is under deep obligations to the merchants, manufacturers and business men of San Francisco for their generous financial aid during the past and previous years, and recognizes the fact that without this special assistance it would have been unable to accomplish one-half of what has been done. The Association is free to acknowledge this, since the largest proportion of the funds received has come from these gentlemen, who are only indirectly interested in the mining industry.

The Committee on Dams and Debris made the following report:

Since the adjournment of the convention of 1898 considerable progress has been made by the various officials whose duties involve action under the mining bill of 1893, providing for the building of restraining barriers and the resumption of hydraulic mining.

Your committee has had the valuable assistance of the work and experience of Hon. Marion De Vries of the Second Congressional District, who has submitted a statement from which we deduce the following facts: That there is available, of the appropriations made by Congress and by the State of California, the sum of $500,000 for the construction of restraining dams, and to be used in such other modes as the Debris Commission may deem expedient in impounding the debris from the mines; and Congress has also provided that the Secretary of War may let contracts for the work, but that one-half of the contract price should be paid by the State of California.

This provision applies to all appropriations that have been made as well as all those that hereafter may be made.

The Secretary of War is also authorized to carry out the provisions of any Act of Congress providing for the restraining or impounding of mining debris in California, and may in his discretion, when the aggregate of appropriations made by the State of California and by Congress, and available therefor, is sufficient to complete the same, undertake the work thereto, by day labor and by purchase of supplies and material therefor, and may accept payment on account thereof as the work progresses under and according to the provisions of the Acts of the Legislature of the State of California for such purposes.

If these works are constructed by day labor under contract, this eliminates the element of risk from the cost of construction, which would be figured by every contractor in making bids upon the same by entirety, which has been estimated at about 25%.

In view of the possibility of the future construction of a dredger by the State of California, to be used in any case when applicable, or the construction of other machinery or appliances by the State, for similar works, it was deemed prudent that the Federal Government be empowered to accept the use of such State property where desirable. The Judge Advocate General of the United States Army having rendered a decision that before the Federal Government could accept the use of State property in any of its works, the following provision to that end was enacted by the last Congress:

"The Secretary of War is hereby authorized to accept from the State of California the use of any dredger or appliances owned or controlled by said State conformably to any offer thereof made by said State; and the Secretary of War is hereby authorized to use any such dredger or appliances in any river or harbor improvements that may be prosecuted therein by the United States, either by part of the United States alone or conjointly with said State; *Provided* that nothing shall be paid to the State of California for the use of said dredger and that nothing herein contained shall create any liability against the United States."

These specific provisions complete to date the legislation necessary to carry into effect the work of the United States engineers and California Debris Commission in relation to restraining dams and impounding works.

The proposed dam at the Narrows, as well as the Reed Creek plan, which were referred to in the last report of this committee, have been abandoned—the former on account of its great cost and the comparatively small capacity for storage of debris, and the latter for reasons not mentioned.

Your committee also waited upon Major Heuer, of the California Debris Commission, from whom was obtained the following gratifying information:

Examinations of sites and plans have been undertaken by said Commission and field work completed.

Report thereon is now in course of preparation and will be submitted to the Chief of Engineers at Washington not later than the 1st day of January, 1900, together with the recommendations of the Commission.

Major Heuer thought that contracts could be let if the plans and recommendations are approved within sixty days after the approval of the report.

As outlined to us, present surveys on the Yuba have demonstrated the existance of suitable sites and the feasibility of plans which will, if the impounding works are constructed in accordance therewith, not only restrain at moderate cost all debris now in the river, but also in unlimited quantities all that will be sent down for at least the next twenty years. This, it is stated, can be done without injury to the navigable waters or lands adjacent to the river.

The importance of the present investigation upon the Yuba must be clearly apparent to all, for if the work should prove successful there, the same plans can be applied to all the tributaries of the Sacramento and San Joaquin river systems, thus enabling the resumption of hydraulic mining throughout the region under the jurisdiction of the California Debris Commission.

Provided other conditions are favorable, we have every reason to believe that the recommendations of the California Debris Commission will be approved, and one of the great perplexing problems which has confronted us for many years will have been solved.

Major Heuer, as one of the California Debris Commission, seems to think that the $500,000 now available for this work will be sufficient to inaugurate and establish the system, to which additions may be made as required from time to time.

In view of the early report of this Commission, it is to be regretted that any action in the courts has been taken by the Anti-Debris Association disputing the right of the Commission to grant permits to mine by the hydraulic process under the Act of 1893, regulating hydraulic mining in California.

This Act was conceived in a spirit of harmony, and its provisions provide for the improvement of navigation facilities in the rivers affected, protection to adjacent lands, and, if hydraulic mining can be carried on without injury thereto, then under regulation it permits the same. Shall the work be abandoned now, after years of trial and experiment, when a solution of the problem appears near at hand?

The most sanguine friend of the rivers and the valley must certainly admit that in all justice, and for the benefit of the mutual interests affected, litigation now pending should be stayed to await the promised report. It will be time then for the Anti-Debris people to proceed if the proposed plans are unsatisfactory to them; but, on the contrary, should it be found that entire and full protection to the river and adjacent lands is the basic principle upon which the impounding works are to be constructed, then the harmony which promised to bless the people of the mines and the valley will be an accomplished fact, and the two sections, proud in the protection afforded to each by a generous Government, will, aiding each other, reach that prosperity which their unparalleled resources unfettered will bring to all.

We recommend that this committee be granted power to meet a committee of the Anti-Debris Association to discuss pending litigation, with a view to avoid a continuance thereof until action is taken by the authorities at Washington on the forthcoming report of the California Debris Commission.

It will be seen from the foregoing that the real, earnest work of this Association is about to commence. If the solution we now believe about to be offered will become an assured fact, the efforts of this Association and of the mining community to resume hydraulic mining under legal control and without injury to any interest, is about to be crowned with success, but as our President said yesterday in his annual address, resolutions are not sufficient; work is necessary—work not only by our officers, our committees, but work by our members, by our people generally, miners as well as farmers; for if this question can be settled right, all are interested—all will be benefited.

We recommend that this committee be given full power to act in the questions committed to its care, subject to the authority of the Executive Committee in the premises. This request is made so that it can be prepared to follow up with proper action the recommendations of the California Debris Commission, if, in its judgment a suitable and favorable plan has been found to impound the debris in our mining streams.

We desire to express our appreciation of the efforts and efficient support of the California delegation in Congress in behalf of the mining interests of this State.



WM. C. RALSTON, OF CALAVERAS COUNTY, CAL.

President California State Miners' Association.

The report was adopted and the closing recommendation was made the subject of a special motion adopting such recommendation.

The Committee on Conservation of Water made report which was adopted. A paper was read by A. H. Ricketts on oil and the law regulating oil lands, and a speech was made by Delegate Maxwell opposing proposed State aid to irrigation and advocating the Federal plan of co-operation.

The Chair appointed a Committee on Revision of Constitution and By-Laws. In the evening a banquet was given by the California delegates to the visiting members from the other States.

The proceedings of the third day—October 25th—began by speeches from Congressman Kahn of San Francisco and Judge Carpenter of Los Angeles. On motion a delegation of 100, to be appointed by the president of the Association, was deputed to attend the convention on the conservation of water, which meets in San Francisco on November 14th.

The paper on "Oil and the Law Regulating Oil Mining," was ordered published in the regular record of the proceedings, and the following resolution was passed:

Resolved, That the president of the Association be authorized to appoint a committee of five on county organization, whose duty it shall be to assist the officers of the Association in organizing branches of this State Association, and stimulating new life and membership in county organizations already existing, actual traveling and living expenses of said committee while in performance of duties above prescribed to be borne by the Association.

In the selection of officers Wm. C. Ralston of Calaveras county was unanimously elected president by acclamation. In the same hearty and enthusiastic way, Fred Zeitler of Nevada county was elected vice-president and E. H. Benjamin of Alameda county and Sam'l J. Hendy of San Francisco county re-elected secretary and treasurer, respectively.

On motion the engrossed resolutions expressive of the esteem of the Association for its retiring president were formally adopted, and J. H. Neff and Julian Sonntag were elected honorary members of the Association.

The Lieutenant-Governor of the State, Hon. Jacob Hart Neff, the president of the Association from its inception, then laid down the gavel for the last time, and in a few feeling words of official farewell retired. As he stepped from the chair, the whole convention rose and gave him three hearty cheers.

On motion the convention adjourned sine die.

The Hoosac Tunnel Fan Tested.

The electric fan designed to clear the Hoosac tunnel of smoke did not meet expectations when first tried some time ago, and experiments have since been in progress. Recently the fan was run for four hours at a speed of 110 revolutions per minute and drew smoke in large volumes from the shaft. The volume was reduced at times, showing that the tunnel was practically cleared, and it was easy to tell when a train passed through the tunnel by the increased amount of smoke raised by the fan. The test was very satisfactory, showing that the principle adopted for ventilating the tunnel is correct, and the only question now is whether a greater speed of the fan will be necessary to fully accomplish the desired end. If so, the power will have to to be increased. In making the test 140 H. P. was used. Before making any further changes the fan will be run for a day and the results will be carefully noted. If the test shows more power to be necessary it will be supplied, but there is no longer any doubt that the tunnel is to be effectually ventilated by means of an electric fan.

A Direct-Current Power Transmission.

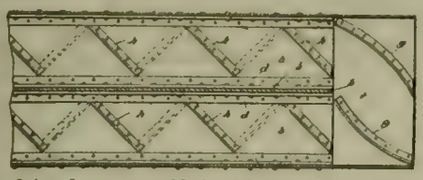
The Compagnie de l'Industrie Electrique has commenced work on the machines for the important St. Maurice–Lausanne power transmission in Switzerland. The line will be sixty-eight kilometers (forty-two miles) long and 10,000 H. P. will be sent over it. Direct current at a maximum pressure of 25,000 volts will be used, the machines generating a constant current at variable voltage; they are, practically, large arc machines.—Electrical Review.

Latest Mining and Metallurgical Patents.

Patents Issued Oct. 17, 1899.

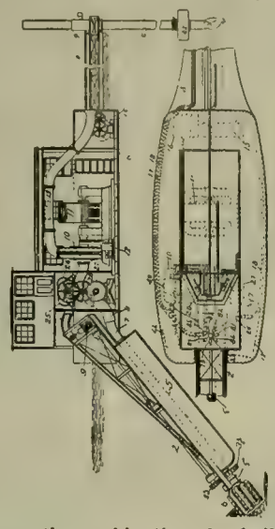
Specially Reported for the MINING AND SCIENTIFIC PRESS.

DRIER.—No. 634,798; J. Bishop, Bartow, and A. P. Jerguson, Hull, Fla.



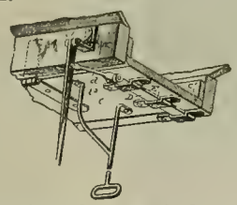
A drier drum provided with a solid continuous diaphragm or partition extending longitudinally through the same to form the drum into a plurality of independent passages, passages extending from the center of the drum to the sides thereof and through which the material to be dried is passed, thereby increasing the effective heating or radiating surface of the drum, and means located at the feed end of the drum for feeding the material to the passages; and spirally disposed passages mounted at the feed end of the drum to advance the stock to the passages in the drum.

DREDGER.—No. 634,865; L. W. Bates, Chicago, Ill.



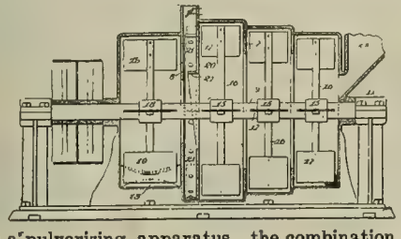
In a dredger, the combination of a hull or boat; a buoyant ladder for carrying the cutting or excavating devices; means for controlling the buoyancy of the ladder; means for effecting the feeding movement of the ladder in the cut; an extension arm projecting rearwardly from the hull or boat; a hollow spud or spuds carried at the outer end of arm, each provided with an air chamber or tank adjustable on the spud; valves and nozzles for operating the spuds and air chambers; electric motors mounted upon the dredger; an electric conductor for supplying current to motors; a buoyant support for cable; and an operating stand upon the dredger, containing devices for directing and controlling the current.

DUMPING CAR.—No. 634,874; R. E. Broyles, Chattanooga, Tenn.



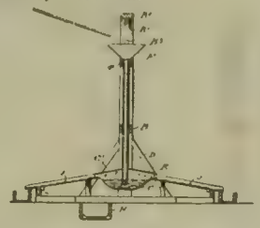
The combination of a car body provided with a hopper, a door hinged at the mouth of the hopper, a sliding bolt, guide straps on the door in which the bolt moves, a locking strap into which the bolt moves, a hand lever hinged to the car body and movable about a pivot parallel with the axis of the hinge of the door, a link jointed to the end of the bolt next to the hinge and jointed to the operating lever between its hinge and its outer end.

PULVERIZER.—No. 635,114; W. M. Wheildon, Boston, Mass.



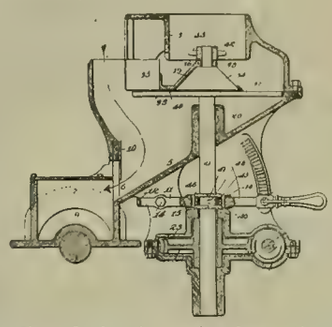
In a pulverizing apparatus, the combination with a series of pulverizing chambers and pulverizers therein, of means for introducing into the pulverizing chambers material to be pulverized and a sufficient quantity of air as to result in perfect pulverization, and means for introducing into the mixture of air and pulverized material an additional supply of air and a single fan for creating both air supplies.

AMALGAMATING APPARATUS.—No. 635,236; H. S. Cope, Melbourne, Victoria.



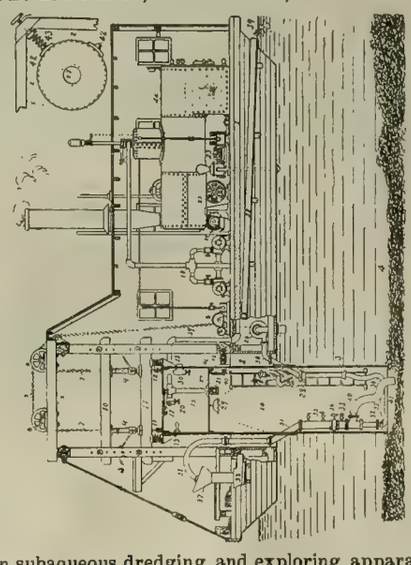
In an amalgamating apparatus and in combination with the frame, a plurality of pipes *A*, arranged vertically in frame, and having their lower ends flanged as described, guide plates *B* and sliding plates *A'* having a limited vertical movement, a chute *K* and a hopper *F*, through which the upper ends of the pipes pass, and into which the pulverized auriferous material and water are adapted to be fed from chute, a mercury-containing receptacle *C* pivotally arranged below pipes, a screw spindle for raising and lowering pipes, riffle tables *J* located one at either side of receptacle and a trough *H* to receive the amalgam.

FEEDING DEVICE FOR PULVERIZERS.—No. 635,112; W. M. Wheildon, Boston, Mass.



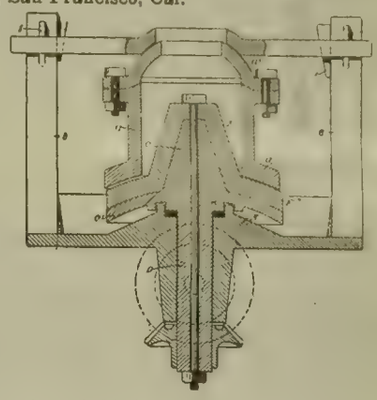
In a feeding device for pulverizers, the combination of a feed chamber having an opening therein at the upper end thereof through which material is introduced, a rotatable feed table mounted in chamber and adjustable toward and away from the feed opening therein, means for adjusting table, and a shear adjustable vertically with table but held from rotation, whereby the shear will remove material from table. The combination of a feed chamber, a cylindrical neck in the upper end of feed chamber through which material is introduced, a rotatable table mounted in feed chamber and adjustable toward and away from neck, means for adjusting table, a deflecting cone carried by the table and arranged to enter the neck, and means adjustable with table for removing material from the table.

DREDGING MACHINERY.—No. 635,270; E. A. Rix and P. B. Donahoo, San Francisco, Cal.



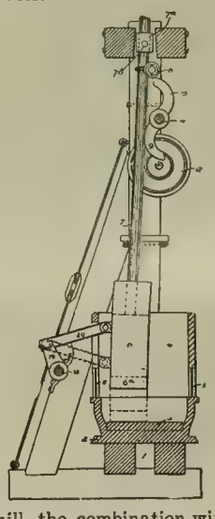
In subaqueous dredging and exploring apparatus, a floating pontoon, a wellway therethrough and a pneumatic caisson suspended therein, means to raise and lower the caisson, screw or hydraulic apparatus to force the caisson downward and springs interposed between the hydraulic or screw devices, to maintain an equal pressure around the pontoon, and elastic bearings or abutments between the sides of the pontoon and wellway, so the pontoon may rock or move without disturbing the caisson. In exploring and dredging apparatus, a floating pontoon on which the operating parts are mounted, a double-chambered caisson adapted to be lowered from the pontoon to the bottom of a stream or other waters, in which the pontoon is moored, means to fill the caisson with air under pressure and expel the water therefrom, a spoil pipe extending upward and outward from the bottom of the caisson provided with an inlet or inlets for air that will mingle with the water and spoil that ascend the pipe. An induction nozzle discharging into spoil pipe and a rotary pump forcing water through induction nozzle into spoil pipe. A gallows-frame to support the caisson and means to raise and lower the same.

CRUSHING AND GRINDING MILL.—No. 635,011; J. M. Dyer, San Francisco, Cal.



The object of this invention is to provide a combined crushing and grinding or pulverizing apparatus. It consists in the combination of a central cone having annular extended flanges around the base and an enclosing cylindrical casing having corresponding annular bottom flanges adapted to rest and grind upon the flanges of the central cone, while by an adjustment of the casing with reference to the cone an eccentric movement is effected between the interior of the casing and the exterior of the cone which acts to crush the rock and gradually prepare it before it arrives at the pulverizing surfaces.

STAMP MILL.—No. 634,894; W. H. Lloyd, Colorado Springs, Colo.



In a stamp mill, the combination with a vertically reciprocating stamp head of means connected with the continuously rotating driving shaft for imparting to the stamp head a lateral reciprocating movement between its successive blows, the greater part of lateral reciprocating movement being made while the stamp head is resting on the material in the mortar.

PROCESS OF TREATING ORE.—No. 635,056; D. O'Keefe, Boston, Mass.

The process of treating ore, consisting of roasting the same while being agitated, for the purpose of mechanical disintegration, subjecting the ore to hydrogen gas under pressure, afterward to chlorin gas, and then leaching the same with hot salt water.

PROCESS OF TREATING REFRACTORY SULPHIDE ORES.—No. 635,093; F. Ellershausen, London, Eng.

A process of treating refractory sulphide ores containing lead and zinc which consists in smelting the raw ores, without previous roasting and leaching, in an ordinary blast furnace, and positively drawing off the fumes and gases by means of an exhaust sufficiently powerful to prevent the formation of zinc accretions in the furnace.

Progress in Ore-Reducing Machinery.

Written for the MINING AND SCIENTIFIC PRESS by ALMARIN B. PAUL.

Machinery for the reduction of ores has bothered the minds of men ever since it was known that gold and silver were minutely combined in a hard matrix, but it is only within the past fifty years that the greatest progress has been achieved by way of successful designs, and here it is safe to say that more advancement has been made in the past fifty years than in the preceding 2500.

Stamps were used fifty or more years ago, but the stamps of the past were crude, cumbersome and really unmechanical as compared with those of the present day. Gradually, and as Americans began to handle them, they soon evolved into a more effective machine, and to-day the stamp battery of the mining world is as unlike the battery of fifty years ago as it is possible to conceive, and to Californians largely belongs the credit of this great advance.

As time passes progress in all things comes with it. Time has perfected the stamp battery to such a degree that it seems nothing more can be added. With all this has come also advancement in metallurgy—the manipulation and extraction of the precious metals.

With the stamp battery and its accompanying machinery for the extraction of the precious metals not over 65%, on the average, has been the yield, while with the advance of the solution processes from 85% to 95%, under suitable conditions, is as readily and more economically obtained. The stamp battery performs its crushing part completely, where simply crushing is required, yet for the solution system it produces too much slimy material, which increases the expense per ton of manipulation, as well as reduction. What is demanded for gold and silver ores, and more especially gold, is a plant that produces a uniform product, free from slimes, and by which a more perfect and speedy percolation can be had.

In the effort to gain this higher percentage obtainable by solution processes new economical questions arise, which begin to show that as a profitable machine the stamp battery has reached its cuminating point of usefulness for ores containing gold and silver, and especially for gold, and that a new method of reduction must be adopted for economically gaining the high percentage obtainable which all up-to-date mill men know can be had. The progress of the times in metallurgy demands that at least 90% of the gold values and 80%, if not 85%, of the silver values should be extracted on an economical basis, and this edict is relegating the stamp battery for ores of the precious metals to the past, and upon the simple proposition that it is inapplicable to the economical working of advanced solution systems, to say nothing of the cheapening of machinery and expense of reduction by this method.

The cyanide processes, of which the MacArthur-Forrest is the original, are the advance steps in metallurgy of the present period, and a great advance it is, when we consider the imperfect extraction of gold of even twenty years ago.

The question that calls for consideration in the change of machinery for the extraction of gold is, shall we hold to the stamp or shall we break into the operations of the past and obtain, as we can, a higher percentage of gold values at less expense?

In some sections, notably Australia, this idea of change is largely acted upon, and has proved acceptable by proving profitable.

When we give our thoughts for critically considering the stamp battery we see a cumbersome collection of heavy material, requiring large space for buildings, heavy expense for excavating, erection, etc., above what it should be for the amount of work to be executed.

The coming system not only gives a higher percentage of the metals at a less expense, but the machinery for doing it, where freight, time, excavations, buildings, etc., are considered, will in the majority of instances cost all of one-third, if not one-half, less. This coming system for reduction of gold and silver ores is the use of crushers, rolls and barrels, or, as they are more properly termed, ball mills. All of this class of machinery has been in use separately, as every mill man knows, and they have proved in their separate operations practical and effective.

The newer feature is the combination of the more perfected machinery of this special kind. To make more clear, I will say:

First—Will be a suitable crusher for reducting the ore down to say 1 inch in size.

Second—The use of steel rolls for receiving this 1-inch ore and bringing it down to say ½-inch or coarser, as may be desired, and agreeable to rock being reduced.

Third—The ball mill, for receiving the ore from the rolls and reducing it to any desired fineness, say from 30 mesh (900) wire to 80 mesh (6400), all of uniform grain and free of any amount of slimy material.

This system of reduction is directly in line—in fact, is the most desirable where any base gold or silver ores require the use of furnaces, or where furnace work may be required to better the percentage for any of the solution processes.

When an increase of capacity is desired the plant is simply duplicated. If we look clearly into the science of reduction of heavy ores into atoms, we find the operation of crushers, rolls and ball mills in accordance with what may be considered a natural principle, and without any extra work on a given number of tons.

The stamp, as is shown by the large amount of slimes made, performs in making them at least two-thirds more work than is required for extracting the metals. This extra labor is saved by the ball system, as is also the percentage of metal carried off with the slimes.

The arrangement of this machinery is such that the reduction can be performed either wet or dry, as may be desired. It gives, however, a little higher percentage of work by the wet way. For gold ores to be treated by the cyanide process no system of reduction equals this.

I am aware that taking the position that stamps as applied to gold mining especially will have to give way to another class of reducing machinery is possibly a very unpopular position for me to take, and that to follow in the old rut is far safer for one's reputation, but that is hard for me to do, and this spirit has cost me, no doubt, much discredit in the minds of the conservative miners, but I have the satisfaction of seeing a realization of more than one of my "fancied notions," notably the fine gold losses, about which I preached for over thirty years, and published, spreading broadcast, free, over 10,000 pamphlets. But it is thus we progress. Practical, substantial facts live on. It may take years to eradicate the stamp in gold mining, especially in California, as even cold facts move slow, but time is ever changing and building upward.

Mining in Aspen District, Colorado.

TO THE EDITOR:—The Smuggler mine is hoisting 8000 tons of ore per month, the most of which comes from about the 900-foot level. The workings extend to 1200 feet in depth, but all below the 950 level are under water. To keep the water below the 900 level the Smuggler pumps lift an average of 1250 gallons per minute. There are about nine miles of underground workings and development work goes on at the rate of about 9000 feet per year. The stopes in the mine will average a thickness of 50 feet between walls, and there is one stope which measures 150 feet from hanging wall to foot wall. All the mine work is done by machine drills. The ores are a sulphide, carrying a silver-lead product, though there are shoots which are markedly zinciferous. Ores of the latter character run about eight ounces silver, 6% lead and 17% zinc. At the Smuggler shafts there is a boiler battery of 1060 H. P. and hoisting engines to correspond with it. This company owns and operates two concentration mills. Of the 8000 tons of ore hoisted per month only 2000 tons are shipped direct to the smelters, the bulk of it being concentrated. The old mill is equipped with crushers, jigs and various types of tables and buddles. The last named are to be torn out. The new mill contains crushers, Chilian mills and seventeen Hallett concentration tables. This is locally known as the zinc mill, because all the zinc-silver-lead ores from the mine are handled by it, and its equipment is such as to effect a separation of the zinc material from the galena. All the ore is ground so it will pass through a 60-mesh screen, and then the coarsest of this is reground to 80 mesh. Supt. S. I. Hallett, who is the inventor of the tables bearing his name, states that he uses much less water than is generally used in concentration mills. The Smuggler has for several years paid a dividend of $20,000 per month, but for September a special dividend of $70,000 was paid. The average cost of mining and milling Smuggler ores falls below $1.75 per ton.

The Hunter's Pass M. Co., which is a branch of the New England Exploration Co. of Boston, operate a gold property at the old town of Independence, eighteen miles from Aspen and thirty-five miles from Leadville. The mine is at an altitude of 11,200 feet and has closed down for the winter. In three months this year they mined and milled 6600 tons of ore, from which, it is stated, a saving of 87% was made—being 55% on the amalgamating plates and the balance in concentrates. The values ran from $8 to $10 per ton. Their mill is run by water power. The property is in charge of Supt. H. D. Quinby.

The Percy Con. M. Co., the People's Light & Power Co. and the Castle Creek Tunnel & Power Co., all under the same management, have interests up Castle creek, on the west side of Aspen mountain. A flume two miles long takes water from Castle creek, delivers it to a power house under 190 feet pressure, by which electric power and air compression are developed to furnish light and power and drive drills. A few hundred feet above the power house is the entrance to the Castle creek tunnel, which goes into Aspen mountain about 2500 feet and connects with the tunnel workings of the Durant M. Co., which enter from the opposite side. The ultimate calculations are said to be to erect a concentration mill near this power house.

The Mollie Gibson and Argentum-Juniata—separate properties, but operated under one management—hoist ore from the same shaft and operate jointly a concentration mill of crushers, Huntington grinders and eighteen vanners. About 175 tons per day are being milled, the product being about twenty-five tons per day of silver-lead concentrates. The milling facilities are being increased to make the capacity 200 tons per day. For 1898 the cost of milling the ore was about 85 cents per ton, and it is stated the cost for 1899 will not vary much from that figure. The cost of mining in 1898 was $1.60 per ton, which was a reduction of 67 cents per ton from the 1897 cost. The expense of operating the large pumping plant is borne jointly by the two companies.

During the past year the tonnage output of Aspen district has kept up to the tonnage of the previous year, but it is evident the values per ton of the product have suffered a decline.

The Cowenhoven tunnel, which penetrates Smuggler mountain a distance of two and five-eighth miles, not only drains the mines of that mountain above its level, but is operated as a common carrier of the ores from the Della S., Bushwhacker, Park Regent, Mineral Farm, Alta Regent, Homestead, Pre-emption, Little Deceiver and Badger State, all of which except the last named are worked by lessees. At present from 125 to 150 tons per day are being delivered to the cars through this tunnel. All this ore goes direct to the smelters because its owners have no concentrating facilities. If they had, doubtless the larger proportion of the ore would be milled and a heavier tonnage would be mined.



A CHAMBER IN THE ASPEN MINE, COLO., TIMBERED WITH SQUARE SETS.

The Aspen mine is worked through the Durant tunnel, which strikes westward into Aspen mountain about 3200 feet. An electric winze runs from the tunnel level to the third level, a vertical distance of 650 feet. Above the tunnel there are eleven levels, the ore passing from the stopes between them through chutes to the tunnel level. Herewith is presented a view of the timbering in square sets in one of the stopes. Prior to the smelter troubles last spring this property was shipping about 100 tons per day. At present shipments do not amount to so much. The ores contain a high percentage of lime, which makes them desirable for the smelters and which serves to reduce their treatment charge.

Aspen, Oct. 17th, '99. WASCOTT.

ONE of the newest mining districts of the Great Basin now attracting attention is that at Stateline, in Lincoln county, Nevada. Some rich finds have recently been made there which have been walked over for years.

Modern Instrument Makers and Tools.

Written for the MINING AND SCIENTIFIC PRESS by JOHN N. McCLINTOCK, A. M. C. E.

About the middle of the Seventeenth century there was a revival of scientific research, more especially in astronomy. The Academy at Florence was founded in 1651; that in Germany in 1652. The Royal Society of London, although organized in 1645, was not incorporated until 1662. The Observatory at Paris was begun in 1667; that at Greenwich in 1675. The ancient world, however, had its scholars and investigators. A building, dedicated to astronomy, made a conspicuous part of the magnificent establishment of the School of Alexandria. An arc of the meridian was measured between Alexandria and Syene, and afterwards verified by the Emperor Nero, which gave approximately the size of the earth. During the middle ages sumptuous buildings, furnished with astronomical instruments, rose successively in the plains of Mesopotamia and among the mountains of Tartary. An observatory in the gardens of the Caliph of Bagdad contained a quadrant with a radius of over 22 feet and a sextant with a radius of over 60 feet. Instruments of still larger size distinguished the Observatory at Samarcand; and the ruins of Benares attest the reality of similar constructions.

The primary problem in geography is to determine the exact position of any proposed point on the earth's surface in respect of the equator and some assumed meridian, as that of Greenwich; that is, to find the latitude and longitude. The corresponding problem in astronomy is to determine the position of any celestial object in respect to the equinoctial circle in the heavens, or else the pole, and a circle passing through the pole and the intersection of the equator and ecliptic; that is, to find its declination or polar distance, and its right ascension. The former of these is found in great observatories by the mural circle, and the latter by the transit instrument, or transit circle, and the clock.

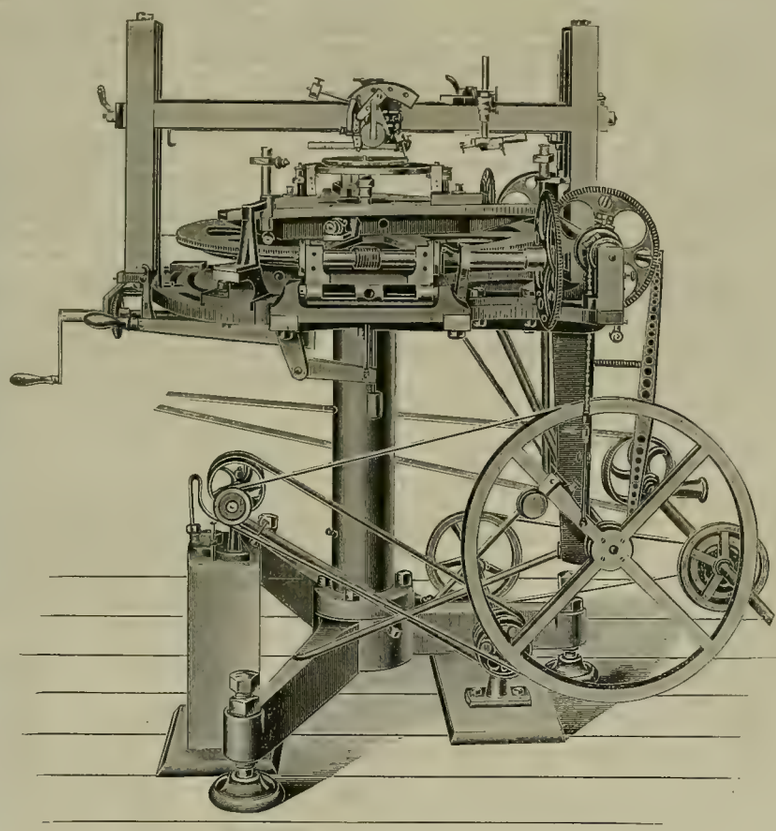
The first transit instrument of which we hear any account was that of Roemer, which he described in 1700. Dr. Halley placed a transit instrument in the Greenwich Observatory in 1721. The axis was iron, and the telescope was about 5 feet in length. This has long been lain aside, but is still preserved as a relic. The great mural quadrant of iron at the observatory was erected by Graham in 1725 and redivided by Bird in 1753. It has a radius of 8 feet. The brass quadrant was constructed by Bird in 1750. The mural circle, 6 feet in diameter, constructed by Troughton, was placed in position at Greenwich in 1812. The second mural circle was constructed by Thomas Jones in 1825.

The art of dividing instruments was carried to great perfection in Great Britain by Graham and Bird; but their preference of the quadrant to instruments of a circular form, introduced long before by Roemer, retarded the progress of astronomy. The great observatories in the early part of this century, as in the last, sought their divided instruments in London. Piazzi and Bessel worked with English circles. Troughton was an artist, the worthy successor of Ramsden—the inventor of the sextant and the maker of the first dividing engine of which there is any record; and even at the present time British astronomers, at least, do not admit that the nice contrivances and beautiful workmanship of Pepsold and of Merz, in Germany, or of Gambey, in France, have produced instruments worthy of more confidence than those which have been constructed in England. In the improvement of object glasses for telescopes, however, Germany—through Frawenhofer—and France bear away the palm, although for many years Dolland supplied Europe with his achromatic telescopes. The celebrated Mayer introduced the repeating circle, which was perfected by Borda, which permits of the fine work accomplished by the great transit circles to be done by the miniature portable transits of recent times. The foregoing facts have been mostly drawn from an old edition of the Enclyclopædia Britannica.

With the organization of the Coast Survey department in the United States, and the invitation from Switzerland of its first superintendent, Prof. Hassler, and his able corps of assistants, gathered from the United States and the different countries of Europe, including Prof. Agassiz, Count Pourtelles and others since famous, the demand for fine instruments was created in this country. For a time the demand was satisfied by importing instruments made by Troughton & Simms, Pistor & Martins, Gambey and the Repsolds. The increasing demand drew many of the best foreign workmen to the United States, who have, with native talent, placed this country in the first rank as makers of instruments of precision.

Instrument making is recognized as an art; it is not a trade, nor is it a profession. Poetry is an art, and a poet is known throughout the world by his work. The great artists among instrument makers for the last 300 years are as well known to the professional world as Newton, Shakespeare, Bacon, Webster or Longfellow to the general public.

Such a master in his chosen field was the late John H. Temple of Boston, in his day famous throughout this country. He was not satisfied with the graduation of circles obtainable in the United States when he began, and devoted many years of his life to making a dividing engine which would operate automatically. It was the masterpiece of this celebrated instrument maker, and reverted to Messrs. Buff & Berger after his death in 1874. Twenty years was devoted to its construction.



THE WURDEMANN AUTOMATIC DIVIDING ENGINE.

Contemporary with Mr. Temple was another master mechanician, William Wurdemann of Washington, enjoying to-day a well-earned retirement at the age of nearly ninety, who, while in charge of the instrument shops of the Coast Survey department, devised and constructed an automatic dividing engine, which at the time was considered the only rival of the Temple engine. C. L. Berger & Sons, successors to Buff & Berger, of Boston, Mass., not only own the Temple engine, but have recently purchased the Wurdemann engine, to the construction and perfection of which the labor of not less than twenty years or so was devoted.

In this country to-day there are several instrument makers of note. Among them may be mentioned Young of Philadelphia, Stackpole of New York, Saegmuller of Washington, Berger of Boston and others, whose reputation for making fine instruments is known in every part of the civilized world.

The writer has been honored by a personal acquaintance with C. L. Berger for over thirty years, and has been an admirer of his well-designed and finely-constructed surveying instruments. To show to what extent the degree of accuracy has been attained in these instruments, he has taken one of Berger's ordinary 6-inch transits for secondary triangulation, with a vernier reading to 30″, and read the rough angle by using a glass to 5″. By reading two sets of six, reversing the telescope, and filling the circle, correction at the center would be less than 1″. Triangles would require an adjustment of less than a second to an angle. No more perfect work could be done with a Gambey 12-inch circle graduated to 3″. It is simply perfection in the art of instrument making. If any young reader wishes to obtain similar results, the writer would advise him to use the Berger transit as he would a Gambey theodolite; see that it is in as perfect adjustment as when received from the maker, that it is kept in the box between stations, that the box rests on rubber cushions, and that during observations the instrument is sheltered from direct sunrays by a sunshade. To illustrate to the unprofessional reader the fine execution of these transits, by which an angle can be read to one second of arc, it must be remembered that at a distance of five miles a second of arc is $\frac{1}{1000}$ of a foot, or about 1¼ inches; at a distance of a mile, $\frac{1}{5}$ of an inch.

Many years ago the faults in the great mural circles and transit instruments of the observatories were discovered by the smaller, but more delicately constructed circles of Gambey, Repsold and other old masters; only recently has such perfection in instrument making been attained that the small portable surveyor's transit will do the work of the larger theodolite of old.

The graduation of the circles being a matter of such vital importance, it will be understood why the Messrs. Berger secured the celebrated Wurdemann and no less famous Temple dividing engine in addition to their old 2-foot automatic engine, said to have been begun by Ramsden of London and imported into this country.

The Wurdemann automatic dividing engine was designed and perfected by Mr. William Wurdemann, a celebrated mechanician of Washington, who devoted many years' labor to its construction. Although the circle of the engine is but 30 inches in diameter, a meridian instrument circle of 45 inches diameter has been graduated upon it to two-minute spaces, making 10,800 lines, with a very satisfactory result, the probable error not reaching two seconds of arc, a degree of accuracy thought never before attained. The engine consists of a circle with 2160 teeth on its outer edge, supported upon a perpendicular axis and moved by a tangent screw gearing working on the teeth of the circle. One full revolution of the tangent screw moves the circle ten minutes. The graduated drum on each of the two tangent screws divides the revolution into 120 parts, the movement of one of which moves the great circle five seconds. The circle to be graduated is securely fastened to the circle of the engine, the engine is connected with the motor, the graving tool moves in a radial line on the surface of the silver limb to be graduated until its mission is accomplished, when it is raised from the surface and is returned to its original position. While it is returning the tangent gearing of the main wheel is moved a certain fraction of a full revolution, the main wheel moving a corresponding distance, two minutes, five minutes, ten minutes, fifteen minutes, twenty minutes, thirty minutes, or a degree, comes to a rest when the graver descends and puts in its work.

The action of the engine is automatic. When once set in motion it continues its work until the full revolution of the main wheel is completed, when from its own mechanism the movement ceases. The movement of the wheel is by a force applied simultaneously by the two driving screws on opposite sides geared together, thus producing a uniform motion in the same direction and at the same speed and serve to divide and equalize any errors or differences arising from slight imperfections in the gear teeth or screws. In consequence of the greater contact surface, the moving screws and the engaging teeth of the circle, there is less pressure and friction on each one of these parts and the center bearing is relieved of side pressure. The axis of the circle is a cylinder where attached to the circle, ending below in a hard steel core that bears the weight. The effect of this long cylindrical axis is that the circle turns with uniform ease under all conditions of temperature. The axis enters a cast-iron column into which its upper end is perfectly fitted, so as to turn easily without any possible shake. The column is supported on a cast-iron tripod with thin leveling screws that step into iron cups. On the upper part of the column is fixed a cast-iron frame on which all the necessary moving parts are supported. The circle and its bearings are also of hard cast iron, a dense, hard metal having a small coefficient of expansion and consequently not affected by slight changes of temperature.

If Private Property, No; Government Property, Yes.

TO THE EDITOR:—In your issue of Sept. 30th was an editorial on the "Rights of Property Holders Along a Stream." I should like to have your opinion as to whether the land within the banks of a non-navigable stream, between the two meander lines, can be located under the mining laws, either when the property down to the meander line is in the hands of private holders or when it is still Government land.

READER.

The Influence of Forests Upon Storage Reservoirs.

Written by JAMES D. SCHUYLER of Los Angeles, Cal.

In an arid region where irrigation is a necessity and where the streams are intermittent in their flow, ranging in discharge from violent floods to trickling rivulets, storage reservoirs are essential for any considerable extension of the irrigated area.

Sites for reservoirs of large capacity are scarce, where all conditions are right for the construction of safe dams, for the certain filling of the reservoirs, and for the convenient distribution of the water to lands suitable for its use. The scarcity of such sites renders it all the more essential that those which exist should be guarded from all influences tending to the destruction of their usefulness.

The mountain slopes of southern California are more than ordinarily precipitous, and the denudation of these steep slopes of their forest growth by destructive fires, or by equally destructive bands of sheep, tends to loosen the surface soil and render it easily eroded, so that as the vegetation of the mountains disappears, the streams become more torrential, and more heavily laden with debris. All this gravel, sand and soil is deposited in the beds of the reservoirs located in their path. The result is to fill the space which should be devoted to the storage of water and lessen its capacity. The rapidity of this destruction of the reservoirs will depend somewhat upon their location; if they are in the mountains and have large watersheds of steep slopes they will more rapidly fill with coarse material. If they are nearer the plains on flatter slopes they will receive sand rolled along the bottom of the stream at the upper ends, and fine mud over the remainder of the area. Under these conditions they will fill less rapidly. The Sweetwater reservoir, near San Diego, is a type of the latter class, where conditions are most favorable. Recent measurements have shown that the deposit in the reservoir during the eleven years of its existence has been about 5% of its total capacity. The filling has been almost directly as the depth of the water, being greatest at the dam, where the fine mud is 2 to 2½ feet deep, largely from the washings of the plowed fields. Were this reservoir higher in the mountains the filling would be coarser and of greater volume, and if the reservoir were smaller it would of course fill more rapidly.

Clear Water.—Streams should always run clear, or nearly so, and their volume should be uniform throughout the year. The more perfectly the watersheds are covered with forest growth, decayed leaves, brush, chaparral and hardy grasses, the more nearly will this ideal condition of run-off be approached. The soil will be so bound with a network of roots that the rain and melted snow will pass off slowly without washing the surface, and the storage reservoirs receive a minimum of detritus and a maximum of water. This ideal condition, when perfectly attained, becomes in fact a substitute in large measure for storage reservoirs, and the soil itself of the mountain forests is converted into a great sponge, which constantly replenishes the springs and streams and keeps them in more uniform flow. Under such conditions, reservoirs could only be needed to store the water of the rainy season for use in the summer months, while the streams themselves would have higher irrigation duty in the dry seasons. A general extension of forest growth will make available many small reservoir sites that are now practically worthless because of the torrential nature of the streams, and their exposure to rapid destruction. The essential, therefore, for the preservation of storage reservoirs and the general increase of stream flow is to maintain as dense a growth of vegetation upon the mountains as possible, and so patrol the sources of our streams as to prevent forest fires.

Influence of Forests.—It is not well established that forests have any special influence in increasing the rainfall of a region, although the presumption is that they have a slight tendency in that direction. But it is conceded that they have a very decided influence upon the temperature. In southern California, we particularly need all such influences to counteract the effect of desert winds upon our orchards, and lessen evaporation upon our reservoirs. The loss by evaporation in reservoirs, ranging as it does from 10% to 50% of their capacity annually, according to their relative depth and surface area exposed, is one of the most important factors in estimating the duty of stored water. No other losses can compare with it and anything which will lessen it will extend their usefulness. A general extension of the forests of the arid region must have marked effect in cooling the surrounding atmosphere, reducing the velocity and temperature of winds, increasing humidity, and lessening evaporation.

Reforesting.—One of the encouraging features of the situation on the Pacific slope is the rapidity with which all forest trees, except the redwood, are being reproduced wherever they are protected from fires and from the ravages of sheep. Young pines, firs and cedars spring up spontaneously where there is soil and moisture, and grow with vigor if let alone. This is a marked contrast to the sand plains of Wisconsin, Michigan and other eastern States, where the pine forests, once out, seldom reproduce themselves, but are replaced by brambles and worthless brush. With proper care, therefore, the Western forests can be made a constant source of revenue, continually replenished.

Government Reserves.—A popular misconception of the intent and object of the Government in segregating forest reserves at the headwaters of our streams, is that they are to be forever left in a virgin state, and so lost to public utility. This opinion is widely held, and needs to be eradicated, for the reverse is really true. The forests are not and should not be regarded as too immaculate for use. It is well recognized as far better and safer to make them a source of lumber and firewood, utilizing the older trees and encouraging new growth, than to allow them to go to maturity and decay untouched. The guardians of the forest preserves should be required to gather seeds of trees and plants and sow them wherever they can be induced to grow. They should keep the young groves of trees properly thinned out and have authority to sell sawlogs and firewood wherever the trees can be judiciously spared.

Fertility in Irrigation Water.—One of the important, though little considered, uses of the forest to the irrigator is the conversion of organic vegetable mold into nitrogenous plant food. This is going on through the agency of the ever-present bacteria, which reconvert the organic waste of the world into innocuous and useful mineral matter. Water, filtering through the soil, is constantly bearing these mineral nitrates into the streams and thence out upon the lands. Streams from treeless mountains lack these nitrogenous elements to a great degree, and the water has less fertility and is less valuable for irrigation.

Forest Destructivn.—The effect of the destruction of forests in mountainous regions is eloquently described by the eminent French political economist, Blanqui, in a memoir read before the Academy of Moral and Political Science of France, in 1843. He says, in referring to the Alps of southern France:

"Signs of unparalleled destruction are visible in all the mountain zone, and the solitudes of those districts are assuming an indescribable character of sterility and desolation. The gradual destruction of the woods has in a thousand localities annihilated at once the springs and the fuel. The abuse of the right of pasturage and the felling of the woods have stripped the soil of all its grass and all its trees, and the scorching rays bake it to the consistency of porphyry. When moistened by the rain, as it has neither support or cohesion, it rolls down to the valleys, sometimes in floods, resembling black, yellow or reddish lava, sometimes in streams of pebbles, and even huge blocks of stone, which pour down with a frightful roar, and in their swift course exhibit the most convulsive movements. No tongue can give an dequate description of their devastations in one of those sudden floods which resemble in almost none of their phenomena the action of ordinary river water. They are no longer overflowing brooks, but real seas, tumbling down in cataracts and rolling before them blocks of stone, which are hurled forward by the shock of waves like balls shot out by the explosion of gunpowder. A furious wind precedes the rushing water and announces its approach. Then comes a violent eruption, followed by a flow of muddy waves, and after a few hours all returns to the dreary silence which at periods of rest marks these abodes of desolation."

French Forestry.—After years of agitation and discussion, the work of restoring the woods and of controlling the floods and destructive erosion of the torrents was undertaken by the French Government at enormous cost, but with gratifying results, wherever carried out. The improvements consisted (1) of the systematic planting of trees, grass and underbrush near the source of the streams, to prevent the sudden and rapid collection of rain and melted snow water. (2) The protection of the shores of the streams from undermining and their beds from erosion, by the erection of small dams of masonry, loose rock and brush, to diminish the grade and decrease the power of the water, to raise and widen the bed and to retain and store detritus. Many of these structures were made of green branches that were induced to take root and grow. (3) The terracing of the mountain slopes in a way to retard the run-off and guide the water into channels of light grade, where it could be conducted to the main streams without washing the soil. On one small watershed of less than 1000 acres the Government expended $125,000; but the benefits resulting immediately after completion were estimated at more than double that sum.

Other European Forestry Work.—The Austrian and Swiss Governments have done a great deal of this work to restore the mountain watersheds to their original condition before the forests were destroyed, and great numbers of masonry dams have been erected, to an extreme height in one case, in the gorge of Ferrina, Austrian Tyrol, of 115 feet. These are built exclusively for retaining debris and curbing the power of the torrents. The usual height of such structures, however, is about 25 feet, and they are placed as near to each other as the grade of the torrent necessitates. Their effect is incidentally to store water, as well as gravel, for the voids in gravel reservoirs of that kind retain a considerable volume of water, which is given off gradually to the stream. Such work can be done to advantage on every mountain stream in California, and I have no doubt that similar works will ultimately be undertaken in various parts of the arid West as a necessity, although it will require much agitation and united public opinion to secure appropriations from the general Government for such construction. The most important work in hand, however, is to take measures for preventing the further destruction of forest, and avoid the necessity for extensive correction of erosion in our mountain slopes and streams. This costs less than the subsequent correction and is more easily accomplished.

When this is well in hand, when we have adopted practical measures for recovering our denuded mountain areas with plant growth and for protecting the forests we have left, a persistent effort should be directed toward the bridling of our torrents and the conversion of every mountain canyon into storage reservoirs. In this way only will our water supply be sensibly augmented and a large portion of the wealth of water annually wasting into the ocean or sinking in the deserts be retarded and retained for useful ends.

New Demand for Aluminum.

The Pittsburg Reduction Co. recently sold two tons of aluminum to the Carnegie Steel Co. for steel-making purposes. While this not a large sale in the present condition of the metal markets, it is interesting as showing the rapid development in the production of aluminum. When the Pittsburg Reduction Co. was formed this product sold for $17 per pound, but the present market quotation is 31 cents per pound. Aluminum is being largely introduced as an aid in the manufacture of steel. It increases the solidity of of Bessemer steel and renders the billet free from blow holes, the theory advanced by chemists being that aluminum absorbes the oxygen in the molten metal and produces a solid piece of steel. The uses of the new metal are fast extending and experiments are now being made to adapt it to new purposes. Efforts are now being made to perfect a process for soldering the new metal. This has long been sought, as one great drawback in adopting aluminum to new uses has been the difficulty in making joints. A successful process of this kind will enable aluminum to be used for roofing and will greatly increase its use for stamped ware. The works of the Pittsburg Reduction Co. at New Kensington are pushed with orders, the majority of which are for sheets.—Iron and Steel.

Ammonia as a Fire Extinguisher.

In an instance where fire had originated, probably from spontaneous combustion, in a pile containing several tons of cotton seed, and the interior of which was almost a solid body of live coal, a half gallon of ammonia completely smothered the fire. In another, which occurred in Savenay, France, the vapors of a tank containing fifty gallons of gasoline caught fire in the linen room of a laundry. The room was instantly a mass of living flames, but a gallon and a half of ammonia water thrown into it completely and almost immediately extinguished the fire. The ammonia was in a glass demijohn in an apothecary's shop next door to the laundry, and was thrown into the room by the druggist as an experiment. To use his own words in reporting the circumstance * * * "The effect was instantaneous, torrents of black smoke rolled upward in place of flames, and in a moment every trace of fire was gone. So completely was the fire extinguished that workmen were enabled to enter the room almost immediately, where they found the iron tank of gasoline intact.—National Druggist.

Draining Wet Tunnels.

In California, where most of the railway tunnels are driven through soft sandstone, the floors are naturally wet and have long occasioned many repairs which would be unnecessary were the floor dry. The Southern Pacific Railroad to remedy this difficulty have employed ordinary drain tile for the purpose of draining the floors of its tunnels, with satisfactory results. The tiles are the common 4 inch or 6 inch clay pipe without flanges and are laid on each side of the track in a drain trench provided for them, and are placed a short distance apart in order that the water seeping into the excavation from the surrounding rocks may find an easy passage into the tile and flow away, which it does readily. If the pipes were closely joined the water would be excluded and the object of the drain would be defeated. There may be places where this plan might be applied with success in metal and coal mines where water on the floor of the tunnel proves a source of annoyance or expense. In soft ground posts stand far better if the ground be well drained.

Mining Summary.

DIRECTOR OF THE MINT ROBERTS makes the following report upon the production of gold and silver during the calendar year 1898:

The production of gold in the United States in the calendar year 1898 was 3,118,398 fine ounces, of the value of $64,463,000. The amount of gold produced from quartz mines in 1898 was, in round numbers, 2,800,000 fine ounces, and from placer mines 318,000 fine ounces. The South African Republic produced 3,831,975 fine ounces, of the value of $79,213,953. Australia produced 3,137,644 fine ounces, of the value of $64,860,800. These three countries are the great producers of the world, their output aggregating 10,088,017 fine ounces, of the value of $208,537,753, or 73% of the product of the world.

Next comes Russia, with $25,463,400; Canada, $13,775,400; Mexico, $8,500,000; India, $7,781,000, and China, $6,078,700.

These five aggregate 92,686 kilograms, valued at $61,599,000, or over 21% of the whole, leaving 6% to the remainder of the world.

The United States still occupies the second place as a silver producer, to which it was relegated by Mexico in 1897. In 1898 it produced 54,438,000 fine ounces of silver, with a commercial value of $32,118,400, against the Mexican production of 56,738,000 fine ounces, with a commercial value of $33,475,000. Together they produced 67% of the world's product. No other country approaches them, the nearest being Australasia, Bolivia and Peru. The product of the last two is somewhat uncertain, but none of the three exceeds 12,000,000 fine ounces.

The amount of silver produced in the United States during the year from quartz mines was, in round numbers, 13,500,000 fine ounces, and from lead ores 31,000,000 fine ounces, and from copper ores 10,000,000 fine ounces.

The world's gold production in 1898 was 13,904,363 fine ounces, of the value of $287,428,600, an increase over the product of 1897 of 2,351,831 ounces, valued at $48,616,600. Since 1887, when about $106,000,000 were produced, each year has shown an increase over the preceding one.

There is no reason to expect any cessation of this steady annual income for some years to come. The Transvaal has not nearly reached its limit; Australia, particularly West Australia, is not yet half developed; Alaska and the Yukon have only fairly begun to produce, while the recent steady increases in Colorado and other Western States shows no signs of abating.

The world's production of silver in 1898 was 165,295,572 fine ounces, showing an increase over 1897 of 1,222,400 fine ounces.

The world's consumption of the precious metals in the arts and manufactures during the year was, in new gold, 97,804 kilograms, of a value of $65,000,000; and in new silver, 1,065,289 kilograms, of a coinage value of $44,273,000 and a commercial value of $20,200,000.

The following table shows the production of gold and silver in the principal producing countries of the world during the year 1898:

Countries.	Gold.	Silver. Fine Ounces.
United States	$64,463,000	$54,438,000
Africa	80,428,000	.....
Australasia	64,860,800	12,021,682
Canada and Newfoundland	13,838,700	4,452,333
Mexico	8,500,000	56,738,000
Russia	25,463,400	278,492
British India	7,781,700	.....
China	6,078,700	.....
Germany	73,600	5,571,516
Bolivia	343,500	3,204,568
Chile	340,700	2,501,998
Spain	37,900	5,597,965
British Guiana	2,048,700	.....
Colombia	2,263,200	5,483,718

ARIZONA.

GILA COUNTY.

Old Dominion is producing from its single shaft 800,000 pounds of copper per month.

Globe *Times*: Last week an accident occurred in the Old Dominion shaft. A cage was descending and a car on the opposite cage was coming up, when near the 400-foot level the car got loose and came in contact with the timbers, which were torn out and the car and its contents precipitated into the shaft. The men in the cage escaped unhurt. When the cage struck the engineer did not notice any effect from it in the operation of the hoist, and the first intimation he had that anything was wrong, the headgear was pulled down, wheels, blocks and all. Several men who were under the sheaves escaped uninjured. The cage occupied by the men was caught by the safety catch.

MOJAVE COUNTY.

In the Stockton Hill district the veins are fissures. The minerals filling the veins are galena, blende, pyrite and chalcopyrite, argentite and ruby silver, with native wire silver, and, as secondary products of oxidation, carbonate and sulphate of lead, copper carbonate, iron oxides and chloride of silver, in a quartz gangue.

Kingman *Miner*: A discovery has been made in the Alpha mine at Layne Springs. The vein in which the strike was made is one of the largest in the district, but of late years little work has been done on it. About 1000 tons of ore is lying on the dumps. On the suggestion of T. McMahon the owners made a test for copper, and the ore contains 20%. The owners cut into what was supposed to be the foot wall of the ledge and exposed a 10-inch vein of ruby silver ore. Fifty feet above this the foot wall ledge was opened and horn silver exposed. The mine is opened by a long tunnel connected by the shaft with the surface. From the tunnel is a winze 80 feet deep, with 4 feet of ore said to carry 20% copper, twenty ounces silver and some gold. Heretofore only silver and lead values were paid for and owing to the locality the lower grade ores were considered worthless.——Sutlier & Roscoe are getting prospects of gold in their camp across the valley from White Hills. Every outcrop of quartz shows gold. C. Metcalfe of Kingman is interested with them.

Kingman *Mineral Wealth*: The crosscut on the Midnight at Chloride passed through four Midnight, at Chloride, passed through four large veins of mineral, and another vein is known to be within a few feet of the end of the crosscut. From present development it is thought enough shipping ore can be taken out in development, without stoping, to pay expenses.

PIMA COUNTY.

Tucson *Star*: The wolfram claims sold to Engineer Bradford by Sampson & Bent are being worked by a New York company. They are in the Guijas mountains, six miles north of the Cerro Colorado mine. The owners of the property are grading and getting ready to erect a concentrating plant. They will concentrate and ship east for treatment.——N. Wild and J. Sheridan have seven claims on the belt, three miles south in the Cerro Colorado district. They have a good showing of fine ore and are developing it.——Water is being raised out of the old workings of the Cerro Colorado in the Guijas mountains and the workmen expect to get into the shaft this week.

YAVAPAI COUNTY.

(Special Correspondence). — The Arizona, Eastern & Montana Copper Co., operating the Big Bug smelting plant at Mayer, have made their first shipment of fifty-four tons of copper matte. The matte carries gold and silver. The plant is managed by H. B. Clifford. D. G. Jewett is the superintendent and metallurgist. J. S. Johnson is the chemist and assayer. Ores are being hauled to the smelter from the Lone Pine mines.

Arizona City, Oct. 21st, '99.

Prescott *Courier*: The recent rains did not reach the Hillside section of country and Boulder creek is dry for the first time in twenty years. The Hillside mill has been shut down.——W. Connors has gone to Morristown, Arizona, to do work on mining claims owned by M. Hickey. Morristown is the new name for Hot Springs Junction.

Daily Enterprise: T. E. Farish will superintend the development of the claims of the Whipsaw M. Co. on Castle creek. Forty men are at work on the property. The company has contracted with S. W. Traylor of Denver, representing the Colorado Iron Works, for a 40-ton smelter.

YUMA COUNTY.

Yuma *Sun*: The second monthly cleanup was made at the King of Arizona last Tuesday and is reported to be about $30,000.——C. E Eichelberger, discoverer of the King of Arizona, reports a discovery of copper ore in the Plomosa district, fifteen miles from Tyson Wells, and will develop it. The outcrop is 40 feet wide and a majority of the ore will bear shipment. The new find is thirty-five miles from the Colorado river.

CALIFORNIA.

Amador.

Jackson *Republican*: Rock from the Central Eureka mine is being treated at the Zeila mill.——The Grizzly Hill gravel mine, which J. Meek has been operating for about a year, has been sold to San Francisco parties. The new Supt. is Mr. Tucker.——A highly mineralized rock has been encountered in the Lincoln mine. The rock was found in crosscutting at the 500. Sinking is progressing, the shaft being down 1180 feet.

Sutter Creek *Record*: During the week good ore has been found at the 500-foot level of the Lincoln mine at Sutter Creek. Supt. Voorheis says it is good paying ore. The crosscut will be extended west until the black slate foot wall is reached. The shaft is down 1190 feet. At 1200 feet a station will be cut.

Butte.

Oroville *Mercury*: The Lost Treasure mine, near Inskip, has made a big cleanup. It is a pocket ledge 14 inches wide, and is owned by A. D. Larzelere. In one day early in the present month Mr. Larzelere panned out $500 besides rich specimens of quartz showing free gold. Mr. Larzelere has taken out several small pockets this summer.

Calaveras.

The Topeka mine, near the Sheep Ranch mine, owned by W. L. Fortner of Jackson and partner, will be worked by an arrastra during the rainy season.

The new 40-stamp mill at the Gwin mine is ready for operation whenever there is sufficient water for power. The former mill of forty stamps is working steadily. A large amount of ore has been developed. It is the purpose of Supt. Thomas to carry the development so far ahead of the extraction of ore that another addition to the milling plant may be anticipated.

El Dorado.

The Amador cinnabar mine, near Placerville, was discovered in 1874 and considerable development work done. Furnaces were built and a quantity of quicksilver produced. The surface chamber was exhausted and the works abandoned. In view of the present high price of quicksilver, steps are being taken to rehabilitate the old mine and explore it for new ore bodies. The mine is within thirty miles of Sacramento.

Jackson *Dispatch*: F. A. Bass, foreman at the Boulder mine, in the western part of this county, is engaging miners with a view to a resumption of work at the mine.——A 10-stamp mill is being put in at the Kimball gravel mine, south of Placerville. The *Democrat* says that a large body of pay gravel has been blocked out.

Georgetown *Gazette*: The Little Gem mine is half a mile southeast of Volcanoville, on the ridge between the east and west branches of Grizzly canyon. Discovery was made a year ago by Root & Schultz. It afterward passed into the hands of San Francisco parties, with Judge Bahrs as Supt.

Kern.

Randsburg *Miner*: The Butte mine is down 35 feet in a new shaft 400 feet from west end of the claim, in good ore. They are also drawing all stopes at the extreme east end.

Lassen.

Redding *Free Press*: Hayden Hill is twenty-two miles southeast of Bieber. The principal mines lie southward from the town.——In the Golden Eagle mine from the 250 level down to the 300 the ore body is in several places 25 to 30 feet wide. The 400 level is showing up better.—— The Juniper mine, being worked by McFarland Bros., is looking well.——The Buckskin, owned by Redding men, is idle. There is talk of putting in a cyanide plant next spring.——The Hayden Hill Tunnel Co. is in 109 feet. The air shaft is down 30 feet and 62 feet sinking will connect it with the tunnel. The tunnel is located on the northwest slope of Hayden hill, half a mile from the town of Hayden Hill.

Mariposa.

At the Mariposa mine the machinery is being put in place. Power will be supplied by three 80 H. P. boilers. The old shaft is being enlarged to three compartments, 4x6½ clear. Connection has been re-established between the old shaft and the tunnel at the first level. Heavy hoisting and air compressing machinery will be put in and the mine opened to a depth of 1000 feet. In the early days this mine was extensively but extravagantly worked. R. W. Raymond's official report says that during August and September, 1870, the ore milled $9.98 per ton, which was too low grade, as steam power was used. This grade of ore to-day will pay a large profit, with modern methods, improvements and conditions.

Nevada.

H. A. Fairbanks of Grass Valley has taken the Keystone mine, near Grass Valley, and organized the Keystone M. Co., to operate the mine. Formerly, when worked, this mine produced ore running $30 to $40 per ton, and lately ore has been mined and milled running $19 per ton. The company will develop the mine by means of a shaft, only tunnel work having been done thus far.

Nevada City *Herald*: On the 21st inst. a storage dam on Dobbins creek, owned by the Yuba Power Co., went out, and several buildings and a lot of machinery were swept away. The accident will cause delay to the company's operations on the North Yuba river.

Grass Valley *Telegraph*: The Champion M. Co. of Nevada City has declared an $8000 dividend. The Champion was never as rich as at present. The recent discovery of the new vein in the old Soggs claim is the most important strike made in the property in recent years. The ore is high-grade. The ledge in the old Soggs ground was worked to the level of the creek and abandoned. This has been reopened, and the discovery is in virgin ground. The Providence, across the creek, is also doing well and paying dividends.

Riverside.

The Indian Queen mine, three miles west of Perris, at the head of the Spring canyon, has been bonded by Mr. Andrews.

A large ledge has been opened on the Jumbo, on the summit of the hill east of the Santa Rosa. A 5-stamp mill will be built.

San Bernardino.

The copper mines four miles east of Oro Grande station are being developed. The ore occurs scattered along on or near the contact of diorite and limestone, and is mostly chrysocolla and malachite at the surface, turning to chalcopyrite with some borite in depth. Large masses of iron sulphide containing a small percentage of copper sulphide have been exposed in the workings. The mines have only superficial development, but are well situated, and the extent of the surface showing of ore justifies exploration.

It is reported that J. K. De Lamar has bought a 40-stamp mill for the Gold Mountain mines near Holcomb Valley. There is a large amount of ore in sight in the open cuts of the property, which may be mined and sent by tram or chute directly to a mill at the foot of the hill.

San Bernardino *Sun*: The Turquoise mines, sixty miles northwest of Vanderbuilt, have been sold to J. B. Wood of New York.

San Diego.

Most of the force at the Owens mine, near Julian, has been laid off, the cause not being stated.

The richest mine in the Julian district was the Golden Chariot, six miles from Banner. It produced a large amount of high-grade free milling ore. It has been idle about twenty years.

The most remarkable mine in the district is the Ready Relief, which has become noted on account of its peculiar vein structure. The ore is a silicification of the mica slates in which it occurs, and these have been folded in a series of close, complex folds, the result of a strong compressive stress, which, while sufficiently strong to fold and crumple the rocks, ceased before fracture resulted. The original slaty structure is still clearly seen in the large quartz masses, which are impregnated with iron sulphide and gold.

Santa Barbara.

Santa Barbara *Press*: The Las Conchas mines, with the exception of one, have finished their work for the season and closed down. The one remaining open will close on the first of the year. The company operating these mines will exert all their energy at the La Patera mines, as the demand for asphalt does not necessitate operations at both places.

Shasta.

(Special Correspondence.)—A Michigan company developing the Popejoy claims under bond, near Copper City, this week found an ore body that runs well in copper and carries some gold.

In the Spraggin claims, near Redding, a new ore body was found yesterday, carrying high values in gold.

Work has been resumed in the six-claim group of the Conners mine and the mill will be started so soon as water is sufficient. Wells are being driven for water supply.

Work will be resumed shortly by a San Francisco company on the Black Spider mine, near Keswick, who expect to place machinery to unwater the shaft.

In the Muletown district there is considerable activity in the development of a dozen properties, notably the Mabie group, the Black Bear, the Rabbit, The London Tunnel Co. and the McDaniels group.

Redding, Oct. 24th, '99.

Free Press: It is reported that a rich strike has been made at the Iron Mountain mine, while opening up the ore body discovered some time ago in prospecting with the diamond drills. The character of the sulphide has improved.

Redding *Searchlight*: A. J. Wright, who is working at the Cleveland Con. mines, in the Bullychoop country, for Beall & Coleman, reports that they are working thirty men at the Cleveland. The old workings have been cleaned out and new ground being worked is yielding good ore. The 10-stamp mill has been repaired.

Redding *Democrat*: The Rabbit mine, owned by T. J. and F. O. Jordan, is located two and one-half miles west of Centerville, in the Clear Creek mining district. The gulch, which is crossed by the road where it passes under the Queen M. Co.'s pipe, has been worked since 1849 and has paid, it is said, $100,000. It is at the head of this gulch that the Rabbit mine is located. The ledge has been explored in several places; at one place a perpendicular shaft has been sunk 50 feet. The pay chute is 500 feet long. The ledge varies from 4 to 12 feet in width and the values are high in both free gold and concentrates. The vein matter contains talc and ochre, and an ore resembling gray copper. All of it disintegrates upon exposure to the air. The owners have not decided upon the method of treatment.

Sierra.

Downieville *Messenger*: G. Black started up the mill at the Triple Pocket mine last Thursday, which has been shut down for some time past on account of lack of water. The late storm furnished sufficient water to run the mill.

Siskiyou.

The Americus Gravel M. Co. has been incorporated by S. L. Lezynsky, F. W. Pags, F. L. Lezynsky, M. Koshland and G. Lezynsky; capital stock, $300,000. This company will operate placer mines near Yreka.

Yreka *Journal*: W. A. Farish of Denver, Colo., has examined the Dewey mine at Gazelle. As the parties could not agree upon terms Mr. Farish was not called on to thoroughly examine the property and returned home.——The Little Tiger or Cape mine at Greenhorn has been traced 3000 feet to the top of the mountain, where a shaft was sunk 12 feet on a ledge 7 feet wide. A tunnel has also been run in 115 feet at the mill in the creek on a ledge 4 feet wide. The company is getting up more machinery.——The work of sinking the shaft in the Greenhorn Blue Gravel No. 2 mine, at the Nehrbass ranch, is progressing slowly, with a large quantity of water to contend with. Some gravel has been hoisted into the sluices which pays.——The old Blue Gravel mine at Greenhorn is worked with a full crew day and night, and a new shaft will be sunk.——At the Schroeder mine on Deadwood mountain they are getting out quartz for crushing during the winter season, when sufficient water is obtainable for operating the mill successfully.

Etna *Advance*: A force is employed at the Gold Run mine at Gilta, repairing and making improvements. A new pump and hoisting works have been ordered. When the work now under way is completed the mine will resume operations with a full crew.

Yreka *Journal*: The miners at the Greenhorn Blue Gravel No. 2 mine on the Nehrbass ranch have struck bedrock at a depth of 141 feet. They first found a large boulder, with a small layer of gravel underneath, and then sunk 8 feet into bedrock, to be deep enough for possible depressions at other points in running drifts, besides affording a reservoir for the pumps. The gravel prospects well. It lies between a cement rim or false bedrock and the permanent bedrock, which is soft.——More claims are being located in the Gazelle district, at the head of Willow creek and Park creek, principally quartz, which contain copper, gold and silver.——The Siskiyou M. Co., J. W. Martin Supt., has been prospecting the Mabel mine between Oak Bar and Scott Bar, and the quartz mill bought from Chamberlain & Timmons will soon be set up.

Trinity.

(Special Correspondence) —The Globe mine, at Dedrick, comprising six claims, was sold this week by the owner, R. Woodburn, to a French company, represented by H. M. Hall and H. Duvergay, Supt. and Sec. respectively of the LaGrange M. Co., for $125,000 cash. The mine has a 9-foot ledge that is said to plate $40 a ton. There is a 5 stamp mill on the property. The mine was purchased by Woodburn in '91 for $4000, since which time he has expended $50,000 in its development.

Near Trinity Center a ledge 5 feet wide has been opened that is locally attracting considerable attention. It is a hornblende granite that has been transformed into a reddish-blue color, carrying 4% copper and $7.50 per ton gold.

Trinity Center, Oct. 24th, '99.

Trinity *Journal*: G. L. Carr has put a cannon ball mill with a steam plant on Copper creek, near Carrville, and is crushing ore from the Yellow Rose of Texas mine. The ore is rich. He will also crush ore from the

Forget-me-not and other mines owned by him in that vicinity.——The Graves Bros. have taken out another pocket from the Blue Jib mine, which gave Coffee creek prominence. ——It is reported that the Copper Queen Co. of Napa, which recently bought the Copper Queen and other copper mines in that vicinity, will erect a smelter.

Tuolumne.

Gen. Mgr. Buckminster says regarding the Santa Ysabel gold mine: Have cut the Central ore shoot on the sixth level, and the ore is good grade. No. 1 shaft is down 760 feet. The sixth level south from No. 1 shaft is in 200 feet, and in the vicinity of the main south ore shoot.

A group of claims is being developed on Turnback creek, eleven miles southeast of Sonora, by J. B. Brescia. Grading for a mill is in progress. Water has been appropriated for power.

Within the past few weeks 6 inches of rain has fallen in this county, and as a consequence most of the mines which have been idle are again in operation and will continue as long as the water lasts. The Eagle Shawmut, at Jacksonville, is dropping forty stamps.

Capt. W. H. McClintock, of Sonora, Supt. of the Goldwin gold mines on the Tuolumne river, reports his shaft down 145 feet in 5 feet of quartz, half of which is laminated and of good grade, and the remaining half rich in gold. The old stopes have been cleaned and some samples obtained which return assays of $60 to $70 per ton. He is negotiating for a gas engine for the property.

Sonora *Independent*: J. F. Callahan of Boston has been in Tuolumne county looking after his mining interests near Big Oak Flat. Some time ago he purchased the Rhode Island, Eureka and Mississippi mines in that vicinity. The Rhode Island adjoins the Mt. Jefferson mine at Groveland.——The 20 stamp mill at the Dutch mine at Quartz has started up, using steam power with coal for fuel. The shaft is down 1209 feet.——At the Jumper mine, south of Stent, the shaft is down 1200 feet and sinking is in progress. Timbering and general repairing are being done. The mill is not running.——The Mazeppa mine, south of the Jumper, has sunk below 400 feet, and when the shaft is at 500 feet they will open up north and south. This mine is also using coal for fuel.——The Arbona mine at Tuttletown is down 487 feet. A vein 3 feet wide shows at the bottom of the shaft, the ore being sprinkled with gold and sulphurets. When the shaft reaches a depth of 500 feet drifting will be commenced north and south. There are 600 tons of ore on top and the stopes are full of ore.——At the Santa Ysabel mine at Stent heavy hoisting machinery is being installed and a large gallows-frame hoist being built preparatory to deep sinking.—— The O K mine, near Tuttletown, is running under Supt. Blake.

COLORADO.

BOULDER COUNTY.

Ward *Miner*: The Big Five is steadily driving the three tunnels—the Adit, Ni Wot and Dewdrop. The main work is confined to the two first mentioned, but recently air pipes have been run to the Dewdrop and machine drills are now employed in that tunnel. The Adit tunnel is in 3300 feet along the Dewdrop vein, with continuous ore nearly every foot of the way. In the breast of the tunnel is always an ore streak varying from 3 to 10 feet in width. The progress of the tunnel is from 100 to 150 feet a month. The Ni Wot crosscut tunnel, which leaves the main tunnel 2300 feet from the mouth, is now in 1150 feet. The Ni Wot tunnel has crossed under Left Hand creek, and 1650 feet more will place the breast under the Ni Wot and Columbia vein at a depth of 700 feet. With the progress now being made the lead will be reached within a year.

CLEAR CREEK COUNTY.

In what was supposed to be a barren block of ground in the Mendota mine at Silver Plume holes were put a few days ago which opened into 20 inches of mineral that runs 50% lead and thirty ounces silver to the ton. It was found by shooting into one of the walls. It has been found in this county that more crosscutting is needed.

Cleveland parties working the Maude S. mine at Empire station have erected a tramway from the mine to the railroad. They are shipping the product to the Newton mill. The cleanup a few days ago proved it to be valuable concentrating ore.

B. F. Kelly of Denver, who promoted the Nelson tunnel at Creede, has taken the Alaska property at Georgetown under lease and bond. It is the intention to drive a tunnel to open up the vein below the old workings, which are showing large bodies of iron pyrites.

GILPIN COUNTY.

The mills at Black Hawk are handling a heavy tonnage of ore. All have been obliged to use steam power, owing to the low condition of the creek, but the past week's snows have added to the water supply. During the week there were running 370 slow drop stamps and ninety rapid drop stamps, a total of 460 stamps, which were treating 550 tons. The two sampling works and the concentrator output makes a total of 700 tons of ore handled daily.

McFarland & Co. have the contract for building a new flume about 1100 feet in length by the Randolph Mill Co., and this company intends tearing out one of its twenty-five slow drop sections to put in a new one in its place. G. W. Malice Jr. is Mgr.

At the Bobtail or Black Hawk mill the work of demolition is under way. Fifty stamps have been partitioned off, so that the treatment of ore can be carried on while two new sections are being built for the Cook M. Co. The pine mortar blocks and timbers from under the batteries are being burned to catch the amalgam with which the wood has become impregnated during its years of service. The new mill is to be built under the direction of M. P. Dalton.

A mill has been built on North Clear creek, between Black Hawk and Smith hill, which will run on gravel and creek dift by the Kenyon Co. The matter from the creek will be put through a No. 8 revolving screw and from there to Bartlett tables.

Central City *Register-Call*: F. Hickman is sinking a new shaft on his Comet mine and has taken out ore all the way down. The pay is 2 feet wide.——F. M. Cobb of Denver owns four claims on the northeast slope of Colorado hill. A tunnel has been run in one of them—the Carrie K.—90 feet, and the vein is 6 feet between walls and well mineralized. Another tunnel has been driven lower, in which the vein has been cut at a depth of 200 feet.—— The Ontario-Colorado G. M. Co. is sinking its O'Neill shaft with three shifts and is down 275 feet. In the shaft there is a crevice, 2 feet of which is smelting and the balance milling ore. Sullivan air drills are being used in sinking and in driving the 200 level.——At the Washington, on Bobtail hill, a depth of 100 feet has been reached, showing a good body of milling and smelting ore has been reached.——Sinking has been stopped for the present at the Cook mine, being down 900 feet. The present force numbers eighty men. Daily shipments are being made, which will be maintained during the erection of the mill at Black Hawk.——The shaft on the Freedom mine is down 510 feet, sinking with three eight-hour shifts. Shipments of mill ore are being made.

GUNNISON COUNTY.

Gunnison *News*: The Goldsmith group, in the Gold Brick district, will be started up by D. D. Walburn of Tomichi ——The Carter Bros. have received their air compressor, and the Carter tunnel, in Gold Brick district, will be driven with air drills.——The Lead Chief and Ajax mining lodes are located in Carbonate camp on the west slope of Big Baldy, in the Gold Brick district, and are owned by Mundell, Ball, Denham & Knight, who are operating the property through tunnels. In tunnel No. 1 is a 3-foot vein of galena. Tunnel No. 3 has been driven 30 feet and a 2-foot vein of galena is showing in the breast. The ore runs 20 to 60% lead and carries $16 to $40 in gold, silver and lead.——At the North Pole mine provisions are being made for winter work. Freight wagons are moving a large amount of carbonate ore to the Hoffman smelter at Marble.——F. Dempke, foreman of the Duke of Wellington mine on Galena mountain, near Elko, says the mine has made a shipment of fifteen tons of ore. The Duke of Wellington is held under bond and lease by H. G. Ingersoll, Denver.——J. B. Crotty has a quantity of bismuth ore on hand and is having the Smith concentrator test it at Crested Butte.——The coal measures in the Elk Mountain district are to be opened by the Fuel Co.——Negley & Walleser are working on the Ready Pay, on Galena mountain. The vein is 51 inches in width. The ore is copper sulphide, galena and gray copper.

LAKE COUNTY.

A strike has been made in the Penrose at Leadville. The company has opened a body of ore running between two walls 25 feet apart.

The Hibernian shaft on Fryer hill, Leadville, a portion of the Great Hope M. Co.'s group, is making steady shipments of iron. Kyle & Donaher are the lessees, and within a short time shipments will be increased to fifty tons a day. Some of the iron is of very good grade, and occasional pockets are found that show ore rich in chloride of silver.

MINERAL COUNTY.

Creede *Candle*: The diamond drill broke into the Last Chance shaft last week, but owing to the mass of mud and rock accumulated in the shaft during the four years that the mine has been flooded, the water did not flow out rapidly. Engineer Rowley had a tin tube made the size of the hole, 17 feet long, and filled it with fifty pounds of giant powder, which was pushed up the hole and as far into the mud as possible and exploded. The water is coming out rapidly.

OURAY COUNTY.

Ouray *Herald*: Among investors in the Red Mountain district the past summer was the Standard Oil Co. Representatives of this corporation were in Ouray in June, and secured a number of promising claims. They are doing preliminary work on several claims and in the spring a large force will be employed.——The Congress mine, in the Red Mountain district, operated by the Congress Copper M. Co., of Connecticut, has been a regular shipper during the past season, its ore netting $40 to $60 per ton in gold and copper. Preparations are being made to sink the shaft. A new shaft and bunkhouse are being built. Twenty-five men are employed. ——The Buchanan Con. G. M. Co., of Boston, are driving the Lizzie E. tunnel. This was first opened in 1890, but never systematically worked. Last year, under a lease, $90,000 was taken out in three months on the Columbia-Menona vein. C. Collins has a contract for driving a 1000-foot tunnel in the direction of Ingram basin, where the vein will be cut. ——The Enterprise mine, in the Red Mountain district, owned by J. A. Adams and Dr. Hall, of Telluride, is preparing to work. A new shafthouse is being erected and other improvements made.

SAN JUAN COUNTY.

Denver *Republican*: The Paradox M. Co. has bought a group of claims in the Paradox district comprising the Mineral King, Monday, Copperopolis and Genevieve. The ore body in the Mineral King is large. The shipping ore is found in massive streaks running through the vein matter from 2 to 20 feet wide. The mass of ore will run $15 to $20 per ton, but shipments have been made yielding from $50 to several hundred dollars per ton. The 30 feet opened in the Gold King is mostly ore, and in one breast there are 6 feet of solid ore that will average 12½% copper. The property is developed by adit levels (none of which has gained great depth,) and a 130-foot shaft and every opening is in ore of good grade. The mine has been worked under lease for some time and has paid more than $9000 in royalties to the owners. The mine is equipped with a small hoist, and it is the intention of the company to put in a gasoline hoist before spring. The company has erected buildings—ore and shaft houses, etc., and will develop all winter. The ore is well adapted for matte smelting, carrying a high percentage of sulphur and all the iron necessary for fluxing, and the company proposes to erect a furnace with a 100-ton daily capacity next season. It is estimated that the ore can be mined and reduced to matte at $5 per ton. A tramway a mile long will be installed in the spring, connecting the mine with the railway. In the Genevieve claim the ore opened up is 12 feet wide, with but one wall, and is of a good average grade.——Mr. Kendrick reports activity in the surrounding mines. The tungsten deposits found there this year will be developed.——A few days ago the Little Dora, near Silverton, opened two veins with crosscut tunnel showing 6 to 10 feet of high-grade ore.

TELLER COUNTY.

The strikes made recently on Copper mountain are attracting interest and will result in increased activity in the northern section. Strikes have been made on two properties to the east and west of the Fluorine.

A strike has been made on the Tornado, at Cripple Creek, which is the best made in several weeks. The lessees operating the ground have 15 inches of smelting-grade mineral, 3 inches of which is solid sylvanite. The find was made in the block under lease to G. Bernard and associates at a depth of 200 feet. The ground is being operated through the workings of the Elkton mine. The 300 level has been extended into the Tornado Co.'s territory, and the breast is 50 feet from the Elkton line. It is at this point that the rich strike has been made; $6000 worth of ore a week has been taken out in driving the drift. With 5 feet more the lessee will be at the limit of his block, and what ore is left in the mine will be mined by the Tornado Co., equipped with a larger plant of machinery, and the company will prosecute extensive development work. As quickly as possible the shaft is to be deepened and connected with the various levels driven into the territory from the Elkton property. The ground at depth has already in this manner been prospected. That ore—and bonanza ore—is there has already been demonstrated, and it is simply a question of doing work enough to make a big producer of the property. There is already some talk that the Tornado may yet rival its big neighbor, the Elkton.

Cripple Creek *Times*: The Gatch Leasing Co., operating the Lost Lillie of the Copper Mountain Co., have struck the Fluorine shoot. At a depth of 150 feet two veins have been encountered, one 7 feet and the other 10 feet in width. Assays from the vein show values from $40 to $350 a ton. The entire vein is pay ore. The leasing company has eighteen months yet to run. Their royalty is from 10% to 20%. A steam plant has been ordered.—— Lessee Brant, operating the Iron King of the C. C. & M. Co. alongside the Hoosier, has the Hoosier vein at a depth of 110 feet. The ore body has been cut for a distance of 10 feet and is not through it.——N. C. Estey of Leadville has taken a three years' lease on the St. Louis and Cripple Creek tunnel on Mineral hill. A large force will be put to work. The tunnel is in a distance of 800 feet. About half way in a 35-foot vein was encountered and it is the intention of the lessee to drift on it in search of the ore shoot.——The Hendrie & Bolthoff Co. of Denver have sold to the Gold Coin mine a Webster, Campbell & Lane first motion double hoisting plant. The engines are 24x48. The plant is equipped with double reels for flat ropes and will hoist a 10,000-pound load 2500 feet at a speed of 1500 feet per minute. The Ajax mine has purchased a similar plant.——Another strike has been made on the Zenobia. It is small, but will run $30,000 to the ton. The strike was made at a depth of 465 feet in a drift from the Garfield Consolidated shaft, in Zenobia ground. The Zenobia shaft is down 425 feet and will be sunk to 465 feet. That part of the property is under lease to Tutt, Penrose & Bartlett. ——It is reported that Boston capital will build a 100-ton chlorination plant at Cameron.

IDAHO.

BOISE COUNTY.

Boise *Statesman*: G M. Cary, owner of the Lion mine, twelve miles from Placerville, says it was discovered two months ago. It shows 3 feet of ore from which an average sample returned 181.77 ounces of silver per ton, $13 22 in gold and 11.64% lead.

IDAHO COUNTY.

Salt Lake *Tribune*: At Marshall lake, twenty-five miles southeast of Florence, on the south side and on the high mountain range, Maxwell & McGibbon located in August the Mountain Chief claim. Ten days ago they went out to do their assessment work. The ledge did not show much on the surface. Several came back and pronounced the camp no good, but Maxwell & McGibbon at 7 feet commenced to find free gold. At 12 feet in depth they found quantities of gold. They brought to Florence a sack of ore that was one-half gold. J. N. Rice, who furnished Mallory $4.75 worth of grub and for which Judge Steele awarded him one-fourth of the Big Buffalo group of mines last July, has secured a bond on the Mountain Chief group for $100,000, one-half to be paid in thirty days —— Parties from Boise basin are here putting in a dredging plant to work tailings of placer days.

MICHIGAN.

HOUGHTON COUNTY.

The Tamarack Co. is contemplating a semi-annual dividend of $5 or $6 per share. Its mineral is running richer, and at present is producing at the rate of 2,000,000 pounds per month.

The new Tamarack-Osceola mill has not yet started up. The mill is awaiting the completion of the 40,000,000-gallon pump.

It is reported from the Victoria mine that a soft epidote has been struck, heavily charged with mass copper, running from one to fifty pounds weight. They are now about 15 feet in on the vein.

Marquette *Mining Journal*: At the Arcadian mill, at Grosse Point, the second head of the mill is running, and both heads are stamping daily 1100 tons. Considerable barrel copper is picked out at the mill which escapes notice at the mine, where the major portion of the barrel rock is sorted. The third head is being placed in position. The anvil block weighs thirteen tons. The 35-ton foundation block and the two 17-ton blocks upon which the anvil block sits are in position.

MISSOURI.

JASPER COUNTY.

The Boston Get There Zinc Co. made the largest return for the week ending October 15th of any of the mines in the Joplin district —272,560 pounds of zinc and 22,320 pounds of lead.

Zinc mines in the Missouri-Kansas district remain closed, but prospects seem to favor early reopening of mines. Prices for zinc and lead remain unchanged. A number of smelters have closed down also, the smelters evidently having determined to combat the Miners' Association for lower rates.

A combination known as the National Lead, Zinc & Spelter Co., with a capitalization of $10,000,000, and with a surplus of $500,000, to control and work large interests in the Joplin-Galena district, has been formed. The concern was promoted by M. Pollasky, president of the National Mine Co., of Kansas City. The concern will operate and develop properties in the district, and as a result of the organization lead and zinc stocks will be listed on the stock exchanges of New York, Boston and Chicago.

MONTANA.

GRANITE COUNTY.

At Philipsburg, P. A. Fusz, through F. D. Brown, has bought for $20,000 all of the placer claims, mill sites and water rights belonging to J. T. Pardee of that city. The properties are patented, together with all the mill sites and water rights, located in Basin gulch.

SILVER BOW COUNTY.

An action has been brought by the Boston & Montana against the owners of the Ella, which was supposed to be Boston & Montana ground, but was jumped by J. R. Bordeaux and others, who have expended their money in opening up the property. Now that the work has developed a mine litigation has begun.

Another mining suit has commenced in Butte, involving the Ella, which has made a fine showing the last few months. The action is commenced by the Boston & Montana Co. and the defendant is the Meaderville M. & M. Co., of which J. R. Bordeaux is the moving spirit. The plaintiff seeks for an order of inspection and survey, and alleges that the defendant is mining and extracting ore from ore bodies of the Ella which have their apexes in the Leonard claim, which adjoins the Ella. The defendant is charged with entering these veins and ore bodies by means of underground workings and extracting ore. For the purpose of determining the truth of this belief the plaintiffs have asked for an order of survey.

Butte *Miner*: Underlying the Harrington placer, the ground which Mr. Heinze seeks to have condemned that he may use it for a dump, it is reported six ore veins had been discovered, and the Butte & Boston is working toward them through the Silver Bow shaft. The ground lies on Meaderville flat and was supposed to be barren.

NEVADA.

ELKO COUNTY.

The Young America M. Co., at Tuscarora, by Mgr. W. B. Andrew, has ordered a mill of ten stamps, with space for twenty to be added next spring, to be followed by a cyanide plant.

LANDER COUNTY.

It is locally reported that mining is to be resumed at the Union mine at Austin.

LINCOLN COUNTY.

Pioche *Record*: W. J. Dooley has bought 812 feet in the Johnny mine, in Stateline district. N. P. Dooley sold 500 feet and C. Robinson 312 feet, Dooley conveying his interest also in the Stateline mill, while Robinson transferred his interests in a number of adjoining locations. C. O. Newell declined to sell his holdings at a $90,000 basis.

NYE COUNTY.

Suit has been commenced in San Francisco, Cal., against W. J. Sutherland, Pres. of the Homes M. Co. of Nevada, by A. H. Ricketts, representing minority shareholders, to prevent the sale of the Homes property and other Nevada mining properties to an English syndicate for $4,000,000. The suit is brought for the protection of the minority shareholders.

STOREY COUNTY.

In the Con. Virginia and California mine a new ore shoot has been found on the 1800 level, which is being developed.

A dozen teams are hauling rock from the Imperial mine to Wheatland, from which place it is shipped to the Stege smelter.

C. E. Dutcher, chief electrician of the Comstock Pumping Ass'n, has returned to Virginia City from a final survey of the route of the pole line from the Comstock to Floriston. The length of the pole line will be twenty-eight miles. Mr. Dutcher says the Truckee River General Electric Co. will be ready to deliver power on the Comstock by June 1, 1900.

The water in the C. & C. shaft has been materially lowered since the re-installation

of No. 2 elevator. The latest official report is as follows:

VIRGINIA, NEV., Oct. 26, 1899.

To Aug. Waterman, Consulted Pumping Assn., San Francisco: At 6:30 this morning the water was 121 feet 3 inches below the 1250-foot level station. No. 2 elevator has been running continually.

JOS. R. RYAN.

NEW MEXICO.

GRANT COUNTY.

Santa Fe *New Mexican*: F. J. Davidson will start the Golden Grant mill at Pinos Altos on ore from the Gopher mine, which employs fifteen men.——The mines and smelter at Pinos Altos recently sold by Dimmick Bros. have suspended operations pending a change of management.——The Pinos Altos G. M. Co. is setting up machinery in the new concentrating plant. The management is also sinking from the 700 to the 800 level in the Gillette shaft, a hoist having been placed on the 700 level to facilitate operations. The company has decided to use coal instead of wood for fuel.——Supt. Brandis of the Atlantic group at Pinos Altos is drifting and sinking winzes from the 600 and 700-foot levels. Fifteen men are employed on development work.——Philips & Adams bonded one of their claims at Ash Peak to a Denver company Oct. 1st. The claim produces ore that runs 900 ounces silver and $295 in gold and copper.——Rodgers & Tong made a strike on the Summit and Commerce at Ash Peak. An assay showed 1652 ounces of silver and some gold. The vein averages 6 feet in width.——The new furnace erected at the Silver City reduction works has increased the capacity of the plant to 225 tons per day. One hundred men are employed.

OREGON.

BAKER COUNTY.

Baker City *Democrat*: A strike has been made in Cornucopia district. Mackay & Dean, in doing assessment work on the Bryan location near the Last Chance—an extension of the Red Jacket—opened an ore shoot that was rich in gold. The pay streak is 1 foot wide.——At the head of Rock creek A. W. Ellis of Sumpter has struck a 20-foot ledge from which ore is being shipped from the surface.——The Chloride, recently purchased by Knoxville, Tenn., people, is being operated.——The Weatherby mining district is in the same mineral belt with the Virtue and Columbia Creek mines. Nearly all the mines are free gold, in granite and slate formations. The gold assays in fineness from $16 to $17.50 per ounce. The Pomeroy dredger is working 30 feet of gravel, averaging 23 cents per cubic yard.——At the Weatherby-Bonanza, owned by a Spokane company, they are preparing to sink a 500-foot shaft.——The Burnt River M. & M. Co. of Walla Walla are erecting a 2-stamp mill.——The Golden Thread M. Co. have a 5-stamp mill and steam hoist which they are putting in place. The property is owned by a Seattle company.——The Gold Cliff M. Co. are shipping to the Tacoma smelter. These properties are within six miles of the O. R. & N. Ry., and are accessible at all seasons.——Supt. Hansen of the Deer Lodge mine, on Rock creek, twenty-five miles west of Baker City, states that work has commenced at the Deer Lodge. The ore assays from $10 to $40 per ton.

Baker City *Democrat*: It is reported that the Bonanza mine, sold a short time ago by the Geisers for $1,000,000 to Pennsylvania capitalists, has been sold for $3,000,000.——E. J. Godfrey, one of the owners of the Red Boy, who has been in London for two months, has placed the Red Boy and North Pole mines at $3,000,000 for the former and $900,000 for the latter.

SOUTH DAKOTA.

CUSTER COUNTY.

Custer *Chronicle*: H. Eisele of Omaha, A. C. Kellar and J. Wallace of Council Bluffs, Iowa, of the North Star M. Co., have been inspecting their property near Custer. Seventeen feet of ore is exposed in the different openings on the property. The company have in contemplation the purchase of steam hoisting works, and air compressor and drills. Mr. Feay is Supt.

LAWRENCE COUNTY.

Pioneer Times: The ore that O. P. T. Grantz took from Deadwood to Denver, Colo., recently from his Hidden Treasure mine near Terraville netted him $79,000.

UTAH.

BEAVER COUNTY.

Salt Lake *Tribune*: There is a representative of a California syndicate in this county who says that within sixty days his people will have 1000 men in the mines and smelters there. This means the purchase and rehabilitation of the two old smelters at Milford; and as the syndicate has secured over fifty claims, they will have considerable territory to operate upon.

JUAB COUNTY.

It is figured that the Centennial-Eureka now shows dividends in sight for the next ten years on a basis of $4 per share per year.

Tintic *Miner*: An interesting apex question has been raised by the Four Aces Co. breaking into South Swansea ground, from which the latter company claims they have extracted considerable ore. Supt. Wheeler and his force came upon the Four Aces miners Tuesday while upraising from the 650 level. He put a bulkhead across the drift.——Mgr. Hunt, of the May Day, will let a contract for a 50 H. P. hoisting plant and an air compressor of 5 drill capacity. A station will be cut in the tunnel 25 feet east of the winze through which the ore bodies have been prospected, where a vertical shaft will be sunk 500 feet. The boilers and air compressor will be housed on the dump.

SUMMIT COUNTY.

The properties embraced within the holdings of the Alliance M. Co., at Park City, have passed into the possession of the Silver King for $65,000. The only thing from which this property has ever derived any revenue has been the water owned by it, although $70,000 has been expended in prospecting it.

WASHINGTON.

FERRY COUNTY.

Spokesman-Review: There is more quartz in sight in the Blacktail than in any other claim in Republic, save the Republic and Mountain Lion. A drift in any direction unearths a body of ore. While there is a quantity of quartz of good value, it is, as a rule, mixed with porphyry, in which large bunches of clean quartz are found.——The shaft on the Knob Hill is down 18 feet in 4 feet of quartz, going $28 per ton. In the tunnel the vein is larger and the values are $36 per ton. The ore to free milling. The property lies a quarter of a mile southeast of the San Poil and a half mile southeast of the Mountain Lion.——Supt. Kehoe of the Bodle says that the shaft is 275 feet deep, with 2 feet of solid quartz in the bottom, which assays $20 per ton. The ledge has been considerably broken, but is solid now.

STEVENS COUNTY.

It is reported that Dr. Grieve, W. R. Hook and R. Roescheisen have struck galena on the west slope of Bossburg hill. The ore is similar to the Bonanza product, but is of higher grade. Considerable galena float has been found by parties in the vicinity of this strike.

OKANOGAN COUNTY.

The Palmer Mountain G. M. & Tunnel Co. was awarded the first prize for the best arranged mineral exhibit at the Spokane Industrial Exhibition.

WYOMING.

CARBON COUNTY.

Grand Encampment *Herald*: The first carload of ore from the Cox mine, shipped to Denver this week, is the richest ever shipped from the Grand Encampment district, running 34% to 79% copper, and will net the company $2400 a car. The mine is thirty-five miles from Battle in a southeasterly direction. The mine is owned by the Wyoming Con. Copper Co. of Boston. They have thirty claims on Big creek, fifteen miles southeast of Encampment. The company is now damming Big creek and is going to put in an electrical plant to develop 300 H. P. Col. Frambach, Pres. of the Wyoming Southern, is interested in the mine.

FOREIGN.

NEW ZEALAND.

Alexandria *Herald*: The several dredgers working in the vicinity of Alexandria during a week in August produced gold as follows: Vincent, 143 oz. 11 dwt.; Matau, 128 oz.; Unity, 74 oz.; Moa, 49 oz.; Nil Desperandum, 49 oz.; Enterprise, 48 oz. 5 dwt.; Chatto Creek, 29 oz.; Manorborn, 24 oz. 10 dwt.; Molyneux Hydraulic, 24 oz; Golden Beach, 22 oz. 9 dwt. 12 gr.; Galtee More, 9 oz.

London *Mining Journal*: From the three centers the output for the month amounts to £51,895 15s 3d, or and increase of £6580 over the corresponding period of 1898. Ohinemuri mines contribute £41,772, Thames proper £6378 and Coromandel £3743.

SOUTH AFRICA.

The output for August on the Witwatersrand was 459,710 ounces, being 3236 ounces greater than that of July. Other South African mines added 22,399 ounces to the above amount, making a total of 482,109 ounces—nearly $10,000,000.

BRITISH COLUMBIA.

A press dispatch from Ashcroft states that there was a robbery on the night of the 18th inst. at the Cariboo mine, near Quesnelle Forks. The safe in the Cariboo Hydraulic Co.'s office was blown open, and part of the amalgam, worth $50,000, stolen.

The Le Roi M. Co. has declared its first dividend since the mine passed from Spokane ownership. The dividend is 5 shillings per share or £25,000, to be paid Nov. 7th. It is also reported from London that the company expects to pay dividends monthly in the future. The changes made in the main shaft have doubled its working capacity. Hereafter, the management states, 400 tons per day will be the output maintained. This does not include 200 tons a day from the second-class ore dump.

The War Eagle has recently showed increase in values. Ore taken out of the stopes at the 250-foot level showed an average value of $90, and there is an average width of 5 feet of this ore.

LOWER CALIFORNIA.

At the Sierra Pintada placers, of a population of the district which at the time of the recent rush was 2000 persons, about 100 are left, and only six or eight Americans, among them being Long and Hatch of Los Angeles, P. Brennan, of the Rice district, San Diego County, Cal., and Cahill, Cunningham and Reece, of Los Angeles, who have filed upon quartz claims rich in copper and gold. The claims are five or six miles from the main camp.

Recently Declared Mining Dividends.

Le Roi M. Co., Rossland, B. C., £25,000; payable Nov. 7.

Montana Ore Purchasing Co., quarterly, $1 per share, $80,000; Oct. 27.

Raven G. M. Co., Colorado, 1 cent per share; payable Nov. 1. Total, $49,500.

Gold King M. Co., Colorado., 3 cents per share; Oct 20.

Boston & Montana M. Co., quarterly dividend, $4 per share, extra $11 per share; payable Nov. 20. Total this year, $36 per share.

Champion M. & M. Co., Nevada City, California, 25 cents per share, $8000; payable Nov. 1.

Personal.

LOUIS JANIN has returned from Utah to San Francisco.

J. H. TIBBETTS has returned to San Francisco from Nova Scotia.

JULIAN SONNTAG has returned to San Francisco from an extended Eastern visit.

COL. MANSON of Reno is secretary of the Paris Expcsition Commission for Nevada.

CECIL RHODES says that mining and fighting will proceed simultaneously in South Africa.

EDGAR RICKARD, late Supt. Moon-Anchor mines, Colorado, has resigned his position and gone to London.

PROF. CHAPMAN of Adelaide, Australia, is in San Francisco on an itinerary through the principal gold mines of the country.

SAM'L J. HENDY, of the Joshua Hendy Machine Works, has returned to San Francisco from a business visit to the Atlantic slope.

H. Z. OSBORNE of Los Angeles, Cal., is attending the eighth annual convention of the California State Miners' Association at San Francisco.

HERMAN ZADIG has returned to San Francisco, Cal., from an official inspection of work in progress on the Brunswick lode at Virginia City, Nev.

WM. B. FISHER of San Francisco has been appointed Gen. Mgr. American Zinc, Lead & Smelting Co., with future headquarters at Joplin, Mo.

J. R. TOOLE, of Butte, Montana, recently returned to that city from an extended tour in Mexico and British Columbia in search of mining property.

N. E. IMHAUS, Mgr. Flagstaff mine, Baker City, and H. S. Ankeny, of Portland, are in San Francisco attending the meeting of the California Miners' Association.

W. R. WHEELER of San Francisco has been selected by the Pacific Coast Manufacturers' and Jobbers' Association to fill the vacancy on the Interstate Commerce Commission.

WAKEFIELD BAKER AND H. D. LOVELAND, of San Francisco, have been respectively elected president and traffic manager Pacific Coast Jobbers' and Manufacturers' Association.

THOS. TONGE, of Denver, represented Colorado at this week's San Francisco session California State Miners' Association, and will report his impressions thereon to the Denver dailies.

J. H. HARRIS, Mgr. Reco M. Co., Sandon. B. C., will spend the winter at his home in Virginia. He says no attempt will be made to reopen the Slocan mines until the labor question is settled.

H. T. WILLS, Mgr. Canadian Bank of Commerce of Dawson, has returned. Within a period of sixteen months, since that institution began doing business in Dawson, he has purchased about $7,000,000 worth of Klondike gold.

URIAH DUDLEY, of Melbourne, Australia, arrived in San Francisco this week on an extended tour of observation of California mines. Mr. Dudley is the founder of the Society of Australian Mining Engineers, and will spend considerable time in this country in noting conditions and methods of practical mining.

JOS. MCGILLIVRAY, the veteran California miner, arrived in San Francisco this week from his second visit to the Klondike. He starts to-day on his third visit to London via Ottawa, Canada, and expects to return to Dawson City via San Francisco next February. At present he has three sets of engineers at work and is negotiating an operation that involves the investment of $2,000,000. He is backed by British capital, and though in his seventy-third year, looks upon a little trip to the Yukon metropolis as a mere incident in the transaction of his mining business.

Industrial Notes.

—Nearly 500 miners are now employed in the Mogollon, New Mexico, district.

—A long-distance telephone is to be put in from Dawson to points down the Yukon river. Ultimately Circle City will be reached, but for the present the lines will not go below Fort Egbert.

—The Pacific Coast Co. announced a rise in wages of from 12½ to 15% of all the men employed in the coal mines at Newcastle, Coal Creek, Lawson and Franklin, Wash., in all about 1200 people.

—The new mills of the Bellingham Bay, Wash., Improvement Co. are to have the largest steam whistle in the world. It will be 5 feet long, 15 inches inside diameter, will weigh 1300 pounds of cast aluminum bronze. The metal must have a tensile strength of 60,000 pounds per square inch to meet the stipulations. It will take considerable of a boiler to furnish steam of commensurate requirements.

—The western section of the Transvaal Railroad consists of a line from Cape Town to Mafeking. The midland section consists of a line from Port Elizabeth to Norval's point, on the Free State frontier, where it connects with the Orange Free State trunk line, running through Bloemfontein to the Transvaal. The western section is connected with the midland by a line from De Aar to Naaupoort Junction, sixty-nine miles long.

—An American engineer is en route to China on behalf of Chicago men, on whose behalf he expects a share in the expected contract to be given out by the Chinese Government for the demolition of the famous Chinese wall. It is stated that one French, two British and three German firms are also bidding for the work, payment for which is to be ample in the shape of rich concessions, so that out of the ruins of the wall there may arise great engineering and industrial works which may change the whole future of China.

—Business is not all a matter of barter. There is more that goes out to a customer at each transaction than the goods and invoice, and more is received from him than the orders and payment, and this incorporeal seasoning of personality that permeates trade is what gives to it its savor and lifts it above the drudgery of mere money grubbing. Man does not work for wealth alone. In fact, there arises a time in the career of almost every successful man when the money that is made is a minor consideration, and in proportion as he gives his time and energy to his business does he value the other things he gets out of it, which his devotion to it prevents him from seeking elsewhere; and so the friendliness injected into his commercial relations means much to him. It is the letters that praise the goods of a house, that comment favorably upon some phase of its policy or that contain evidences of personal esteem, that are read and re-read by all from the head down, are passed from hand to hand with expressions of appreciation and are finally most carefully filed. So, too, when by any chance the heads of the businesses meet, the cordiality that is displayed has its origin in the esteem gained from association, lying far deeper than any mere monetary consideration involved in the trading done.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING OCTOBER 17, 1899.

635,069.—LIFE PRESERVER—Z. C. Angevine, Los Angeles, Cal.

635,009.—DISH WASHER—J. D. Atkinson, Seattle, Wash.

634,978.—WATER TUBE BOILER—M. P. Boss, S. F.

635,037.—TRUCK—C. A. Buck, S. F.

635,230.—BUCKLE—O. K. Burnham, Palouse, Wash.

635,234—STOOL SEAT—G. H. Chance, Portland, Or.

635,127. — FLUID-CONTROLLING MECHANISM — C. Cummings, S. F.

635,011.—CRUSHING MILL—J. M. Dyer, S. F.

635,012.—SAFETY GAS COCK—H. H. Fassett, S. F.

634,982.—INSUFFLATOR—E. T. Johnson, S. F.

635,049.—JAR CLOSER—L. Look, Dos Angeles, Cal.

635,264.—GRAIN HEADER — J. C. Lynch, Walla Walla, Wash.

635,177. — CONVEYOR — W. L. McCabe, Tacoma, Wash.

635,176—FILLING FOR WOOD PAVEMENTS.—T. K. Muir, Portland, Or.

635,270.—DREDGER—Rix & Donahoo, S. F.

635,000.—ENVELOPE FASTENER—C. P. Schademan, Congress, Ariz.

634,918.—CALIPERS—J. H. Smith, Chico, Cal.

635,208.—CURRENT MOTOR—W. Turner, Wenatchee, Wash.

635,209—TELEPHONE MOUTH PIECE—G. W. Van Alstine, Los Angeles, Cal.

634,922.—COPY HOLDER—E. Waldrip, Asotin, Wash.

635,216.—MOP HEAD—C. M. Williams, Los Angeles, Cal.

634,973.—ENGINES—G. L. Woodworth, Palo Alto, Cal.

634,934.—SWING—W. S. Young, Artesia, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SAFETY GAS COCK.—H. H. Fassett, San Francisco, Cal. No. 635,012. Dated Oct. 17, 1899. The object of this invention is to prevent the escape of gas and the danger arising therefrom if the gas cock is accidentally turned back after the gas has once been turned off. The invention consists of an elastic wavy outlined spring fitting circumferentially in a case or enclosure surrounding and concentric with the axis of the gas cock. A pin projects from the cock in line with the spring and forms contact with each of the raised portions of the wavy outline as it passes, and when it is left at the point where it is either closed or opened it is practically locked between two of these raised portions of the spring, so that it cannot be turned from its position without the exercise of considerable force. When sufficient force is applied the elastic nut of the spring causes it to yield so that the point of the pin will pass these raised portions of the spring.

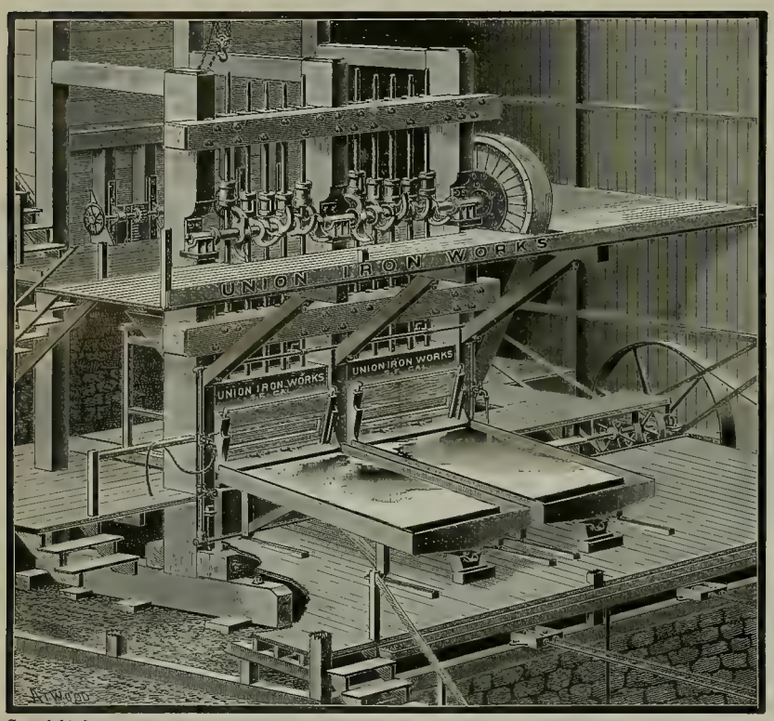
CONTROLLING MECHANISM FOR FLUIDS AND GASES UNDER PRESSURE.—Charles Cummings, Oakland, Cal., assignor to the Pneumatic Power Co., San Francisco, Cal. No. 635,127. Dated Oct. 17, 1899. This invention relates to improvement in valves used in pipes for conveying fluids or gases under pressure. In operating machines by fluids or gases under pressure a main pipe or conductor extends from the source of power to the point or points where it is desired to apply it. Small pipes connect this main with the motors to be actuated and any number may be independently connected in this manner. The object of this invention is to provide for closing the connection between the main and any one of these small pipes in case of fracture of the pipe or other accident which would otherwise cause a loss of the fluid under pressure. This is particularly valuable where the main carries a fluid under a high pressure and in cases where the gas or fluid is circulated in a closed system at two unequal pressures. The invention consists essentially of an automatically operating valve interposed between the main and supplemental conducting pipes, the piston mounted upon the valve stem and movable in a cylinder, one end of which is open to pressure from the passage between the two pipes and the other to atmospheric pressure.

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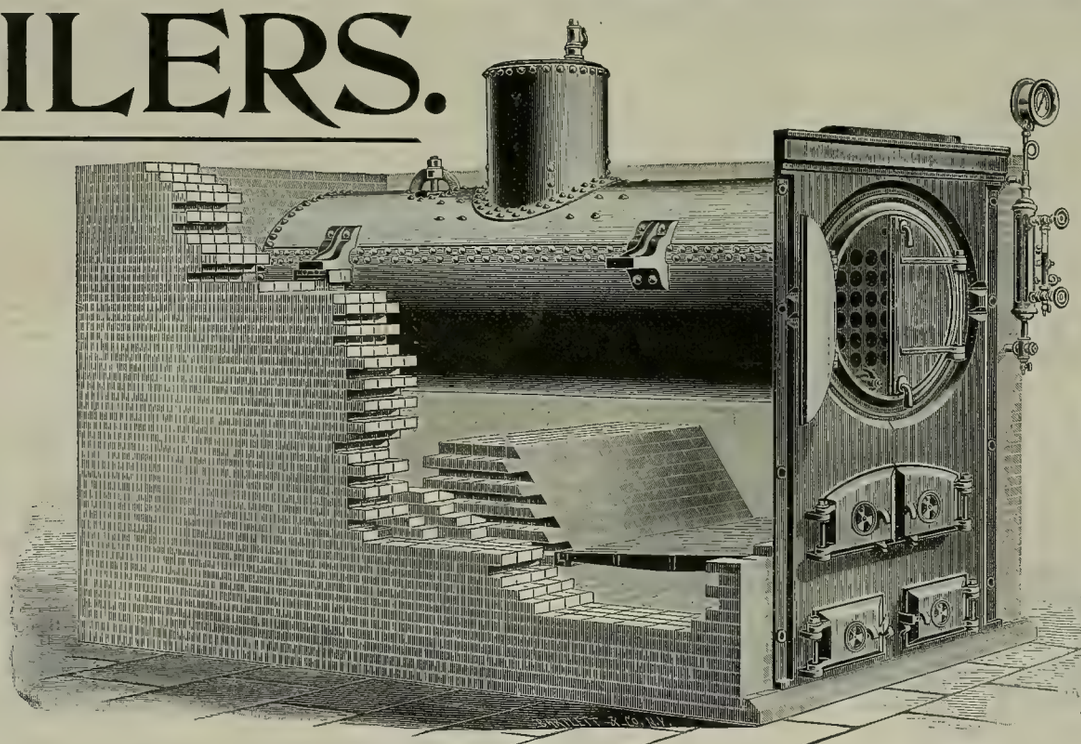


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The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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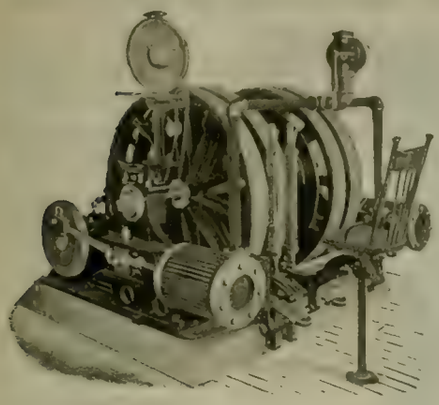
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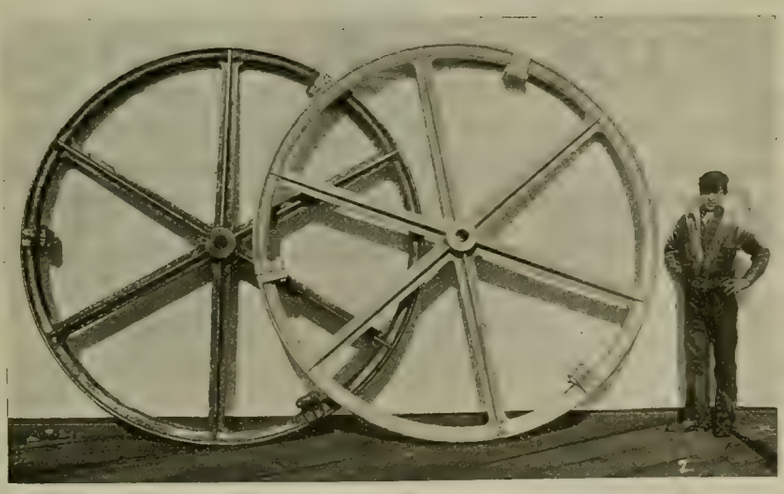
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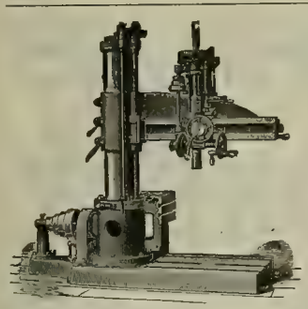
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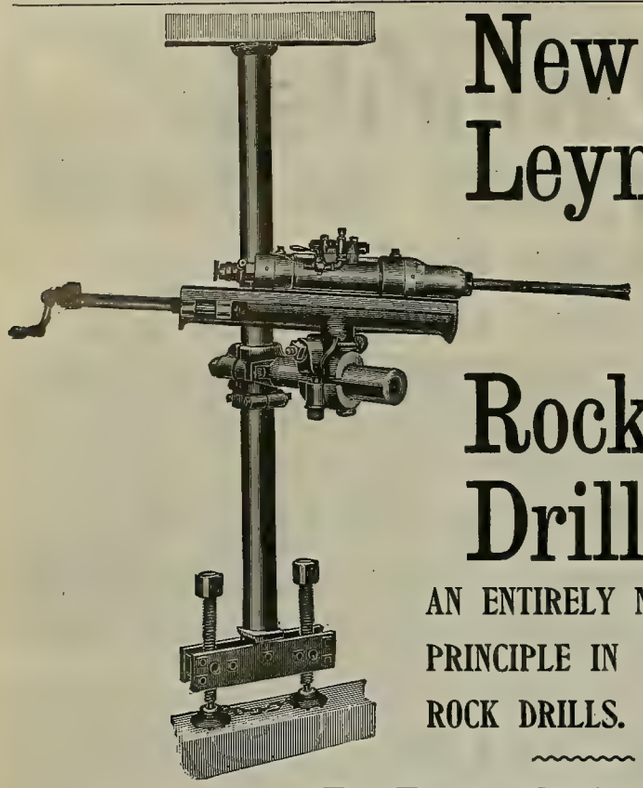
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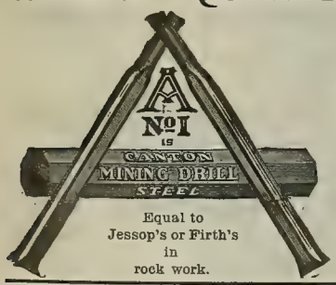
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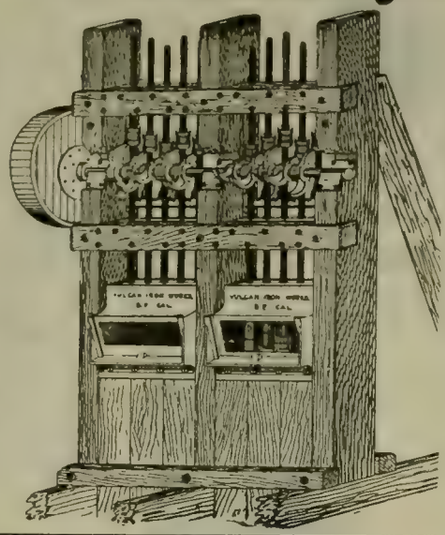
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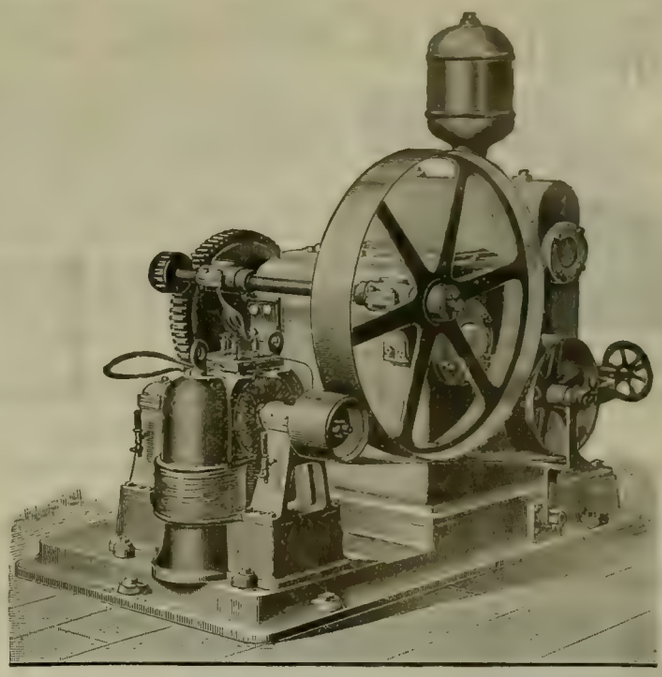


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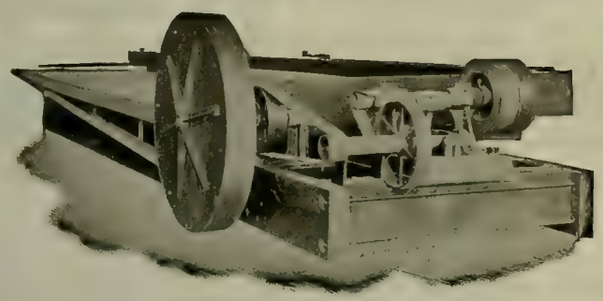
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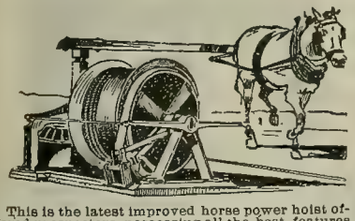
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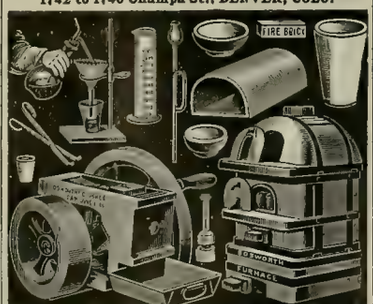


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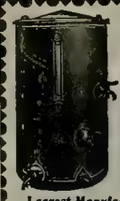
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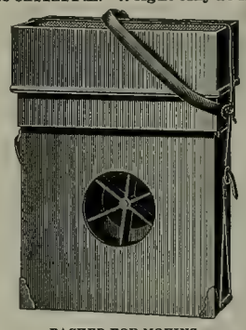
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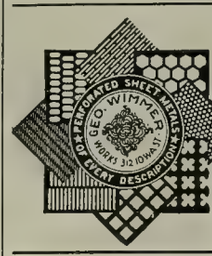
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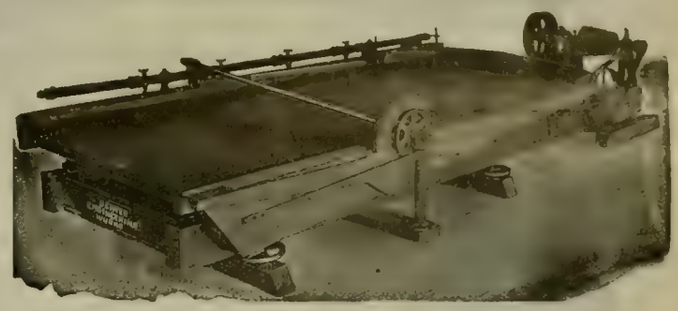


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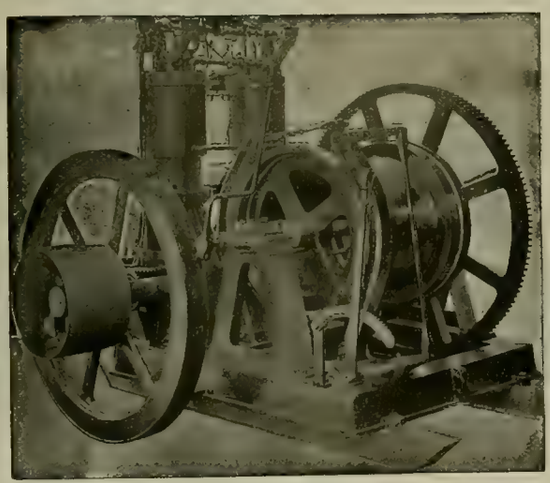
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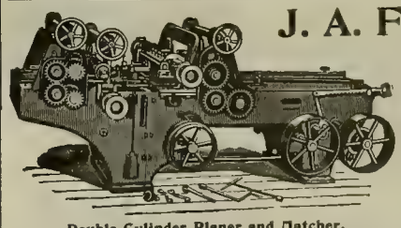
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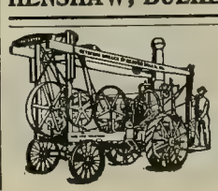
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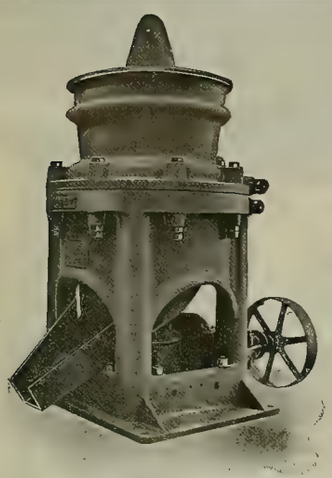
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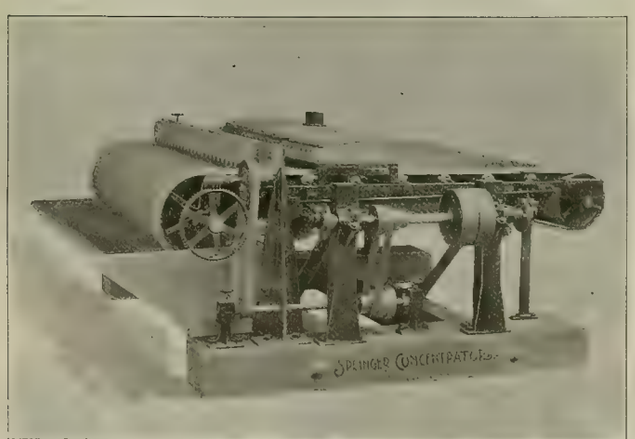
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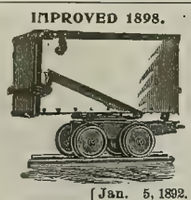
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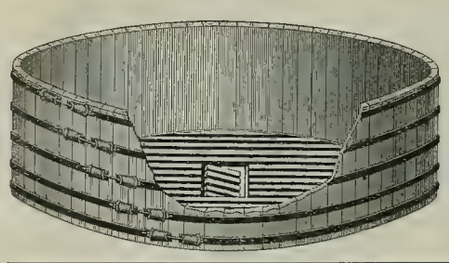
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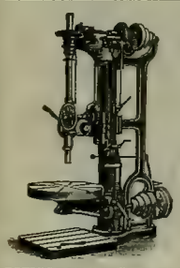
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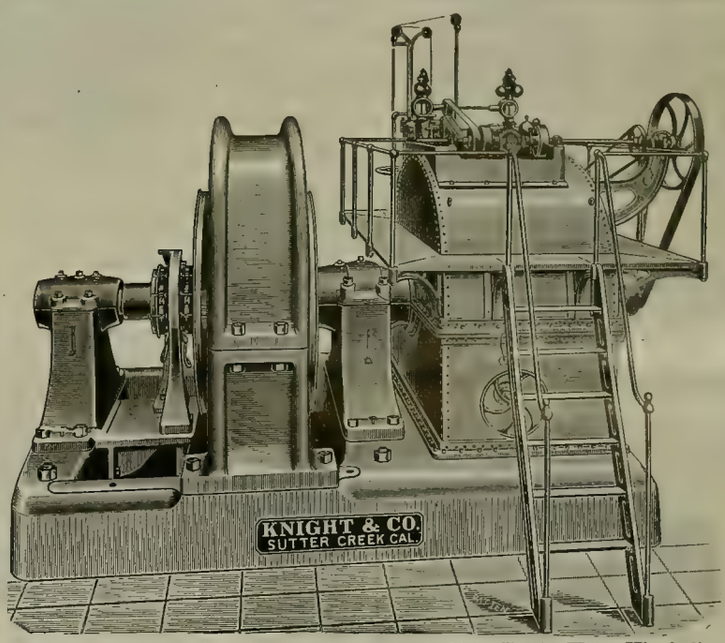
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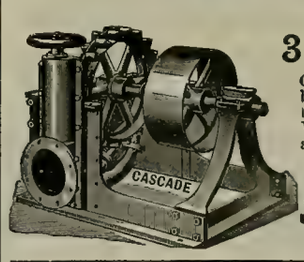
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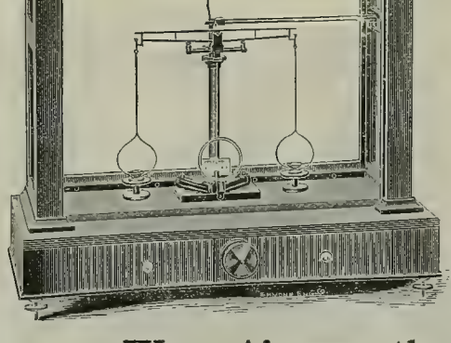


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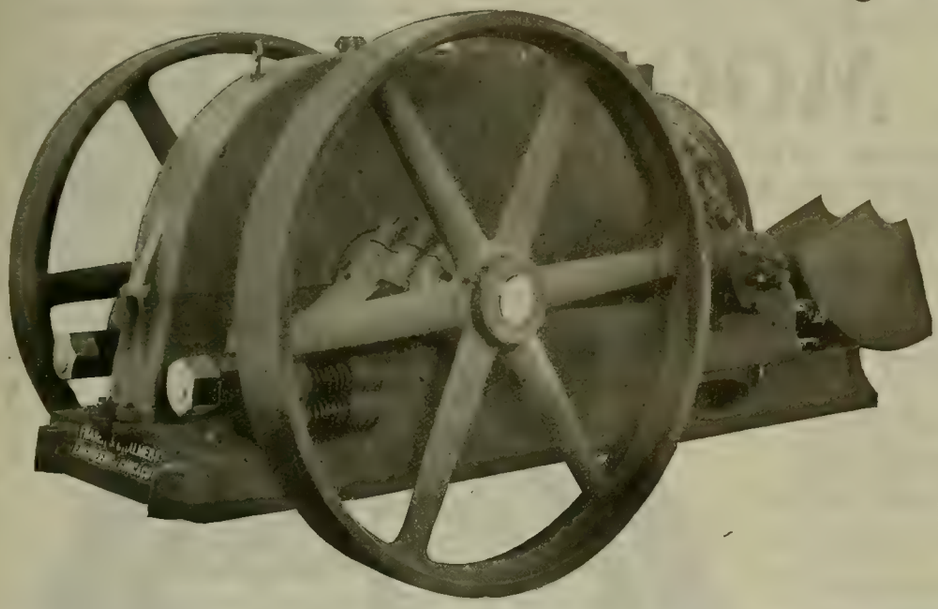
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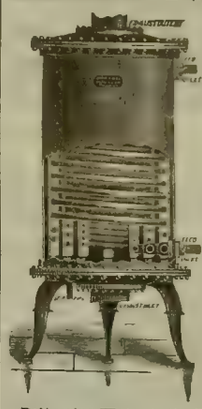


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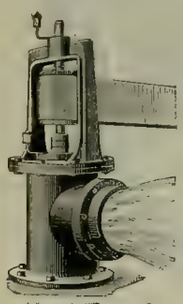


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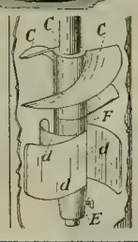
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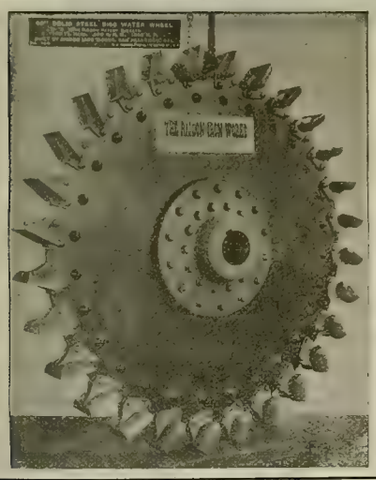
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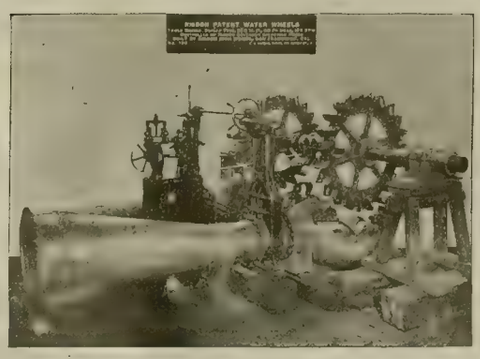


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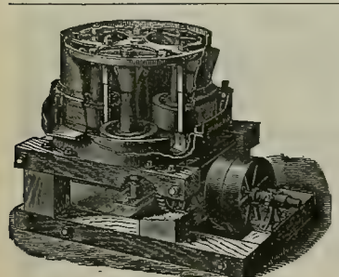
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173 LAKE ST., CHICAGO, ILL.
INSULATED MAGNET WIRE & ELECTRIC WIRES.



C. H. EVANS & CO.

HAVE REMOVED THEIR Machine Works TO 183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,
Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.

Mining Pipe!



STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.

WRITE FOR CIRCULARS OF The Truax Pat. Automatic ORE CARS.

SCHAW, INGRAM, BATCHER & CO., Hardware Merchants, SACRAMENTO, CAL.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—

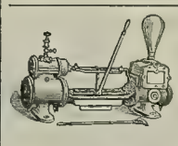
SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

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Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared for coating all sizes of Pipes with Asphaltum.



SOLE AGENCY

Worthington Steam Pumps and Water Meters.

Pumping Plants of any Capacity.

TATUM & BOWEN,

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MACHINERY—ALL KINDS

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.

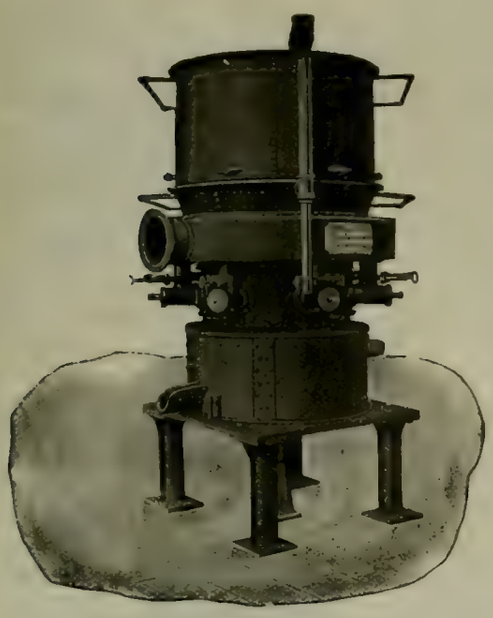
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

OFFICE: 208 California Street, San Francisco, Cal. WORKS: Point Isabel, Contra Costa Co., Cal.



A MODERN COPPER SMELTER (ROUND FORM).

THE COLORADO IRON WORKS CO.,

Established 1860. DENVER, COLO.

MANUFACTURERS OF

Smelting Furnaces and Equipments

For the Treatment of

GOLD, SILVER, LEAD, COPPER and PYRITIC ORES.

THIS CLASS OF WORK IS A SPECIALTY WITH US.

We also manufacture all kinds of Ore Milling Equipments for Amalgamation, Concentration, Cyanide and Chlorination Processes.

(SEE PAGE 503.)

GENERAL ELECTRIC COMPANY

Schenectady, N. Y.

Standard of the World.

EQUIPPED

The Great Electrical Transmissions

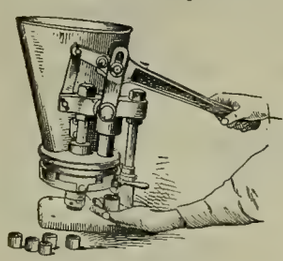
—OF—

FOLSOM-SACRAMENTO (Cal.), 24 Miles,
SAN JOAQUIN-FRESNO (Cal.), 36 Miles,
WILLAMETTE-PORTLAND (Or.), 12½ Miles.

The Power is now used for Railways, and Lighting and Operating Large Mill Plants.

Write-- SAN FRANCISCO, CAL., Claus Spreckels Building. DENVER, COL., Kittredge Building. PORTLAND, OR., Worcester Building. SALT LAKE CITY, UTAH, Templeton Building. If You Want Anything Electrical.

Patent Pending.



PERFECT CUPELS

can be made by anyone with ease and dispatch with

CALKINS' CUPEL MACHINES.

Compact, easily operated, can't get out of order, everlasting.

NO ASSAY OFFICE COMPLETE WITHOUT ONE.

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This machine will make five sizes cupels of ideal perfection.

Capacity, *600 an hour.*

Three designs and grades.

Descriptive Pamphlet and Price List Mailed on Application.

F. W. BRAUN & CO.,

Assayers' Goods of Every Description,

LOS ANGELES, CAL.

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WE ARE AGENTS FOR

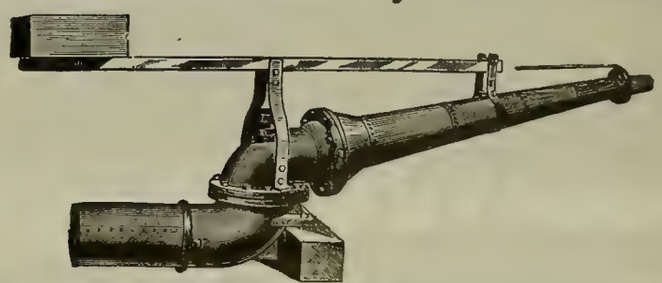
Dow Steam Pumps,
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117-123 S. LOS ANGELES ST., LOS ANGELES, CAL.

Dewey, Strong & Co., Patent Agents,

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Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved Double-Jointed Ball-Bearing Hydraulic Giant which we build. The improvement consists of the introduction of a Ball Bearing by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.

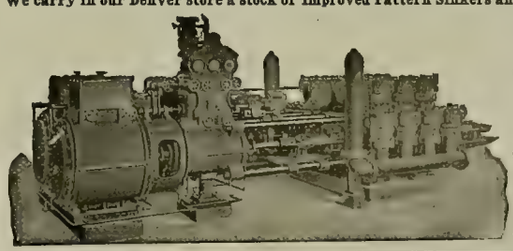
Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

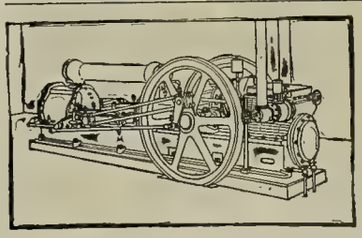
We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.

Write for Catalogue and Estimates.



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Telephone 2298 A.
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THE NORWALK Air and Gas Compressor.

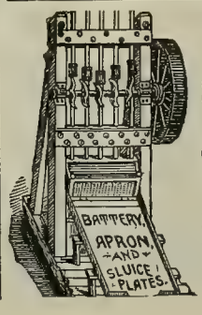
In use in every State in the Union, Central and South America, Great Britain, etc. Also by the U. S. Army and Navy.

ESPECIALLY DESIGNED FOR DRIVING

Rock Drills,
Pneumatic Locomotives,
Engines, Pumps, Coal Cutters,

And Other Mining Machinery. The Best Machine for Compressing Air for All Dynamic Purposes. Send for Illustrated Descriptive Catalogue.

HENSHAW, BULKLEY & CO., Agents, - San Francisco, Cal.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES BOUGHT OR TAKEN IN EXCHANGE FOR NEW PLATES. GOLD EXTRACTED FROM OLD PLATES AT A MODERATE COST. OLD PLATES REPLATED. GOLD, SILVER, NICKEL, COPPER AND BRASS PLATING.

Denniston San Francisco Plating Works,
652 Mission Street, Cor. Annie, San Francisco, Cal.
E. G. DENNISTON, ... Proprietor.
—:Send for Circular.:—

Market Reports.

SAN FRANCISCO, Oct. 26, 1899.

SILVER.—London, 26⅝d; New York, 57⅞; San Francisco, 57⅞; Mexican Dollars, 47½@48⅛; New York exchange, sight, 12½; telegraphic, 15 cents premium.

Silver is weak and somewhat lower in London.

LEAD.—New York reports quiet, $4.60 bid, $4.65 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake very quiet at $17.75; brokers' price, $17.75. Local—Mill copper plates, 23¾c.

Copper is showing a lower tone, selling under 18 cents for the first time in several months, although there is stated to be decrease in the visible supply. United States production of copper (long tons) for September, 1899, aggregated 22,715 tons, compared with 22,686 tons for the previous month. Exports of copper from the United States (long tons) for September, 1899, aggregated 7553 tons, compared with 10,920 the previous month. European copper production (long tons) for September, 1899, aggregated 7839 tons, compared with 7292 the previous month. Visible supply of copper in London Oct. 15th, 26,164 tons—a decrease of 2164 tons since Oct. 1st. Visible supply Jan. 1, 1899, was 27,896 tons; Feb. 1st, 26,015; March 1st, 24,326; April 1st, 28,497; May 1st, 26,529; June 1st, 30,156; July 1st, 29,004; Aug. 1st, 33,019; Sept. 1st, 32,381; Oct. 1st, 28,328. Supplies for the fortnight, 8670 tons, of which 700 were from Chili and 4954 from America; deliveries, 10,834 tons. The decrease in the visible supply the last six weeks, or since Sept. 1st, amounts to 6217 tons.

IRON.—American, soft, $22.50@24.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

The *American Manufacturer*, in to-day's issue, says: "It is understood that the mills manufacturing steel rails combined and notified the railroad interests of the country that prices would be advanced and that the railroads could cover all their wants at $33 per ton. Nearly every railroad in the country came in with orders, and an aggregate of 1,500,000 tons of rails was ordered at the above price for delivery in 1900. The price was then raised by rail makers as follows: For standard sections, in lots from 100 to 200 tons, $37; carload lots, $38, and less than carload lots, $40; light rails, from twenty-five to fifty pounds per yard, $37 per ton. All the prices quoted are free on board Pittsburg mills. The importance of this can scarcely be realized. The total sales aggregate about $50,000,000. This means that about one-sixth of the total steel output for 1900 will be consumed in the manufacture of rails. This does not include orders placed by the Russian Government some time ago, together with other orders, which will make the aggregate tonnage in rails next year much more than has already been ordered. This fixes it beyond all peradventure that prices of iron and steel for 1900 will be considerably higher than prevailing figures."

STEEL.—11¼@20c per pound.

TIN.—$31.50 bid and $31.65 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $47; export, $43@43.50; carload lots, special rates.

Within the week quicksilver has taken another upward step, export metal being quoted $1 per flask higher than a week ago. The visible supply of quicksilver in this country is between 3000 and 4000 flasks, or less than a month's requirements. The visible supply abroad is less than one-half the amount normally on hand. Prospects favor a still further advance in the near future. Quicksilver is not sold for future delivery, all sales being made for cash and spot delivery.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 66s per ounce; New York, $17.75; San Francisco, $17.25.

ZINC.—$5.15 bid, $5.25 asked.

There is a noted feature in zinc—its perishability. After a ton of iron or copper or silver or gold is produced it is practically indestructible. The world's supply of the metal is increased by just that amount, less the natural waste and wear and tear. Convert copper into electric wire, and it is permanent. Should it pass through the fire the copper is simply melted and can be recovered. Zinc, on the contrary, is volatile. It is obtained from the ore by vaporization and subsequent precipitation. Put it in the fire and it is gone forever. Used in electric batteries it is eaten by acids. When used for gold extraction it disappears. As surface for galvanized iron it cannot be recovered. Hence the world is dependent upon the annual supply of the metal. There are no accumulated stores, so that however high the price may go it is not possible to work over old metal, as in the case of almost every other metal.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¾c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c.

CANDLES.—Electric Light Candles—6s, 16 oz., 8½c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8½c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 00

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Oct. 25, 1899.

9:30 A. M. SESSION.

400 Ophir	73c	500	30c
100 Mexican	24c	500 Yellow Jacket	20½
500 Gould & Curry	30c	100	19c
400 Best & Belcher	49c	300 Sierra Nevada	54c
100 Con. Cal. & Va.	$1 65	200	53c
300 Chollar	27c	1100 Overman	12c
300 Potosi	36c	500 Justice	04c
300	35c	100 Caledonia	45c
100 Hale & Nore's	31c		

2:30 P. M. SESSION.

200 Mexican	23c	500	54c
200 Con. Cal. & Va.	$1 65	100 Utah	09c
500 Chollar	29c	100 Overman	14c
400 Potosi	38c	100 Union Con	32c
400 Sierra Nevada	54c	200 Andes	08c

Mining Stocks and Securities for sale. Purchaser guaranteed against loss. Correspondence solicited from people wishing to buy Stocks and Securities, and also from brokers and others who are able to dispose of Stocks and Securities.

Address **E. N. BREITUNG,**
Marquette, Mich., U. S A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

A BIG SALE.

All the oil lands of the Union-Consolidated Oil & Transportation Company have been bought by us.

WE HAVE OIL LANDS

In Merced, Contra Costa, San Mateo, Santa Clara and Colusa counties. Oil in 60 days our experts claim. Shares now at $5 for a limited time only. Particulars on application. New York references.

AMERICAN OIL and REFINERY COMPANY,
Rooms 322-323 Parrott Building,
SAN FRANCISCO, U. S. A.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

TUBBS CORDAGE CO.
(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. ☞ Extra sizes and lengths made to order on short notice
611 and 613 Front St., San Francisco, Cal.

ACCOUNTANT.—Expert accountant, now employed by one of the largest mining companies in Colorado, wishes to make a change to lower altitude on account of his wife's health. Am familiar with all the details of a mining office. Best references. Address H. A., Mining and Scientific Press.

WANTED—For Eastern syndicate, developed and paying gold mine; no limit as to price. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

Mining Engineer and Metallurgist Desires Position as Superintendent.

Fifteen years of practical experience in mining and milling in the United States, Canada and Mexico. Thoroughly competent in every respect. Speaks and writes Spanish fluently. Specialist in the treatment of rebellious silver and gold-bearing ores. Experienced in designing and building of mills.

Address F. VALENTINOV, Apartado Postal 814, City of Mexico.

WANTED.
Huntington Mill and Concentrator.

A second-hand Mill and Concentrator in good working order can be sold for cash. Address, stating price and description, W. E. D., care of Tribune, Oakland, Cal.

S. O. Graham. J. H. Garrett. J. W. Heisner, T. E. Dexter.
GRAHAM, GARRETT & CO.,
211-212 Peyton Block, SPOKANE, WASH.
MINE PROMOTERS, AND BROKERS.
Make a specialty of promoting, operating and developing mines. We handle all standard stocks.
Our specialties are: Syndicate G. M. Co., Syndicate Camp, Idaho; Admiral Dewey G. M. Co., Republic, Wash.; Mabel G. M. Co., Republic, Wash.; Juno M. & M. Co., Republic, Wash.; Ninety-Eight G. M. Co., Republic, Wash. Send for free maps of Republic Camp. Codes used: Moring & Neal and Clough's.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Henry H. Meyer et als., in the French Claim, at Alabama Hill, near Downieville, Sierra Co., to deposit tailings in a ravine below the mine; from R. J. Sinnott and F. M. Spencer, in the Hopkins Creek Tailing Claim, in Goodwin Township, Plumas Co., to deposit tailings in Hopkins Creek; and from James C. West, in the Eagle Gulch Mine, in Butte Co., near Strawberry Valley, to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 30, 1899, at 1:30 P. M.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

FOR SALE.
Gold Properties in Various Stages of Development.

Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
2219 Stout St., Denver, Col.

FRED C. MILES,
CISCO, PLACER CO., CAL.
Gold Mines for Sale or Interest for Development and Small Mill.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.
Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.
ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

ESTABLISHED 1856.
Controls AND Check Assays
(A SPECIALTY.)
MARINER & HOSKINS,
ASSAYERS AND CHEMISTS,
Mining Engineers and Metallurgists.
81 South Clark Street,
Rooms 51-55,
CHICAGO, ILLINOIS.
SEND SAMPLES BY MAIL OR EXPRESS.
MAILING SACKS ON APPLICATION. : :

PIONEER REDUCTION CO.
Established 1858. Nevada City, Cal.
Buyers of Gold, Silver and Copper Ores and Concentrates.
HIGHEST PRICES PAID FOR COPPER ORES.
WRITE FOR RATES.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

"SMOOTH ON" CASTINGS
FOR LEAKS AND FRACTURES IN STEAM OR HYDRAULIC WORK IS MAGICAL.
It repairs a blemish in iron castings with a durable metallic iron finish that can be polished and will withstand a red heat. It makes a superior flange joint for steam, water or oil.
Write for Catalogue. Manufactured by SMOOTH ON MFG. CO., Jersey City, N. J., U. S. A.
MESSRS. MADISON, BRUCE & SELLERS,
34-36 STEUART ST., SAN FRANCISCO, CAL.....AGENTS FOR PACIFIC COAST.



Most reliable for controlling steam and other fluids. Can be reground, if necessary, while valve is in position on steam pipe.

—MADE BY—

The Wm. Powell Co.,
CINCINNATI, O.

Carried in stock by Miller, Sloss & Scott, San Francisco.

Quicksilver

—FOR SALE BY—

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

Assessment Notices.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of October, 1899, an assessment (No. 9) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of November, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 21st day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of September, 1899, an assessment (No. 13) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1899, an assessment (No. 33) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, 10th floor Mills building, San Francisco, California.

ANDES SILVER MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of October, 1899, an assessment (No. 49) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of November, 1899, at 1 o'clock P. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of October, 1899, an assessment (No. 8) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California. location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No 30) levied on the 16th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No Cert.	No. Shares.	Amt.
G. A. Hinckelbein, Trustee	9	1,000	$50 00
G. A. Hinckelbein, Trustee	10	1,000	50 00
G. A. Hinckelbein, Trustee	11	1,000	50 00
G. A. Hinckelbein, Trustee	32	200	10 00
P. A. Wagner, Trustee	90	980	49 00
P. A. Wagner, Trustee	91	1,000	50 00
P. A. Wagner, Trustee	92	1,000	50 00
P. A. Wagner, Trustee	93	1,000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of September, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento St., San Francisco, California, on WEDNESDAY, the 15th day of November, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary.

Office—217 Sacramento St., San Francisco, California.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 2. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
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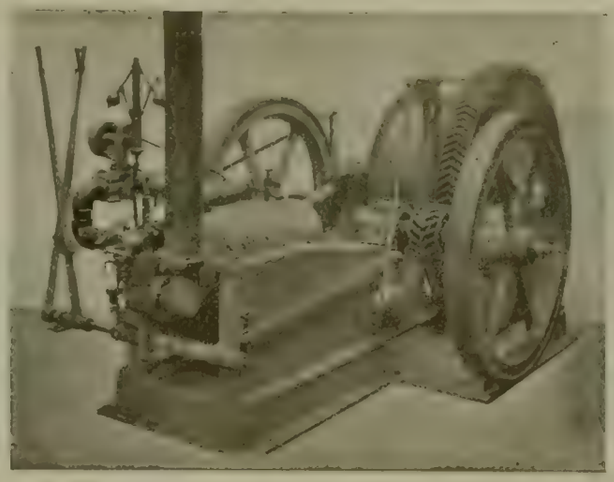
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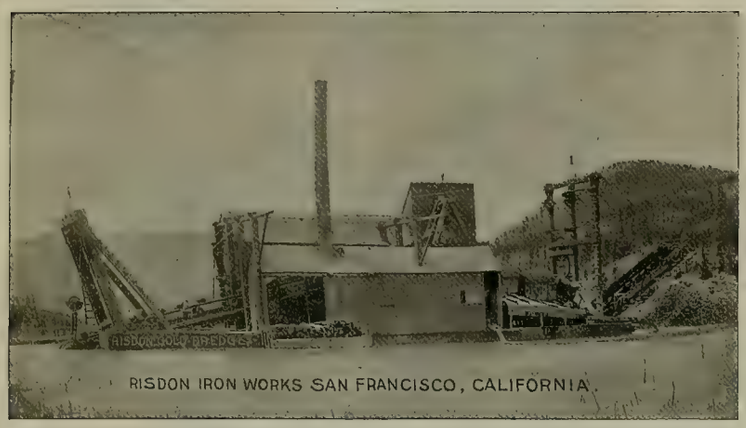
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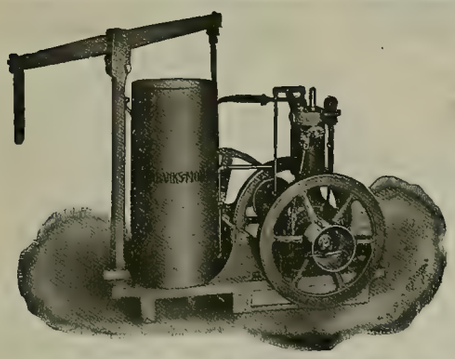
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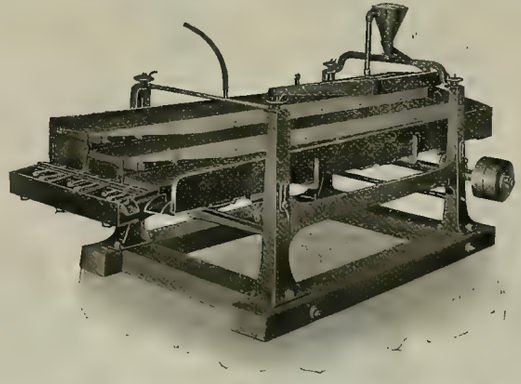
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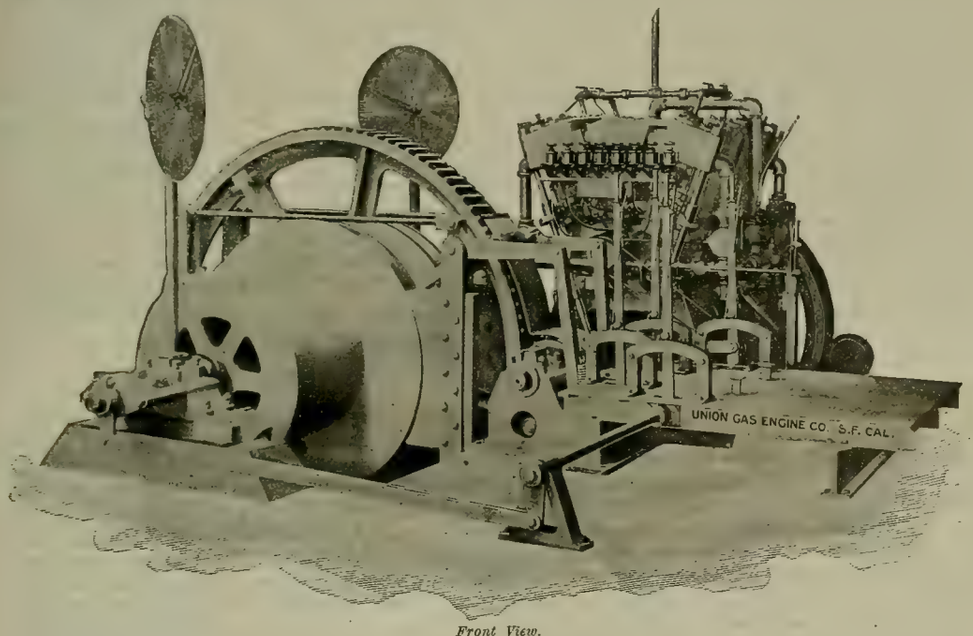
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No. 2052.—VOLUME LXXIX. Number 19. SAN FRANCISCO, SATURDAY, NOVEMBER 4, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A 130 H. P. "Union" Mining Hoist.

The accompanying illustrations show the latest development in gasoline hoisting engines. It consists of a four-cylinder vertical gasoline engine of 130 H. P. combined with a double-drum geared hoist, intended to work down to about 2000 feet. It was built for the Yellow Aster M. & M. Co. of Randsburg, Cal., by the Union Gas Engine Co. of San Francisco.



Front View.

The hoist is to be placed under ground about 350 feet from the mouth of the tunnel, at the head of an inclined double-compartment shaft.

It is arranged to start the big engine with a small auxiliary engine, the latter being used also for running the blower for ventilating the mine. Both engines run on distillate, which is about one-half the cost of gasoline when delivered at the mine; but they can be run on naphtha, benzine, or any grade of gasoline.

The levers are all brought to one platform, enabling the engineer to have full control over both hoist and engine, as in modern steam practice.

The double-cylinder and four-cylinder engines are particularly well adapted to hoisting purposes, as they have more frequent impulses than single-cylinder engines, and as each impulse is of smaller volume and force, the result is that the load is lifted more steadily.

The Yellow Aster M. & M. Co. have been using one of the "Union" hoists for the past two years, and were so well pleased with its work that they ordered from the same company the hoist of 130 H. P. The Union Gas Engine Co. make a specialty of gasoline mining hoists and engines, which they have been building for the past fifteen years.

They recently closed a contract with the Arizona Copper Co. for two horizontal stationary engines of about 150 H. P. each, which are to operate on distillate or producer gas. One is to run the air compressor and the other the new concentrating plant.

It is not always the mine making the largest output that pays the largest dividend, though it may be best for the greatest number of people.

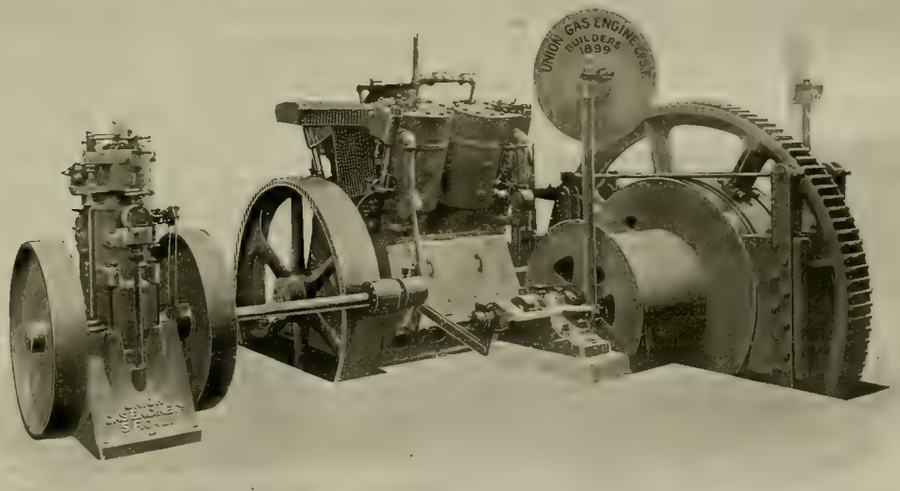
Promoting Mining Enterprises.

An exaggeration of the facts when presenting a mine or a prospect for sale seldom accomplishes the desired result, and often has a reactionary effect when the misrepresentation is discovered. In these days little or nothing is taken "for granted," as was often the case in former years, and now in order to interest capital a mine owner must have a property worthy of the necessary investigation, to say nothing of a possible subsequent investment. Realizing this, the claim owner, in his anxiety to proffer something attractive to the possible investor, and knowing perhaps that his property does not possess all the merits of a bonanza, is led to place exaggerated values on his ores and the greatest width of vein becomes its average width. All the disadvantages are suppressed as far as possible, while such favorable conditions as do exist are magnified to such an extent as often to lead to a suspicion that the truth is not given due consideration, often to the ridicule of the entire proposition. It is not an easy matter to sell poor property of any kind, and misstating the facts seldom affords a remedy, for in the event of an investigation by competent persons these facts are sure to be discovered. A well-known American expert once remarked: "When I go to examine a mine I usually ask the foreman or superintendent—with a wink—to show me where his best ore is, which he invariably does, and then I find the poor places myself."

While the prospector usually is on the bull side in a deal for his property, he sometimes underestimates its value. A well-known mine was discovered and worked in a shiftless fashion by the discoverer, who one day had an offer of $12,500 for it. He promptly accepted the offer, and, upon receiving his money, crossed the street to where a friend was standing and remarked: "Thank God, the fools are not all dead yet." "How's that?" inquired his friend. "I've just sold the D—— mine for $12,500." This mine has since produced more than $5,000,000.

What a contrast between this man and the Siskiyou Co., Cal., "mine superintendent" who recently remarked that he had in his property 45 feet of ore. His listener, who was acquainted with the facts, inquired in astonishment where it was. "Why," was the reply, "we have thirty claims with a foot and a half of ore in each."

The secret of successful mine promotion lies in a careful selection of property worth all that is asked for it, and such a mine will practically sell itself. No amount of misrepresentation will give value to the property, and its proximity to other valuable and producing mines is given but passing consideration unless it be known that the ore shoots of the working mines actually pass their end lines and enter the property offered for sale, and even then unless the ore shoots be developed the value is wholly speculative and not given more than nominal credit by the investor. Still in the face of these facts promoters continually magnify the value of adjoining property, and in the glittering prospectus make prominent passing reference to valuable mines which chance to be in the same county or perhaps the same State. Such methods are particularly resorted to when the property offered for sale has little merit of its own to recommend it, but the time has come when such representations and misrepresentations are measured by their proper worth.



Back View.

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J. F. HALLORAN.....Publisher

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Front and Back Views of the Largest Gasoline Mine Hoist Ever Built, 513. Working on a Grub Stake; A Home-Made Mill Test, 516. Latest Mining and Metallurgical Patents, 518-519. Browne's Vacuum Bailing Tank, 520.

EDITORIAL.—A 130 H. P. "Union" Mining Hoist; Promoting Mining Enterprises, 513. The Concentration of Ores; Real vs. Bogus Mining Experts; Miscellaneous, 514.

MINING SUMMARY.—521-522-523.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 538.

MISCELLANEOUS.—Concentrates, 515. Notes on Mine Surface Sampling; Put the Blame Where it Belongs; Typical Prospecting Scenes; Copper in South Africa, 516. Notes on the Ymir Mine and Its Mill Practice; Soda Nitrate in Chile; Cyaniding Prior to Amalgamation; The Use of Charcoal in the Cyanide Process, 517. Latest Mining and Metallurgical Patents, 518. Notes on the Geology and Mineral Deposits of Vancouver Island; Mining Operations in the Yukon Basin; A Valuable Publication, 519. Browne's Vacuum Bailing Tank; Grading Near the Smelter of the Golden Reward Con. M. Co.; Warming Quartz Mills and Battery Water; What Many Men Constantly Say, 520. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Commercial Paragraphs; Books Received, 524. Expected Meteoric Shower; The Arch Principle in Dams; Experiments in Wireless Telegraphy, 525.

THE war now raging in South Africa is attracting the attention of the entire world. As was supposed, England, being unprepared, is meeting severe reverses, but that she will ultimately be the victor few doubt. Upon the issue of this conflict depends the future prestige of Great Britain, not only in South Africa but in the entire world.

ALREADY it is being said that there are not nearly enough provisions at Cape Nome to feed the 4000 people now there during the coming winter, the greater number of whom will be unable to get away owing to lack of transportation facilities. A large number have gone to the Klondyke to winter, as in that district work may be obtained in the underground mines throughout the winter season.

IT is announced that the Federal troops which have been doing duty at Wardner, Idaho, since last spring are to be withdrawn by the order of Secretary Root, although Gov. Steunenberg has strongly objected to it. It is claimed that everything is peaceful in the Cœur d'Alene district and that there is no further need of the military. This the Governor denies. If the troops are withdrawn the real condition existing in that district will soon become apparent, whatever it may be.

IN the summer of 1898 the discovery of large and rich veins of gold ore was announced in the Buffalo Hump region of Idaho. During the following fall and winter much was said of these prospects, and on several occasions they were announced sold or bonded—once to Clark and Sweeney for $550,000, who later gave up the bond—and then it was reported that Capt. J. R. DeLamar had bought the property for a large sum. Later this bond was also given up. Now the announcement is made of another deal on a basis of $200,000, in which Clark and Sweeney again figure prominently. During all this time a shaft 80 feet in depth, with a drift and crosscut at the bottom and a number of small open cuts along the surface, constitute all the development work accomplished on the Big Buffalo mine in nearly a year and a half. The Buffalo Hump is isolated and difficult of approach, but its situation is not without precedent. The Homestake mine in the Black Hills was discovered in 1876; and although nearly 300 miles distant from the nearest railroad, and notwithstanding the route lay through a hostile Indian country, mills were erected and the bullion output had commenced within a year of its discovery and has never since ceased, though the ore did not even at that time average more than $6 per ton. This is a single instance; many others might be cited. The owners of the Buffalo Hump mines evidently believe there is more money to be made by making haste slowly.

The Concentration of Ores.

A Colorado mill man, speaking of the low-grade ores of that State, such as are found in Boulder and Gilpin counties, says that in his opinion no improvement over existing methods employed in the district are needed.

"Concentrating," he says in the Ward *Miner*, "to make a clean product, regardless of making a close saving, secures all the values that can be easily and cheaply had by concentration, and the use of cyanide for the final treatment will in nearly all cases get from 95% to 99% of the values. Clean concentrates are a very desirable product for the smelters, and I have no doubt they will do all they can to encourage this system of milling. There is no excuse now for any good and well located concentrating mill standing idle. The addition of a cyanide plant fills the missing link. We have made very extensive tests on this line here in Boulder county, and always with first-class results. It is very safe to say that any method that will handle Boulder county ore will answer for any other ores produced in this State. Our tests show that with a well-equipped concentrating mill and cyanide plant of fifty tons per day capacity low-grade ore can be converted into money at an expense not exceeding $1.50 per ton. In the two operations of concentrating and cyaniding nearly full assay value is saved. This $1.50 per ton will include the expense of shipping and smelting charges on the concentrates."

In some ores the heavy sulphide material does not carry the highest value, the gangue being richer than the concentrates, but such instances are comparatively rare. There are mines, too, wherein are found both high-grade and low-grade sulphides, and unless these can be distinguished and separated in the mine the low-grade material will be saved on the concentrators, together with the high-grade, reducing the average value. If the lower grade sulphide contains sufficient value to pay for treatment at the mine, or for treatment at the smelters, it makes no difference, but, not containing such value, the low-grade material should be separated, if possible, from that containing the high-grade. Where there are two clearly recognized classes of ore occurring in a mine, each of different character and value, and where each can be easily mined separately, their treatment in separate batteries would give better results than if these ores of differing material or value were mixed and worked together.

There are, however, few mines where the ores, having sufficient value to pay for the cost of mining and milling, and containing sulphides as well, do not justify concentration, and as, in the greater number of such cases, the sulphides contain higher value than an equal weight of gangue, clean concentration is desirable, for the reason that an admixture of the relatively worthless sands reduces the grade of the concentrates, and transportation and reduction charges have to be paid on a quantity of material containing no value, or at least a value below the cost of transportation and treatment.

It is true, concentration may be carried mechanically beyond the limit of economy, and when the point is reached where closer concentration does not result in profit it should cease.

Sorting by hand is a rude concentration and should be regulated by the result. If the silicious portion is susceptible to profitable treatment at the mine, it should not be sent to the smelter, where the cost of transportation and treatment is higher. On the other hand, if the cost of more closely hand sorting this ore is greater than the cost of transportation and smelting, then close hand sorting should be discontinued. It often occurs that the gangue remaining in hand-sorted ore, which might be treated at the mine at a profit, does not contain sufficient value to pay for shipment and treatment charges, which makes the situation still worse; but the fact that such gangue does contain sufficient value to pay these charges and possibly leave a profit does not justify its shipment when it may be hand-sorted and treated at the mine with greater profit.

At most mines where hand sorting is practiced the ore is broken down with hammers by a number of cheap men, who laboriously break and almost mechanically separate the high-grade sulphides from the gangue. Necessarily this process, unless carried to an extreme and expensive point, leaves a large amount of gangue in the selected ore sacked for shipment. It is cheaper, and will afford much more satisfactory results, to run the ore through a breaker and, if necessary, through a set of rolls.

Ore in which the high values occur in bunches or ribbons of sulphide material in a gangue of quartz, calcite, baryta or other material may usually be cheaply hand-sorted, as suggested above. When the ore is first brought from the mine it should be dumped onto a flat grizzly made of railroad iron or heavy bars set ½ inch apart. The ore should be washed by a stream of water from a hose, the fine material passing through the grizzly into a box or bin beneath. The large masses, now being clean, may be picked over by hand and often a quantity of clean sulphide mineral obtained, while a rough breaking with a hammer will often result in the recovery of still more. The remaining ore should then be shoveled off the grizzly into a car below and sent to the breaker, passing which a stream is again turned onto the ore, cleaning it for further hand sorting. The solid pieces of sulphide mineral may here be quickly picked out, the remainder going to the mill for reduction and mechanical concentration. A grizzly similar to the first may also be provided at the breaker for passing the fine material washed from the broken ore. The ore passing the grizzlies contains a high percentage of sulphide mineral and may be collected and shipped as first-class ore. In a plant of this description it would scarcely be advisable to add rolls unless trommels and jigs were also added. A plant of the latter description is more suited to ores wherein the sulphides form a heavy percentage, but values are more evenly disseminated, which condition renders hand-sorting impracticable.

Real vs. Bogus Mining Experts.

There is probably no class of men who are more abused than mining experts. That all who profess to be expert in mining affairs are really entitled to any such distinction is more than doubtful, but that the term "mining expert" includes men of undoubted ability and experience is equally true. Many definitions of what constitutes a mining expert have been given—some of them humorous and some abusive. However, the ideal mining expert must be a man of broad education and experience in mining matters, engineering and metallurgy, and there are many mining men whose experience in these matters entitles their opinion and judgment to more than ordinary consideration, and the term expert applied to such men is not a misnomer. When a mining engineer is sent to examine a property he must necessarily be conservative, for his own experience and that of others has taught him to accept little for fact that he cannot see, and he is often compelled to refuse to recommend a property—at the seller's price—in which he really sees merit, and possibly recommends at a lower price, and for this he is roundly abused by the miners, and sometimes the newspapers, of the district in which the property is situated.

In general, mining experts are accused of dressing ridiculously, going about the country with much circumstance and bluster, rushing hastily through a mine and passing judgment on its value. There are those who do such things but they are imposters, such as are found in every walk of life, and not entitled to be classed as expert at anything. There are often times when a mining engineer goes a long distance to examine a mine on the statement of the owner, or on a report written by some person signing E. M. after his name, who may be the blacksmith at the mine or a bartender in the village nearest the property. Having arrived at the mine, a glance is sometimes sufficient for the expert to decide that time spent in an examination would be wasted and ninety-nine times out of a hundred he will be right. It is rarely that a property is sold for a large sum without a thorough examination lasting from a few days to several months. There are cases of record wherein undeveloped mining claims have been sold for large sums on the advice of experts because of the value in adjoining mines.

Concentrates.

NO STONE containing iron sulphide is suitable for ornamental purposes.

ROTHSCHILD is reported having withdrawn from the American quicksilver market.

THE flux used at the Reno, Nev., reduction works is limestone from Wadsworth, Nev.

SO LONG as a prospect improves, however poor at first, the work of development should continue.

CERTAIN high grades of steel, used in making cutting tools, are not wholly suited to the making of rock drills.

IN '90 quicksilver sold in San Francisco, Cal., for $52 per flask. It is now worth $50—the highest price in nine years.

A DEMAND for nickel has been increased by its use in the steel industry, particularly in the armor of naval vessels.

THE Rio Tinto Copper Mining Co. of Spain has declared a dividend for the first half of '99 of 35s per share, or at the rate of 70% per annum.

MANY of the miners who during fall have been at Cape Nome have gone to Klondide for the winter, expecting to return to Nome in spring.

THE copper production of Arizona in '93 was 43,000,000 pounds; in '98 it was 110,000,000 pounds. The output of '99 is expected to reach 140,000,000 pounds.

THE fluctuation of 1 cent per pound in the price of copper makes a difference to the Anaconda mine, at Butte, Mont., of $85,000 per month at its present rate of output.

THE firing of several holes by means of the electric spark is thought to give an increased efficiency of 25%. It admits of deeper holes and consequently more rapid progress.

WHETHER Archæan rocks are metamorphosed sedimentary rocks or chemical precipitates has not been satisfactorily determined. Eminent authorities do not agree on this.

GLAUCOPHANE is a variety of hornblende of blue color. It is usually found in certain crystalline rocks. Glaucophane schist is abundant in the Coast Range of California.

A DISCOVERY of tin ores in Orange county, Cal., is announced. In that vicinity are found ores of lead, zinc, copper, quicksilver, silver and gold; but all, thus far, in small quantity.

AFTER copper, aluminum is the best conductor among the cheaper metals. An aluminum wire has the additional advantage of being lighter to handle and of being noncorrosive.

ALTA is a name given to a black slaty gouge-like material found in quicksilver mines. Originally it was applied to the hanging or upper wall, from the Spanish word alta, meaning above.

QUICKSILVER is found in the California gold belt at Mast's Cabinet mine, near Horseshoe Bend, 2¼ miles west of Coulterville, in Mariposa county, Cal.; also, near Placerville, Cal., in the Amador mine.

IT is estimated that about $10,000,000,000 in gold have been produced in the world since the discovery of America, of which sum more than one-half has been produced since '60 and one-fourth since '85.

A PARTNER drawing a salary in addition to profits is entitled to the same after the expiration of the period for which the partnership was formed, where the business continues without new agreement.

THE mines of the Frontino and Bolivia Co., S. A., are in limestone near a granite contact. The ore bodies are small, seldom exceeding 4 feet, but are usually rich in gold. It costs about $5 per ton to mine there.

A MIXTURE of magnesium carbonate and free silica heated in a solution of alkaline carbonate forms a hydrous magnesian carbonate. This reaction is supposed to account for the formation of some hydrous magnesian rocks.

GOLD-BEARING veins have been worked very little in Siberia, though they are known to exist. A large immigration is being made into that region—chiefly Russians—and a development of the quartz veins may be anticipated.

DURING the year ending July 30th, '98, there were patented to the railroad companies 504,671 aces of land in the United States. The whole area of the Northern Pacific land grant is 36,570,099 acres: of the Union Pacific, 12,129,842.

RUSSIA has decided to let in American miners, and the Siberian Department of Mines announces that a public auction of gold-bearing lands, situated on the northwest coast of the Sea of Okhotsk, will take place from Feb. 15th to 27th, 1900.

AN Eastern railway company last year ordered a large tonnage of new steel rails. The old rails which these replaced were sold this year at such an advance as to pay not only the cost of the new rails, but also for their laying, and leaving a profit as well.

A PURCHASE of goods while the buyer is insolvent, where made without intention of paying for same, is a fraud entitling the seller to recover the goods if found in the possession of the buyer or any person holding them for, or standing in the position of the buyer.

IN California most of the quicksilver deposits occur at or near the contact of sandstone and serpentine. In some instances dyke rocks are noticed in the vicinity of cinnabar deposits, notably at New Almaden, where a rhyolite dyke is an accompaniment of the vein.

IT has been suggested that the beach sands of Cape Nome region be concentrated and shipped to the United States for treatment in smelters. It would doubtless result in a larger saving than is now being made by the crude methods in vogue there at present.

THE smelter charges at Trail, B. C., are $20 per ton; the extra $12 per ton over cost in U. S. smelters represents the haulage and custom charges to American smelters. It likewise represents the profit to the Canadian Pacific Ry. Co. under the existing arrangements.

IN British Columbia mining locations are 1500 feet square, and no extralateral right can be taken under the law. The American law was in force there for a time but was repealed for the square location, numerous law suits having resulted from a short trial of the American law.

IN blasting rocks, certain general principles may be laid down, but each individual case must be determined by the judgment of the miner. Where power drills are used, it is often the practice to put in a certain number of holes in regular system, regardless of the results of the last series of shots.

THE Payne mine, in the Slocan district, B. C., is the largest and most profitable in that section. The lead carbonate produced there contains 80 to 100 ounces silver and 35% to 40% lead per ton, and the galena runs about 175 ounces silver and 70% lead. It has paid over $1,000,000 in dividends.

UP to 1840 charcoal was employed in making all the pig iron manufactured in the United States. The first blast furnace—a crude affair—was set up in '39. In '40 D. Thomas introduced the manufacture of pig iron by means of anthracite as fuel, from which the present great iron industry has developed.

THE Iron Mask and Center Star mining companies, of B. C., are credited with having expended $35,000 each on the mining litigation in which these properties have been involved and which is not yet settled, and the Butte City, Montana, suit recently submitted to the courts will cost, it is said, $300,000.

A $20 GOLD PIECE weighs 516 grains and contains 464.4 grains fine gold. There is $20 worth of pure gold in a $20-gold piece; the 51.6 grains of alloy therein is to give the coin hardness and durability. Whether in the shape of a coin or a melted nugget, the $20-gold piece, intact, as it came from the U. S. mint, is worth exactly $20 in gold.

NEXT year will not be a leap year, and will contain but 365 days; it was so with the year 1700 and will be so with 2100. By 2700 the extra eleven days omitted in 1582 will all have been accounted for, and the years will regularly run 365 days till some subsequent arrangement makes account of the extra time beyond that required for the earth to pass through its orbit.

WHEN sandstone is used in the construction of a building or a wall, it should not be set on edge but laid flat as it naturally occurs in its bed. When set upon edge, unless very firm, exfoliation is likely to occur, causing a cracking or crumbling of the rock. In cold countries sandstone absorbs water and upon freezing the rock will have a tendency to disintegrate.

TO MAKE iron take a bright polish like steel, pulverize and dissolve in one quart of hot water one ounce of blue vitriol, one ounce of borax, one ounce of prussiate of potash, one ounce of charcoal, one-half pint of salt, all of which is to be added to one gallon of linseed oil and thoroughly mixed. To apply, bring the iron or steel to the proper heat and cool in the solution.

UNDER the present U. S. tariff law the duties on metals are as follows: Antimony, metal or regulus, ¾c per lb.; lead, 1½c per lb. on lead in ores; 2½c per lb. on pigs, bars, etc.; 2½c on sheet, pipe and manufactured forms; nickel, 6c per lb.; quicksilver, 7c per lb.; spelter or zinc, 1½c per lb. in pigs and bars; 2c on sheets, etc.; copper, tin and platinum are free of duty.

THE International Mining Congress held its first session at Denver, Colo., in '97; its second session was held at Salt Lake City, Utah, in '98; it adjourned to meet at Milwaukee, Wis., in June, '99, but no meeting was held. Irving Mahon, secretary Executive Committee, says an official call will be issued this week for the session of 1900 at Milwaukee, to begin June 19 and last four days.

THE discovery of placer mines in British Columbia attracted attention to that country as a mining region in '58, and a rush of adventurers followed, but it was not until fifteen years ago that attention was given the great sulphide deposits. There were American engineers in the Kootenay country in '87, who at that time declared it was destined to become an important mining section.

AS YET no process which is chemically and mechanically a success, and at the same time not too expensive, has been devised to treat the complex ores found in many of the lead-silver-zinc mines. Of this class of ores there is a vast amount in the mines and on the dumps awaiting treatment. No less than twenty different new processes have been tried, but none of them have as yet been able to give entire satisfaction.

DURING the first ten months of '99 this paper lost 138 subscribers—and gained 1724 new ones. The figures well illustrate existing conditions in the mining industry; death and removal were the causes of the cessation of subscription of the 138; the advance of the industry and the realization of this paper's value to them the cause for the accession of the 1724 new ones in the last ten months. The greatest number of the total of new names comes from the States of Colorado and Montana and the Territory of Arizona.

GOLD DREDGING, as carried on in New Zealand and, later, in California, Oregon and Montana, is a dividend-paying proposition. The business has evolved from experiment to demonstrated profit. At Otago, N. Z., there are now about seventy dredgers at work, some paying dividends from 10% to 200%. The Electric Co., in South New Zealand, reports securing gold to the amount of $300,000 in less than four years. Dredging there costs about 3 cents per cubic yard; an entire plant costs from $15,000 to $35,000.

SILICIOUS SINTER is a deposit of silica formed about hot springs and geysers. Geyserite is a silicious snow-white formation of this character, and is found lining the pipes of geysers, and forms deposits about these vents. At Rotomahana, New Zealand, white terraces have been formed of silicious sinter, which are of great extent. The large deposits of travertine at the Formation Springs, in the Yellowstone National Park in Wyoming, are a deposit of calcium carbonate from springs, and differ from the silicious deposits above referred to.

IN artificial paving stones the newest process is to mix coal tar with sulphur and warm thoroughly; to the resulting semi-liquid mass, chlorate of lime (chlorkalk) is added. After cooling, the mass is broken into small pieces and mixed with blast furnace slag. This powder is then subjected to a pressure of 200 atmospheres and reduced to the form or forms wanted. The specific weight of these stones is 2.2; the resistance against crushing is 143 kilograms to the square centimeter. The resistance to wear and tear in use is said to be half as great as that of granite.

PROSPECTORS should take careful notice of every iron cropping, vein and deposit. Many veins are capped with iron, which is simply the oxidized product of the sulphide ores. Ordinarily, when the iron sulphide in its normal condition contains gold, the oxidized outcrop will prospect in free gold. There are exceptions to this, however, but an assay by fire will show the presence of gold. Silver leads are also often marked by a line of iron croppings, and some important and valuable deposits of copper ore have the iron gossan, though there may be no sign of copper appearing in the iron croppings, that metal having been leached out.

AS COMPARED with September, '98, the September, '99 output of copper by domestic mines showed an increase of about 4000 tons, while exports showed a loss of about 3700 tons:

	September—	
Annual Produced—	1899. *Tons.*	1898. *Tons.*
By United States reporting mines	19,515	17,064
By outside sources (estimated)	3,300	1,700
By foreign reporting mines	7,830	7,122
Exports	7,553	11,189

IT is difficult to give arbitrarily the cost of blasting in any particular rock, as the accompanying conditions always render each individual case different from all others. Granite is so variable in texture and composition in different regions, and even in different parts of the same region the structure, jointing planes and hardness are so variable that no exact figures can be given, and what applies to granite applies with equal force to all other rocks. In slaty rocks the direction of the shaft or tunnel, with reference to the strike and dip of the rocks, makes a material difference.

THE most recent discovery of palladium was in September at the Mount Torrens property, near Adelaide, Australia. Palladium was discovered nearly 100 years ago. It is nearly always associated with platinum and constitutes about 1% of the platinum ore of Russia and California. It is extraordinarily hard, is malleable, ductile, easily welded, and is used by mathematical instrument makers in construction requiring absolute accuracy. Palladium is used as a silver alloy by dentists, and is reported to be of service in case-hardening Krupp guns; it is roughly worth $50 per ounce.

TO SILVER PLATE any article, place eight silver 25-cent pieces in two ounces of nitric acid; when the silver has disappeared, add one pint of water and four ounces of common salt. The addition of the salt will precipitate powdery pure silver. Decant the water and repeat, washing till all the effects of the salt shall have disappeared. Then add two quarts of pure rain water and the silver solution is complete. Hang the articles to be plated in the solution, suspended at the end of a strip of lead, or they can be immersed and boil ten to twenty minutes, according to the thickness of the silver deposit desired. The articles to be plated should be clean and absolutely free from grease or dust.

STREAMS issuing from rocks containing pyrite or other sulphides which are in the process of decomposition often have a strongly astringent taste—the taste of alum. This is due to the free sulphuric acid in the water or to alum in solution which has been formed by a combination of the acid freed by the decomposing sulphides with the aluminous material present in the rocks, forming aluminous sulphate, which, dissolving as it forms by additions of fresh water, gives the water its peculiar taste. A search for a bed of alum under such conditions is not likely to result in its discovery, as the source of the acid is the sulphide mineral and not a deposit of alum. The yellowish brown deposit is due to the precipitation of iron taken up in solution in the water. It is deposited as oxide. It often acts as a cementing material to the gravel and debris lying in the valley or gulch below the spring—forming a local deposit of conglomerate.

THE Great Western quicksilver mine, in Lake county, Cal., has yielded considerably over 50,000 flasks of metal. The ore bodies consist of large lens-shaped masses at contact of a slightly altered sandstone and serpentine. The serpentine is accompanied by a belt of black opaline rock, known to the miners of northern California as quicksilver rock. This rock, being harder and less subject to decay than the surrounding rocks, stands up above the surface, veinlike, and constitutes the croppings of the vein. The ore bodies are in direct contact with the sandstone, but are surrounded on three sides by the serpentine. The ore shoots, along the strike of the lead, are separated by masses of barren rock. The ore is for most part cinnabar, but at one point a mass of rock was found charged with native quicksilver. Pyrite is abundant. Some of the cinnabar is embedded in quartz. No hot waters or gases now enter the mine. At the Abbott mine, in Lake county, Cal., there is a large influx of inflammable gas.

WHEN it is noon in New York it is 7 o'clock in the evening of the same day in the Transvaal, and 8:46 A. M., sun time, in San Francisco. News from Glencoe, Ladysmith and other points in Natal, South Africa, reaches San Francisco over the Durban and west coast line or via Cape Town and and the east coast. From Durban the cable runs 345 miles to Lorenzo Marquez (Delagoa Bay), thence into the Indian ocean and emerging at Mozambique, 974 miles away, thence by cable to Zanzibar, 692 miles, and finally to Aden, 1920 miles farther. From Aden the news goes under the whole length of the Red sea to Suez, 1403 miles, thence on land wires along the Suez canal to Port Said, 92 miles; then by cable to Alexandria, 154 miles; thence to Malta, 928 miles; to Gibraltar, 1126 miles; to Lisbon, 398; to Lands End, England, 899; then by land to London and from London to Dublin, thence to Waterville, Ireland. From there it goes under the Atlantic ocean to Nova Scotia, 2348 miles; 840 miles of cable remain and the news is at New York. From there to San Francisco is 3200 miles more. Over the west coast route the start is made at Cape Town, thence by cable to Mossamedes, 1383 miles; to Benguela, 234; to Loanda, 296; to Accra, 975 miles; to Sierra Leone, 1020; to Bathhurst, 463; thence to Santiago, a British possession near the Cape Verde Islands, 470; to St. Vincent, 204 miles; St. Vincent to Maderia, 1169; to Lisbon, 632 miles; thence to London following the same route as news from the east coast.

Notes on Mine Surface Sampling.*

Written by S. H. PEARCE.

The primary object of sampling is to obtain, in as small a bulk as may be convenient, a portion which shall represent the whole, in whatever particular that may be desired. In sampling any material where the constituents are unevenly distributed, this want of uniformity is the greatest drawback to obtaining a representative sample, no matter for what purpose it is required; and the difficulties may be further enhanced by circumstances.

Use is to be made of the law of averages in order to overcome most of our difficulties, which should be carried to such a point as is found to give sufficiently correct results.

The subject matter is anything but uniform in regard to the one constituent we wish to determine, for in the case of rock to mill we have a mixture of all values, from waste rock, containing practically nothing, to reef matter, containing as much as fifty ounces to the ton.

To further complicate the matter, we have variation in size, from dust to pieces as big as a man's head in some cases, and probably no two pieces having the same value.

As a third difficulty, we have the enormous quantities of material to sample daily, which amounts to as much as 1000 tons in the case of a 200-stamp mill.

These are the main difficulties in sampling rock to mill; there are some others, but they are comparatively unimportant. If we consider them, we find that the only way to overcome the first two is to take a large enough proportion, which, unfortunately, the third condition renders impossible.

There are three ways more or less generally adopted in sampling rock to mill:

1. From the trucks to mill.
2. From the cam floor chutes.
3. From the feeders.

From Trucks to Mill.—This sample is generally obtained by taking a shovelful from each truck, and, if it were fairly and regularly performed, would give very fair results; but the difficulty comes in with the large quantity necessarily taken. A shovelful weighs about seven pounds, and even with a 100-stamp mill, where one-ton skips were used, the daily sample would amount to 1½ tons, which is a considerable amount to crush and quarter down for assay. Even were this of no consideration, there would be a tendency for the larger lumps to fall off the shovel and an unfair proportion of fines taken, and as these are usually the richer part of the material being considered, the sample would be generally too high. It is not unusual to put a kaffir on to taking a handful or a lump as the fancy takes him. There can be no regularity or much dependence placed upon a sample so obtained.

From Cam Floor Chutes.—This sample is obtained by taking a shovelful from each chute, at regular intervals, usually hourly.

It seems to give fair results on some mines, but it has the same drawback as the last in regard to the quantity taken; in this case, however, the rock in the bins in traveling down the chutes has a tendency towards separation of the fines towards the bottom and the coarser to the surface, and the probability is that the sample will have too much coarse rock. It is possible that this in a great measure will counterbalance the tendency for the lumps to fall off the shovel.

From Feeders.—This sample is also taken at intervals of time like the last. There are two ways in which it may be taken, *i. e.*, by small shovelfuls from the disc of the feeder, or by holding a tray made to fit the edge of the disc under it, to catch that which falls from it.

In speaking generally of all these rock samples, it would appear that they will give too high a result, and I may say further that the smaller the sample taken, the more erratic will the results come out daily.

It has also been my experience that the larger the mill the more steady will be the daily assays; in this case I do not think that this is due so much to the quantity taken, as that it is taken from more places, and has a better chance of being mixed.

Quartering Down.—Every mine should be equipped with a proper sample room, fitted with suitable crushing machinery, which, if not actually needed for rock to mill samples, is at least required for mine samples.

The old style of kaffir, and pestle and mortar on the veld, useful enough in the past, and in the present as a stand by, cannot to-day be considered as sufficient to meet the requirements of a modernly equipped mine.

A properly equipped sample room, an example of which may be seen on the Nourse Deep, should be large enough for all purposes; being, say, 16 feet square, fairly draught and dust-tight, and have a floor of cement, or iron plates, on which a large sample may be quartered down; and have at least two crushing machines; one for reducing, say, to ½ inch cube, and the other for fine grinding. There should be a quartering table, and counters and shelving, as well as the panning tank, if such is required, and all articles such as sieves, brushes and other little things supplied freely.

In regard to quartering down, I lay before you a small table, which, if not exactly accurate, may be taken as a fairly safe guide to the limit to which it is advisable to go in reducing the bulk of your sample:

2-inch cube to	1200 lbs.
1-inch cube to	300 lbs.
½-inch cube to	80 lbs.
¼-inch cube to	20 lbs.
⅛-inch cube to	5 lbs.
1/16-inch cube to	2 lbs.

These figures are based upon experience and convenience.

The old practice of quartering is, I think, as good as any other. It may be tedious, but it is at least free from the objection attached to most of the machines used for that purpose.

Spread as thinly as you can, and be careful to eliminate the whole quarter each time. Use a brush for that purpose, if necessary, so as not to leave any fine matter behind, which may perhaps contain free gold. Mixing between each operation cannot be performed too thoroughly. In cases where the ore has been very finely ground, it is more difficult to mix than coarser material, and in such a case I think it is not an unnecessary precaution to mix by passing through a sieve.

Screen Sample.—This is obtained by taking a certain quantity of the pulp as it passes through the battery screens, at regular intervals of time. In this case at least one of the disturbing factors is removed, and the ore is now reduced to a finer state of division, and is better mixed; under these conditions a smaller sample can be taken with more reliable results. The difficulties will be found to exist mainly in the limited space there is to use a receptacle of any size for the sample, so that you have to guard against overflowing and consequent concentration.

In regard to the splash, I should suggest the adoption of a splash board to throw the pulp downwards on to the iron lip, and so help to carry away the heavy matter continuously. I would advise the use of as large a vessel as may be convenient, and not be afraid to take a good big sample. I also think it a good thing to try and arrange the time of sampling, so that it comes just before the time for adding the mercury to the boxes, so as to avoid as much as possible the inclusion of amalgam.

I consider this sample as being the nearest daily check upon the value of rock milled. It has the disadvantage of being minus the gold caught in the boxes, and this has to be remedied by adding that amount, divided by tonnage, to the assay at the end of the month; this will include die sands, screen tanks and lip sands.

(To be Continued.)

*Condensed from Journal Chemical and Metallurgical Society of South Africa.

Put the Blame Where It Belongs.

TO THE EDITOR:—I notice in a recent number of the MINING AND SCIENTIFIC PRESS that Mr. N. S. Keith, in his valuable articles on "Amalgamated Copper Plates," winds up with the statement that "it seems almost superfluous to say that ignorance and laziness are the causes of these conditions" (of the plates), which statement seems to me to imply that we of the amalgamating fraternity are the parties to be indicted. Let us see if sometimes the blame does not lay higher!

At the X Y Z mine the new superintendent found the plates in that pasty condition so often described as being just the thing. Something, however, in his estimation, had to be done, as the rock was getting lower grade, and the number of ounces of amalgam obtained was consequently less each day. So the boys were hurrahed on to the plates to keep up the average, and most nobly did those devoted plates respond.

Day after day an iron-muscled mine foreman on one side, with scraper and rubber, was bound to get an extra cent over the day before and win a grin from the powers that be, a mad amalgamator on the other side having to follow suit in the murder of his pets. Finally, even copper couldn't stand it and the yellow flag of distress was hung out by one plate after another, to be shortly after followed by the greenish and brown color of dissolution.

The N. O. P. mill started out with a brand new set of heavy plates well silvered. The slaughter was ordered from the word go, hot water being piled on top of the rest of the agony. Those plates were very soon ready for the attention of the plating works. WALLACE J. WILLIAMS, Millman.

Nevada City, Cal., Oct. 18th, '99.

Typical Prospecting Scenes.

The accompanying illustrations are typical of new mining regions in the West. The first one shows the hardy miner and the man who is "putting up" for him at the windlass. When the bucket comes up, the miner goes below and digs another bucketful, while the monied man "assays" the ore by taking a sample, crushing it in a mortar and panning it, as shown in the second illustration. Close check on the value of the ore is thus kept. The vein in this instance is about 2 feet in width, and in sinking the shaft some 50 feet the value of a few tons of ore taken out more than paid all expenses; and a lot of good second-grade ore shows on the dump.

The prospect hole is on the Hamburg, a new discovery near Silver Star, Mont., and is owned by Dr. A. W. Noble of Butte, Mont., and Mel Cabbage of Silver Star.

It is evident that, while having a good thing, no money has been wasted in preliminary investigation. The shaft timbers are of unpeeled logs, and the windlass standards and braces have been picked up somewhere; yet this shaft, or another near it, is more likely to have an expensive hoisting plant over it than many other prospects which start out under what may seem to be more favorable auspices.



WORKING ON A GRUB STAKE



A HOME-MADE MILL TEST.

Copper in South Africa.

South Africa may become a producer of copper as well as gold. The report of the directors of the Northern Territories Exploring Company, Ltd., states that the expedition to the north of the Zambesi for the purpose of marking out the concession of 500 square miles returned to Buluwayo, having located numerous copper mines. From the report of the leader of the expedition it appears that there are on the properties large old workings, similar to those found in Rhodesia, and the dumps are covered with carbonate of copper ore. The outcrops are large, and show some rich lodes of copper. Some of the mines are still being worked by the natives, who, owing to their primitive means and indolent nature, can only deal with very rich ore, working the metal up for ornaments, and also into bars for trading purposes.

Notes on the Ymir Mine and Its Mill Practice.

By S. S. FOWLER, Nelson, B. C.

Lying north of the International Boundary, west of Kootenay lake, east of Columbia river and south of Nelson, and the outlet of Kootenay lake, is a roughly quadrangular mountainous country covering about 1450 square miles.

Occupying the central portion of this quadrangle is the drainage area of the Salmon river.

This Salmon river country, covering about 900 square miles, was practically inaccessible until the construction of the Nelson & Fort Sheppard railway in 1893, and it was not until the summer of 1896 that any considerable mining activity was manifest. Aside from the placer mining operations of thirty-five years ago, which were carried on near the mouth of the Salmon and along the Pend D'Oreille, there is no evidence of mineral location until 1885, two years before the discovery of the Silver King, near Nelson, by the Hall brothers.

Physically, the Salmon country is not complicated in structure. It is mountainous, but few of the mountains reach an altitude of more than 8000 feet, and the summits are generally rounded. The creek valleys are deep, however, and glaciation appears to have been an important factor in determining the present topography. The glaciers, have, I believe, all disappeared.

The rocks which underlie the region being described, are of igneous origin. In a general way it it may be said that east of the Salmon the granites are in evidence, while to the west augite porphyrites, schists derived from them, some small gabbro bosses and large areas of tuffs and agglomerate occupy the field. But throughout these rocks may be seen considerable inclusions of sedimentary rocks, principally slates, except along and near the range which forms the watershed between the Salmon river and Kootenay lake, where there are thick beds of quartzites and some crystalline limestone, extending southwesterly into American territory.

The small slate areas of Salmon river are probably of Cambrian or pre-Cambrian age. The various basic igneous rocks may be of different ages. Some of the granites appear to be comparatively recent, but the youngest rocks of the vicinity occur in dykes of blackish to dark grey color, varying much in texture and composition, and piercing the rocks above named and, I believe, most of the veins of the district. Generally these dykes may be described as mica diabase, the biotite probably being a first product of alteration, while frequently the whole mass has become completely kaolinized.

The Ymir mine is on the west side of the valley of a north fork of Wild Horse creek. This valley lies in a slate area several miles in length and 4000 to 5000 feet wide. The slates are limited on the east by granite and on the west by porphyrite. They strike about N. 35 E. and stand on edge, the line of contact with the porphyrites being approximately parallel to the strike. Extending from a point near the contact in a direction about N. 65 E. is a fracture in the slates which is traceable several thousand feet, but within the distance along which this one fracture can be identified there are no ore bodies known other than that which has become the Ymir mine.

Since November, 1896, 5000 feet of development has been done, resulting in showing an ore body 500 feet in length, with its end limits practically parallel and vertical. A depth of nearly 500 feet has been attained, but very little water has been encountered —in fact, barely sufficient to justify running a pump for sinking.

In plan this ore body shows a lenticular shape, with a maximum width of ore of about 30 feet. No disturbances of importance have shown themselves, but there are many slips and several partially open narrow fissures, while two principal dykes with a number of branches cross the deposit generally nearly at right angles to the latter. From a structural standpoint these dykes form one of the most interesting features of the mine. Beside the numerous horses of slate the vein filling is quartz, impregnated with pyrite, galena and blende, no copper mineral having ever been found.

The ore appears to have been deposited at two different periods or derived from different sources, for the eastern 300 feet shows a white quartz, and the sulphides contained are coarser in structure and brighter in color than in the western 200 feet of the shoot, where the quartz is not only frequently of dark blue color and often nearly opaque, but the gold tenure is considerably higher. Near the region where these two varieties of quartz join they are curiously intermixed, but may be easily distinguished. Throughout the mine the walls are usually free, but in places along the hanging of the blue quartz there is not only no clay parting, but the quartz seems to have replaced the slate, retaining the structural features of the latter and becoming difficult to distinguish underground from the country rock.

Subsequently to the deposition of the ore of both these bodies the dykes were intruded and the fractures which rendered their presence possible seem to have been followed by movements more or less in the direction of the plane of the vein, and in parts along the walls, with the result that other fissures were formed, some extending for some distance into the foot wall, diagonally to the strike of the vein, and others along the hanging wall. These last fissures are filled with a nearly barren white quartz, carrying at times sharply angular fragments of slate.

The later movements have also created fractures in the ore body, along one of which at least, where there is a local concentration of galena, oxidizing action has been going on, with the result of producing a band of carbonate, affording fine specimens of cerussite and a local but marked increase in the gold values, the gold being largely free but invisible except after careful panning.

In the No. 2 level a 4-foot dyke comes squarely up to the foot wall, where it turns a right angle to the left along the wall, and so continues, gradually curving to the right for 20 feet, where it crossed the drift squarely. Going through the dyke we found slate, and crosscutting on the outer side of the dyke we found it suddenly turning again and butting against a fault fissure, nearly filled with 2 feet of calcite. Our failure to closely examine what we presumed to be the foot wall rock led us astray, and to an expense which was useless at the time except to reveal an interesting structure.

The fact that much of the ore body is too wide for stulls, and that good mining timbers are scarce, together with the presence of what will probably prove itself to be a not too strong hanging wall, will undoubtedly necessitate a system of combined crib work, filled with waste and of square setting.

The mine produces two general classes of ore: first, mill stuff; second, crude ore. The former is sent directly to mill by a Hallidie ropeway, about 2400 feet in length from the mouth of No. 3 tunnel, the lowest which has exit to the surface. The second general class consists of two sub-classes, crude galena and oxidized ore or carbonate. Both of these are small in amount compared to the milling ore, and they are shipped directly to the Hall Mines Smelter at Nelson, the crude ore in bulk and the carbonate in sacks. Milling material at the lower tramway terminal passes through a No. 3 Gates crusher, which reduces the coarsest to pass a 2-inch ring. Below the crusher is a 200 ton bin from which the feed passes by tram car, after being weighed, into the battery bins proper.

The mill proper embraces a 40-stamp 850-pound battery, eight silvered copper plates 56 inches by 12 feet, four sets of four-cone classifiers, and twelve 6-foot Frue vanners. This plant is driven by water with a 6-foot Pelton wheel under 415 feet head, the crusher being separately driven by a 24-inch motor under 320 feet head. The stamps make from 96 to 102 6½ inch drops per minute, and with an average issue (height of discharge) of 7 inches crush a little over 100 tons per diem through No. 9 diagonal slot screens.

We have found a tendency toward banking of the pulp at each end of the mortar, to avoid which we give the first and fifth stamps about 1½ inch greater drop.

We employ one inside plate, and on it accumulates about 40% of our gold. The outside plates slope 2 inches in 1 foot, and on the upper 24 inches of their length we gather about 80% of the recovered free gold which passes the screens. The lower part of the plate (10 feet) we find to be very valuable, and it passes an extremely small amount only of free gold. An interesting feature of the operation of the lower part of the plate is that the amalgam on that portion is very much higher in silver than that gathered elsewhere, and proportionately lower in gold.

Zinc blende and pyrite cause us no trouble in keeping the plates clean, but the extremely small size of the galena particles, together with their gravity, causes them to catch in the minute depressions of the amalgam and gradually to cover the latter. For this reason our plates are dressed every six hours, and thus we are able to keep them in excellent condition. This result we consider good work in view of the fact that our concentrates amount to 6$\frac{3}{10}$% of the mill feed, and contains our 14% lead and 10% zinc.

The bullion produced averages about $\frac{580}{1000}$ gold, $\frac{400}{1000}$ silver and $\frac{20}{1000}$ base, thus showing practically no amalgamation of lead, but the presence of a very considerable amount of free silver.

Without disclosing the gold tenure of our tailings, I may say that they are satisfactory, and, in fact, are remarkably low when we consider the apparent baseness of the ore. Of the total gold and silver recovered we find in the bullion 82% of the gold, 27% of the silver, and in concentrates 18% of the gold and 73% of the silver.

The ore, thus far, has shown itself free from acids and from arsenic, antimony and tellurium, a fact which is partially reflected in the very low consumption of quicksilver, viz., about $\frac{9}{10}$ of one ounce avoirdupois per ton crushed.

*Condensed from paper read before Canadian Mining Institute.

Soda Nitrate in Chile.

Consul Merriam, of Iquique, writes that the cost of production of nitrate varies greatly in the different establishments, depending upon the abundance and quality of the "caliche," or crude nitrate, distance from port, price of coal, etc. Moreover, the manufacturers are not disposed to declare the cost of production, considering this to be one of the secrets of the trade. Railroad transportation rates to the coast are 6d (12 cents) per Spanish quintal of 100 pounds for forty miles or more, with a proportionate reduction for distances under forty miles. On and after January 1, 1900, the rate will be 4½d (9 cents). The average rate of ocean freights for nitrate from January to June of the present year has been 27s 2d ($6.61) to Europe and the United States. Below are given figures showing the exportation of nitrate of soda from the ports of Iquique, Pisagua, Junin, Calesa, Buena, Antofagasta, Trocopilla and Taltal:

	Tons.
1896	1,091,681
1897	1,063,349
1898	1,272,121
First six months of 1899	557,327

Cyaniding Prior to Amalgamation.

TO THE EDITOR:—Referring to the communication in your issue of Sept. 23d, '99, entitled "Cyanide Prior to Amalgamation," and suggesting reversing the usual practice of amalgamating first and cyaniding afterwards, I would say that at the Clark mill, at Rochester, Montana, a custom mill, the ore is crushed coarse and cyanided. The leached material then passes through a ball pulverizer, where it is crushed to from 80 to 100-mesh, from whence it passes over amalgamating plates and a Wilfley table. The amount of gold obtained by amalgamation has been so slight that amalgamation is now dispensed with in treating most ores and the pulp passes direct to the Wilfley table. Some of the ores in this district contain a small amount of galena and this is so brittle that even with coarse crushing the metallic particles are fine. By crushing all of the ore very fine a close saving of the galena, which always carries more or less gold, is effected and the concentrate is a valuable product. With most Montana ores, cyaniding prior to amalgamation would not tend to increase the amount that could be saved on the plates, but the reverse would follow, and with a considerable proportion of the ores in the lime formation, particularly, fine crushing is essential to a good saving by either amalgamation or cyanidation, and with fine crushing a more perfect extraction can be secured by the use of cyanide than by amalgamation. With an ore containing quite coarse gold there might be an advantage in cyaniding first, but it does not so seem to me. The period of leaching would necessarily be lengthened indefinitely, because of the uncertainty existing—one not knowing whether the tailings from his vat would run lower by longer leaching or not. No! The experience of the many is the criterion to go by. Take out the coarse gold first; then leach the tailings, and when as perfect extraction has been secured as can be, the assay of the residue shows it with a freedom from the uncertainty that must follow the other proposed method. MATT. W. ALDERSON.

Sheridan, Montana, Oct. 23d, '99.

The Use of Charcoal in the Cyanide Process.

TO THE EDITOR:—I have read with much interest your editorial in the last issue of the MINING AND SCIENTIFIC PRESS regarding "The Use of Charcoal in the Cyanide Process," and the connection of the late Dr. W. D. Johnston with the same.

Several years before Dr. Johnston was appointed chemist of the State Mining Bureau I brought to his attention a pamphlet describing the use of charcoal in the Mears & Davis chlorination process for the precipitation of gold from the ter-chloride solution, and the mode of passing the solution through the filter used by Mears & Davis. As far as I know, this was the first use of charcoal for this purpose.

Dr. Johnston became much interested in the subject, and subsequently when it was announced that he had obtained a patent for the use of charcoal in the cyanide process I readily understood how he was led to its adoption. Dr. Johnston was a person of quick and clear perception and an expert in experimentation, and to his mind the suggestion, the transition from its use in the chloride solution to that of the cyanide, was an easy step and its value soon practically determined by him.

The problem I submitted to him was whether the action was chemical or mechanical, and I don't know that it has yet been solved.

Of the objections raised to the use of charcoal in the cyanide process only one has any weight, and that is the one mentioned in your editorial, viz: that the finely divided particles of charcoal pass through the filter and affect the solution injuriously for future use. This can be readily prevented.

Sonora, Oct. 23d, '99. LOUIS BLANDING.

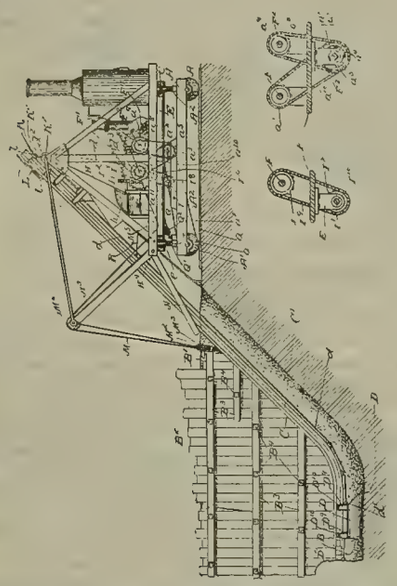
It would seem from the fact, as stated in the editorial on the subject in the issue of Oct. 21st, that as the gold was found coating a solid piece of charcoal floating in the cyanide solution during Dr. Johnston's period of experimentation that the precipitation was largely, if not wholly, chemical.—ED

Latest Mining and Metallurgical Patents.

Patents Issued Oct. 24, 1899.

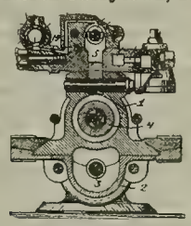
Specially Reported for the MINING AND SCIENTIFIC PRESS.

EXCAVATOR.—No. 635,047; G. W. King, Marion, Ohio.



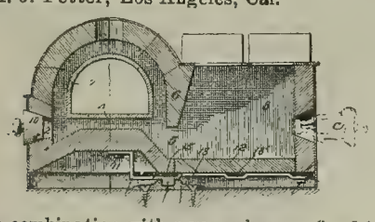
An excavator having a longitudinally movable platform *A*, the framework or structure *E* mounted upon and movable transversely of the platform, a shovel-guiding track, the excavating shovel held in connection with and movable endwise of the track, the shovel and track having the arrangement required to render the shovel capable of excavating in the direction of the framework, apparatus for actuating the framework and the track and shovel actuating apparatus being supported from the framework.

OILING DEVICE FOR ROCK DRILLS.—No. 635,286; R. L. Ambrose, North Tarrytown, N. Y.



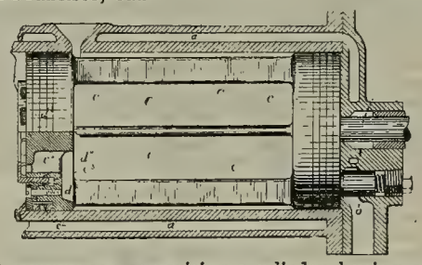
The combination with a rock drill comprising a cylinder, a piston, a valve chamber and a valve arranged to reciprocate therein and control the admission and exhaust of the motive fluid to and from the cylinder, of a casing pivoted or swivelly mounted upon the side of rock drill, casing being provided with a filling hole at the top, a circular channel arranged between casing and rock drill, a hollow plug rotatably mounted in casing, plug provided with an orifice adapted to register with filling hole when plug is turned in one direction, a channel connecting with circular orifice, and with the interior of plug, when plug is turned in the opposite direction, and a channel leading from the circular channel to the interior of the valve chamber.

ASSAYING FUREACE.—No. 635,586; O. W. Martin and A. J. Petter, Los Angeles, Cal.



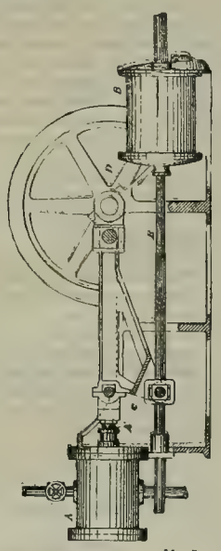
The combination with a vapor burner fixed in position, of a pivoted furnace adapted to rotate horizontally, furnace including a smelting or crucible chamber having a burner hole, an adjacent cupeling or muffle chamber having a separate burner hole, and an open passage between the two chambers, as shown and described, whereby both chambers may be heated by one and the same medium, or one of them independently, as required. The combined furnace comprising two firing chambers arranged adjacently in the same structure or body, and connected by an open passage, and having independent burner holes at either end, the body of the furnace being pivoted to adapt it for rotation. The body of the furnace having a removable raised bottom, inserted from beneath, of latches or latch bars crossed upon bottom and pivoted together centrally and a series of catches fixed on the rim of the furnace body, and adapted to lock with bars when the latter are swung horizontally into proper position.

AIR COMPRESSOR.—No. 635,516; J. P. Simmons, San Francisco, Cal.



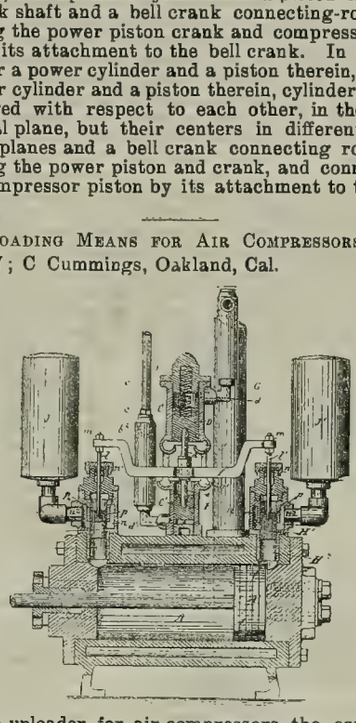
A compressor comprising a cylinder having suitable outlets, a cage piston therein provided with a valve-controlled port in each end thereof communicating with the interior of the cylinder on opposite sides, and an annular recess or pocket exterior to and separate from port, in which the stem of the valve is guided. The combination with the piston of a compressor having an annular passage, of a ring valve controlling the passage having an annular stem projecting within the body of the piston and provided with a radial projection, and a ring detachably secured to the piston adapted to engage with the radial projection whereby the movement of the valve is limited.

AIR COMPRESSOR.—No. 635,517; J. P. Simmons, San Francisco, Cal.



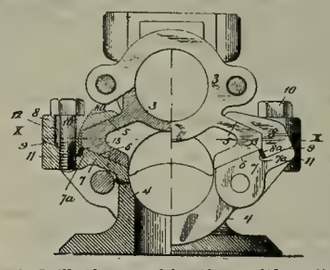
In a compressor a power cylinder and a piston therein, a compressor cylinder and a piston therein, a crank shaft and a bell crank connecting-rod connecting the power piston crank and compressor piston by its attachment to the bell crank. In a compressor a power cylinder and a piston therein, a compressor cylinder and a piston therein, cylinders being arranged with respect to each other, in the same vertical plane, but their centers in different horizontal planes and a bell crank connecting rod connecting the power piston and crank, and connecting the compressor piston by its attachment to the bell crank.

UNLOADING MEANS FOR AIR COMPRESSORS.—No. 635,667; C Cummings, Oakland, Cal.



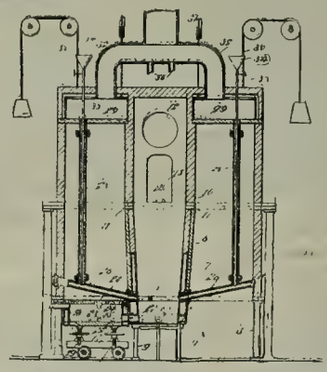
In an unloader for air compressors the combination with the compressor cylinder, of the valve chambers connecting with the interior of the cylinder near each end thereof, the air receivers of approximately the same volume as the cylinder, connection between the valve chambers and the receivers, a piston valve working in each chamber so as to control the communication between the cylinder and air receivers, the piston cylinders, connected pistons working therein, a yoke carried thereby, connection between the yoke and piston valves, the high and low pressure supply pipes and the pistons whereby the pistons are raised and lowered by the change of pressure in the supply pipes.

ROCK DRILL.—No. 635,301; H. V. Conrad and R. L. Ambrose, North Tarrytown, N. Y.



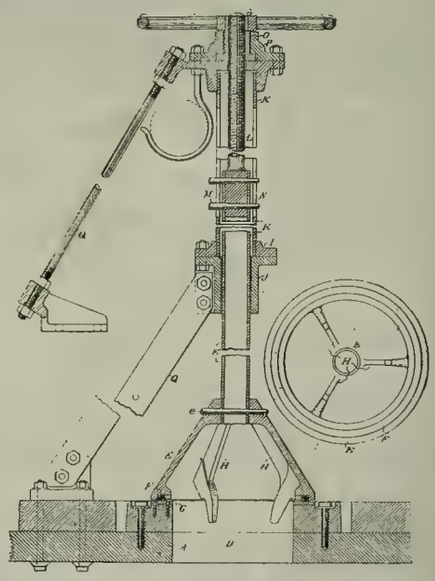
In a rock drill the combination with cylinder and guides on cylinder composed of longitudinal ribs, each of ribs having faces *5 6* converging as shown, of a shell having stationary slideways *7* upon which the lower face *6* of guides engage, adjustable slideways *8* with which the upper faces *5* of guides engage, angular faces *9* through which the adjustable slideways engage with the shell, bolts fitted to shell, slotted holes in adjustable slideways through which bolts are adapted to pass and removable spacing pieces *13*.

SMELTING FURNACE.—No. 635,652; J. H. Canavan, Kirkland, Ariz.



A smelting furnace, comprising an outer shell or casing, a cupola arranged therein and having a water jacket, a chimney at the upper end of the cupola, the outer shell or jacket and the walls of the cupola and chimney forming walls of hot-air chambers open at the bottom, forehearths movable underneath the hot-air chambers, water jackets surrounning the forehearths, trucks on which the forehearths are mounted, means for vertically moving the hearths, tuyeres extended into the cupola at opposite sides, air-blast pipes in the hot-air chambers and communicating with the tuyeres, air boxes with which the upper ends of pipes communicate, and a pipe for discharging air into said air boxes.

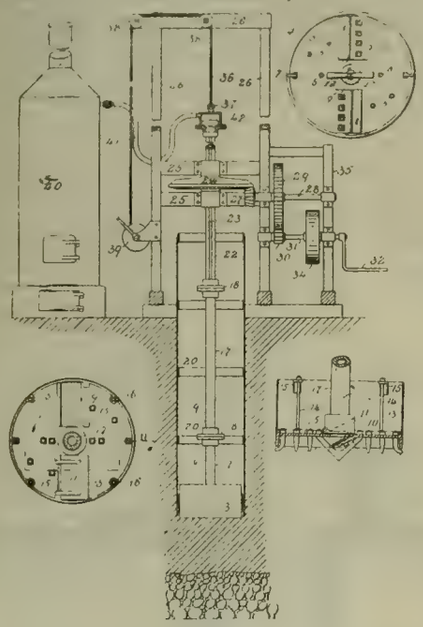
DISCHARGE GATE FOR TANKS.—No. 635,442; C. W. Merrill, Alameda, Cal.



The combination with a vat or like inclosure having a bottom discharge opening and an annular seat

surrounding opening, of a hollow conical gate with a thickened channeled rim at the lower edge and a packing ring fitted therein and adapted to close upon the seat, interior guides by which the gate is centered when closing, a tubular stem fixed in the top of the gate, extending upwardly therefrom having a screw shank fitted in its upper end, an exterior tube within which the gate stem and screw are movable, a nut having a hand wheel fixed thereto and turnable in a retaining head whereby the screw and connected parts are caused to rise or fall, keys by which the lower end of the screw is secured to the gate stem, slots made in the sides of the outer tube through which the ends of the keys project to serve as guides and prevent the screw and gate from rotating when the nut is turned.

APPARATUS FOR MINING IN FROZEN EARTH.—No. 635,522; J. E. Stuart, Winchester, Cal.



An apparatus for mining in frozen earth comprising an auger consisting of an annular flange having an interior crossplate formed with a radial opening and with a radial depending flange projecting beneath the opening and a radial cutting plate secured to the depending flange, a cylinder, angular lugs and bolts whereby the cylinder is secured to the crossplate, a hollow shaft secured to the crossplate whereby the auger is supported and a centrally located V-shaped bracket secured pendantly to the crossplate beneath the hollow shaft and crosswise of the radial opening.

PROCESS OF TREATING GOLD OR SILVER ORES.—No. 635,199; J. Smith, Salt Lake City, Utah.

A process for treating gold and silver ores, tailings, slimes and like materials containing precious metals, which consists in mixing the material to be treated with caustic lime, saturating or covering the mixture entirely with water and keeping it thus until all the acid present has combined with the lime, drying the material, exposing it to the action of atmospheric air, and treating it with a cyanide.

Notes on the Geology and Mineral Deposits of Vancouver Island.

Written for the MINING AND SCIENTIFIC PRESS by H. W. FAIRBANKS.

Vancouver is the largest of the islands lying off the western coast of North America. Its longer axis, lying southeast and northwest, has a length of nearly 300 miles and the shorter axis of about sixty miles. At the southern end is the city of Victoria. On the eastern side are Nanaimo and Wellington, noted for their valuable coal deposits. Other settlements are scattered along the deeply indented coast, but the greater portion of the island remains in its primitive condition.

With the exception of some low areas along the coast, the island is mountainous. The crests along the center rise from 4000 to 8000 feet. Perpetual snow mantles the higher peaks, and in places well-defined glaciers still remain.

The whole island is covered with coniferous trees. Cedar, fir, spruce, balsam and hemlock are the principal trees, and owing to the rapid growth and slow decay there is formed an almost impenetrable mass of fallen and living growth.

This dense vegetation makes prospecting exceedingly difficult, and except on the higher and more rugged mountains it is mostly confined to the coasts and stream beds. Much of the island has never been explored and numerous rivers and large lakes exist there which have never been placed upon a map.

The geology of the island has not been studied in detail, but the work of Dawson and the Canadian Geological Survey has shown that there are two distinct formations represented here. The older he has called the Vancouver series. It is mostly of Triassic age. It forms the greater part of the island and consists of limestone, slate and flinty quartite, with enormous areas of interbedded volcanic flows. This is the mineral-bearing formation.

To the east of the island, forming the adjoining mainland and the numerous intervening islands, lies a great body of granite, intrusive in the Vancouver series. But little of this granite mass is found upon Vancouver island.

The other important formation upon the island is the Cretaceous. It carries the coal, and the latter has been up to the present the chief production of the island. This formation is at present limited to a strip along the eastern side from the region of Nanaimo north, and to scattered areas at the north end of the island. The fields which have thus far been found to be productive are the Nanaimo, Wellington and Comox. Coal is found, however, at almost all points where the Cretaceous occurs, and prospecting at Quatsino sound and upon the eastern shore north of Comox has been carried on.

The coal from this Cretaceous formation is the oldest, geologically, and probably the best which will ever be found upon the Pacific coast. At Nanaimo and Wellington the coal has in places been found to be 14 feet thick. In the vicinity of the former place the coal formation extends out under the ocean and the adjoining islands. Upon some of these islands shafts have been put down.

It is only in recent years that ores of the metals have been found upon the island in paying quantities, and even now there are no well-developed properties. Consequently the full character and extent of the ore bodies are not yet known. Since the Alaska excitement prospectors have gradually spread over the island and many apparently valuable discoveries have been made.

So far as I am aware the ore bodies found here are all base. They consist chiefly of the various ores of copper, iron and zinc, nearly all carrying gold and silver in varying quantities. Chalcopyrite is the common copper ore. Bornite is also found in places. Of the iron ores, magnetite and pyrrhotite are known. Pyrrhotite, especially, is found in large quantities.

Veins and bunches of quartz containing iron pyrites occur in many places, but they do not generally seem to carry very much gold. The ore deposits are more often found at or near the contact of the limestone with the various dykes of igneous rocks which are so common.

Prospecting has shown that here, as in other mineral regions, many of the deposits are of small size and too bunchy to pay for working, but, nevertheless, about Alberni and Clayoquot sound, and the southeast arm of Quatsino sound, copper deposits have been found which will undoubtedly prove of value. Alberni and Clayoquot prospecting has been especially active the past season.

So far as I have observed the ore deposits do not occupy defined fissures, but occur along more or less regular zones of impregnation or replacement. Some prospectors with whom I have talked seem to think that the deposits do not go down, but there is no reason why they should not. In places upon the mountain sides the ore bodies are exposed vertically for nearly 1000 feet. Although the deposits are bunchy, there does not seem to be any reason why they cannot be mined where they are of any size. The exceedingly moist climate prevents deep oxidation, and no mistake as to the real character of the ores can be made.

The deep inlets make access to nearly all parts of the island comparatively easy, and this, together with the abundance of timber and the magnificent water power in the streams, the presence of coal and limestone, make itpossible to carry on profitably the smelting of low-grade ores.

A Valuable Publication.

TO THE EDITOR:—I beg to call your attention to the publication by this Bureau of Monograph XXXII (Part II) of the Survey series, relating to the Geology of the Yellowstone National Park. It embraces chapters of the descriptive geology of the mountains surrounding the Park plateau, by Arnold Hague and colleagues; elaborate investigations of the petrography of the crystalline rocks, by J. P. Iddings; reports upon the invertebrate paleontology of the Park and the Absaroka range, by Messrs. C. D. Walcott, G. H. Girty and T. W. Stanton; and an exhaustive study of the fossil flora of the region, by F. H. Knowlton.

The volume consists of 893 pages, handsomely illustrated by 121 plates and numerous colored maps and figures. It can be purchased for $2 45—the actual cost of preparation—and payment should be made only by postal or express money order, stamps or checks being not acceptable.

Very respectfully,
CHAS. D. WALCOTT, Director.

Department of the Interior U. S. Geological Survey, Washington, D. C., Oct. 28th, '99.

Mining Operations in the Yukon Basin.

The introduction of machinery into the placer mining operations of the Klondyke region was due to the efforts and enterprise of Capt. J. J. Healy, general manager of the North American Transportion & Trading Co., who, realizing that the streams tributary to the Yukon had not generally sufficient fall and volume of water for placer mining, purchased large boilers, pumps and elevators, and last spring installed them on his properties on upper Bonanza creek and on El Dorado. These pumps were successful in the extensive development of the property, so far as the volume of water was able to handle the gravel extracted, but the operations have shown that the plant is not adapted for the small sluice head of water available during the summer months. The pumps and elevators raised 60% of water and 40% of gravel, but on account of the lack of water the gravel is not handled in sufficient quantities to meet the output of the pumps and elevators.

Upon its introduction the installation was recognized as an experiment, and a single season's operations were scarcely sufficient to determine positively the actual requirements which would meet the conditions found in this Arctic region; but Capt. Healy was so far satisfied with the first experiment in this direction that he now contemplates the introduction of steam shovels mounted on a car and movable on a truck for the handling of a large quantity of material, and to also employ derricks to raise large buckets of gravel to the level of the hydraulic elevators, which will raise the gravel and water to the level of the dumping boxes of the sluices. Electric power generated at a station on the Yukon is also looked to as among the possibilities of next season, this power to be conveyed to the various dredging machines on the tributary streams.

During the coming winter the steam thawing machines will be used to thaw a large amount of ground and pay dirt for washing next summer will be raised to the surface. Although this bedrock gravel is rich in gold, no precaution is necessary to protect it from those disposed to loot the pile of wealth, for in short time after exposure to the low temperature of a Yukon winter it has become a solid mass of gravel and ice.

On the Yukon fair weather usually prevails from May until September, and for nearly two and one-half months there is almost continuous daylight. This has the effect of considerably lengthening the period available for summer sluicing, and is, therefore, an important working factor.

Although industrious search has been made for the source of the placer gold, no gold-bearing veins of great value have as yet been discovered, so that the region still remains practically a placer mining country, though without doubt if the search is continued valuable veins of gold ore will be found.

The creeks on which there is the greatest activity in that region known as the Klondyke are Dominion, Gold Run, Hunker, El Dorado, Bonanza and Sulphur, of which each has tributaries. On each of these creeks there are benches being profitably worked. The fact that gold is found on a series of terraces may be taken as an indication that the gold was not derived from the immediate vicinity in which it was found, but is more likely to have come some distance. The distance which gold found in alluvial may have traveled is not always easy of determination, though its physical appearance is a better index of this than the size of the grains or nuggets. Very smooth gold is usually found at some distance from its source, and another peculiarity is that the more distant from its source the higher grade the gold.

In all of the gulches, whether containing pay gravel or not, the bedrock stratum is overlaid by a deposit of "muck," as it is called, which consists of decayed organic matter, principally moss, with some fine silt. This is found frozen, and is essentially rock, but when thawed it becomes black mud, which may be sluiced away. In depth the muck ranges from 3 to 40 feet. When the ice and snow melt in summer the water is conducted onto a claim covered with muck and the water rapidly thaws it out and it is carried away in the stream, but where deep, shafts are sunk through it to the gravel bed, and through that to bedrock, which is then exposed by a system of drifts and crosscuts, the gravel is hoisted out and sluiced.

In the first seasons the ground was thawed in the most primitive manner by building large fires, the heat from which thawed a few inches of the muck or gravel, which was removed and another fire started to remove a few inches more. In this costly, laborious and tedious manner all the shafts were sunk, but the introduction of the steam thawing machines has rendered the sinking of shafts comparatively inexpensive, and it will result in a much more extensive system of operations. These thawing machines have limitations, for the heat penetrates only a few inches, but it leaves back of the thawed ground which is removed a solid mass of frozen ground, which stands without timber support, rendering operations simple and cheap as compared with former methods.

Browne's Vacuum Bailing Tank.

This patented device is intended as an economical and effectual means of raising limited quantities of water from a mine shaft while the work of sinking the shaft is in progress. Handling water which seeps and flows when sinking a shaft is frequently a source of delay. Ordinary practice is to lift and force the water to the surface by suction or force pumps. The pump is placed in the shaft 15 to 25 feet above its bottom and draws the water by suction through a strainer and suction hose to the pump cylinder, whence the bucket piston or plunger lifts or forces it upward.

While the work of sinking is in progress, it is not often practicable to more than provide a small sump in the bottom of the shaft for the water to collect in and to pump from, so that the pump must adapt itself to varying conditions, resulting in wear to the reciprocating parts and necessitating frequent repacking, repairs and delays. The pump must also be lowered from time to time as the work progresses, and the water columns and power supply pipes must be extended and reconnected. During blasting operations it must be removed or protected by a bulkhead.

After the shaft is completed a deeper sump may be provided from which the water may be dipped by means of bailing tanks, water buckets or kibbles and hoisted to the surface, but during shaft-sinking operations the maintenance of a sump sufficiently deep to dip from is impracticable.

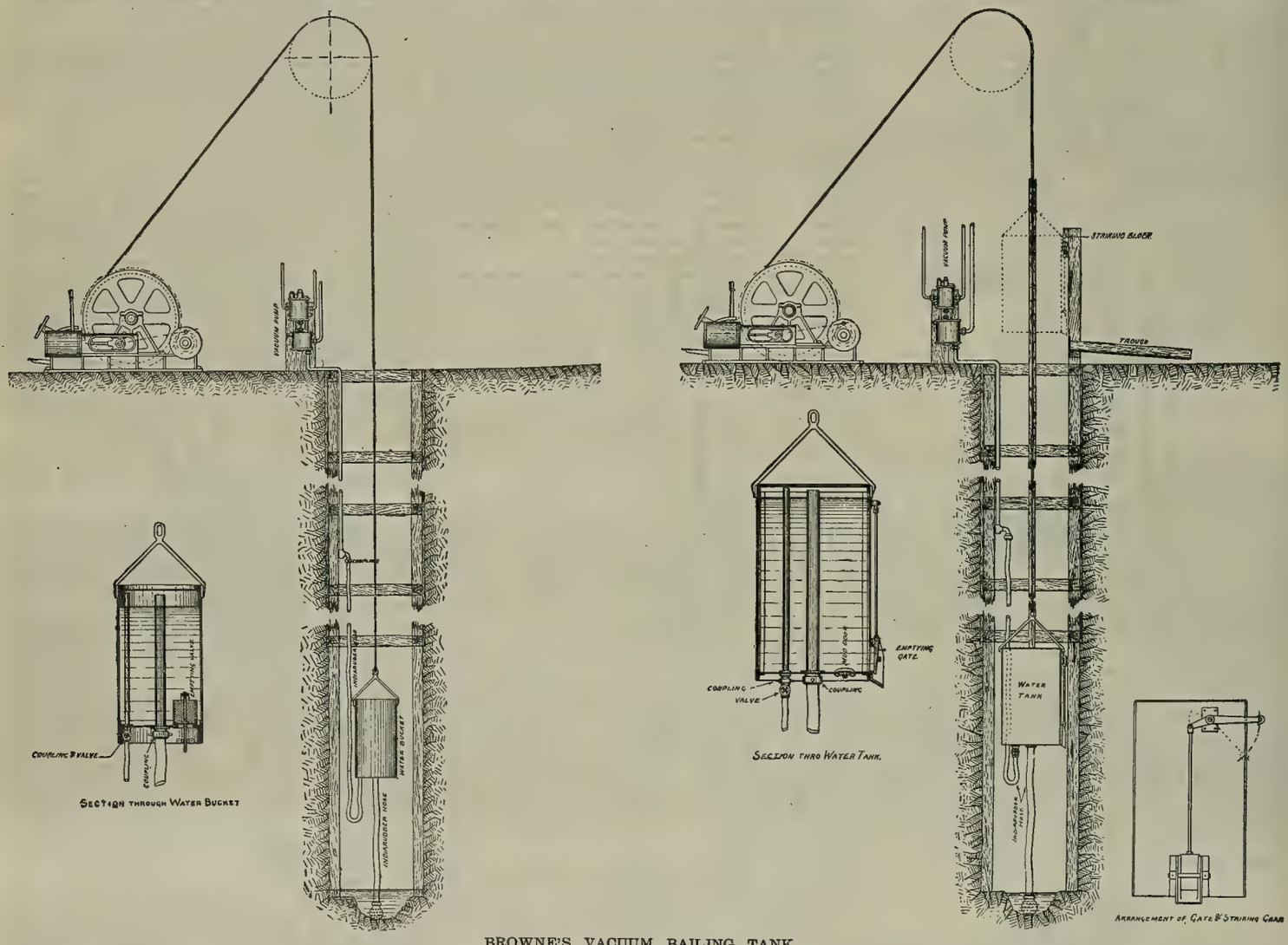
The vacuum bailing tank herein illustrated was patented by Mr. Ross E. Browne and assigned to Fraser & Chalmers. By its employment the difficulties and inconveniences usually experienced in removing limited quantities of water from the uncompleted shaft are intended to be overcome. The apparatus consists of a large vacuum tank which may be lowered and hoisted rapidly in the shaft by means of an ordinary hoisting or winding engine located on the surface. The tank is lowered to a point near the bottom of the shaft and connected by means of a vacuum pipe leading to the vacuum pump on the surface, which may be driven continuously or intermittently by steam, compressed air, electric current, water power, or otherwise. The operation of this pump produces a vacuum in the tank, which draws the water from the shaft bottom through a strainer foot valve, suction hose and suction valve. When the tank is filled with water, the coupling is loosened and the tank is then hoisted to the surface to be emptied and returned to the bottom of the shaft, where it is reconnected with the vacuum pipe and is then ready for refilling.

The coupling is preferably connected with the vacuum pipe and with the tank by means of flexible hose so as to occupy a position readily accessible to the miner and is most suitably constructed to cut off the air intake when uncoupled and open the same when coupled. Similar couplings are in common use for other purposes at the present time.

The tank is best provided with shoes to run in guides in the shaft; its construction also involves the use of a self-dumping valve operated by a rod passing through a stuffing box at the top of the tank and connected with a lever which is automatically tipped by a stationary guide at the surface, the discharging water being carried through a water trough. Similar arrangements for automatically emptying the tank are commonly used in bailing. Additional hoisting capacity is not required where double hoists are already provided, as is very frequently the case —one for each of two compartments.

The utilization of one hoisting compartment for bailing while sinking as a rule is not objectionable, as shafts generally have two or more compartments, only one of which is used for hoisting the rock from the bottom of the shaft.

The tank is described as specially designed for use in vertical shafts, but it may be adapted to inclines. The patentee and manufacturers consider that this apparatus commends itself by its simplicity. They announce that it lifts air, water, mud, sand, etc., with less than the usual amount of wear and tear, necessitates less labor in handling and is more easily kept in order than many styles of sinking pumps in ordinary use. All desired information concerning the device may be obtained by addressing the manufacturers, Fraser & Chalmers, Chicago and London.



BROWNE'S VACUUM BAILING TANK.

GRADING is under way near the smelter of the Golden Reward Con. M. Co., at Deadwood, S. D., for the construction of an experimental plant to recover values lost in the slag from the furnaces. The investment of $2000 is necessary to build this test plant. The slag dump is estimated to contain 1,250,000 tons with a value approximating $1,000,000. The plant will consist of a reverberatory furnace and the molten slag from the smelter will be conveyed by electric cars and dumped in this furnace, which will require but a small amount of coal to win the value that remains in the slag.

Warming Quartz Mills and Battery Water.

In quartz mills located in cold countries or where the temperature falls to low point during winter, the water used in the batteries, coming usually from open conduits, is reduced in temperature to a degree nearly equaling that of the atmosphere. Good amalgamation cannot be accomplished with water at temperatures approaching the freezing point, and some method of heating the water should be employed. In most mills so situated steam is used to supply motive power. The exhaust steam from the boilers can be employed with great benefit in a number of ways. First it can be utilized in heating the feed water going to the boilers themselves, thereby greatly reducing the cost of making steam. After having accomplished this the exhaust steam still retains a large amount of heat which can be utilized in warming the battery water, in the same manner as in heating the boiler feed water. By a proper arrangement it may also be made to heat a large volume of air in a receiver and this air can be driven through large iron pipes, 30 inches in diameter, which can be placed along the floor of the mill in front of the battery plates or on the concentrator floor. The pipe should be made so as to be easily put together or disconnected, so that upon the approach of cold weather it may be put in place and when the winter is over it may be removed. It will thoroughly warm the mill, and not only make the men comfortable, but pay for itself in the increased saving of amalgam. Exhaust steam may be used in place of the hot air heater for the mill in places where the temperature does not fall too low, but where the mercury drops far below zero, as in Montana, South Dakota and in the high altitudes of California, Colorado and elsewhere, the condensation is likely to cause the pipes to freeze up, adding new difficulties instead of lessening those which already exist.

What Many Men Constantly Say.

MARTINEZ, ARIZ., Oct. 14th, '99.

Publisher "Mining and Scientific Press," San Francisco, Cal.: I enclose $3, for which please renew my subscription for the MINING AND SCIENTIFIC PRESS. I find that it is to me the most valuable paper published—one that mining men and prospectors cannot well do without, and a paper that is valuable in every pursuit of mining business.

Yours respectfully, J. ANDRE NEWMAN.

Mining Summary.

ALASKA.

The Yukon river is reported closed by ice.

The monthly report of the Alaska Treadwell mine, issued October 27th, shows 540 stamps crushed 58,407 tons yeilding $68,646, with a saving of 1,083 tons sulphurets worth $30,178. The ore averaged $1.83 per ton. Gross receipts for the month were $107,087, and expenses $36,500. The fourth quarterly dividend of the company was paid October 28th, making $300,000 given to stockholders since January 1st. The dividends are 37½c per share quarterly.

At Cook Inlet Blackwell & Webber propose putting in development of two miles of Indian river, one of the tributaries of Turnagain Arm. Blackwell says he has completed the building of a dam 380 feet long across Indian river 3000 feet from its mouth. In the dam are two gates, one 16 feet wide and 10 feet 8 inches high, the other 7 feet wide and 9 feet high. The gate opens automatically with a flow of 4500 miners' inches, requiring fourteen minutes to exhaust the dam water, which it takes six hours to fill. Next season he hopes to have washed the three-fifths of a mile of river to bedrock and begin taking out gold.

R. C. Norman, who has been running a rocker on the Cape Nome beach, says he left there on October 6th on a steamer carrying 300 men, the trip to Seattle taking ten days, and the cost of passage amounting to $100, $75 or $50, according to first cabin, second cabin or steerage. Many of the passengers expect to go back next year, but think they can easily pay passage both ways and then make money, in preference to wintering at Nome, where house room is scarce and where hotels charge $4 a day for board and lodging. Mr. Norman thinks there is good pay dirt along the beach for a distance of thirty miles, but it takes judgment and experience to make "rocking" a success. Miners who used rockers made from $5 to $50 per day last summer, according to their knowledge of the business. The gold is very fine, and difficult to save, unless one knows how. All the rockermen are obliged to use quicksilver, which is placed in the bottom of the rocker and kept there by careful manipulation, until it has amalgamated a considerable quantity of gold, when the amalgam is taken out and the mercury dissipated into the air by placing the amalgam in a gold pan and holding it over a fire. Quicksilver is worth $1.25 a pound at Anvil City, and a pound will gather $1000 worth of "flour gold" if properly handled. Beach mining is usually pursued by two men, who work together as partners and "batch" in a tent or cabin close by. A good many cabins have been put up in the vicinity this fall, as lumber can now be procured at $125 per M. Scarcity of fuel is being overcome by the importation of coal, which sells for $75 a ton, and miners who decide to remain there all winter can keep from freezing to death by building tight cabins and laying in a supply of coal. Navigation has been closed since Oct. 15th.

ARIZONA.

The Arizona Copper Co. produced in '93, 7,871,819 pounds, and in '98, 18,169,096 pounds. The production of the Copper Queen in '93 was 13,795,618 pounds; in '98, 33,749,390 pounds. The Detroit produced 4,942,728 pounds in '93, and 11,428,992 in '98. The production of the United Verde in '93 was 9,121,146 pounds; in '98, 42,323,926 pounds. The total production of copper during the period mentioned increased from 43,773,675 pounds to 110,823,864 pounds. The '99 production is expected to reach 140,000,000 pounds.

COCHISE COUNTY.

Silver Belt: The Copper King Co., at Barrett, in the Dragoon mountains, has blown in a thirty-ton smelter on ore obtained from the Golden States mine. The Copper King Co. commenced operations at Bisbee four years ago, capitalized at $5,000,000, and owing to its near proximity to the Copper Queen and a judicious expenditure of money in printers' ink, both in and outside of Arizona, succeeded in disposing of a large amount of stock. The Bisbee holdings have been practically abandoned—save the name.

GILA COUNTY.

Globe *Silver Belt*: The United Globe furnace sprung a leak last week, and Supt. Cook suspended smelting until a new furnace has been erected. Forty men were laid off. Smelting will not be resumed before the new year. Work in the mines continues.

Globe *Silver Belt*: The Helvetia M. Co. contemplates building a narrow-gauge road from the mines to the smelter, an eighteen-mile line from the mine to Vail's station, on the Southern Pacific. It is reported that an additional smelter of 150 tons capacity will be erected, making 350 tons daily capacity.

GRAHAM COUNTY.

The Grand Reef mine, J. W. Mackay, has developed to that extent that a reduction plant is said to be the next move of the management.

Arizona *Star*: The wolfram claims sold to Mr. Bradford by Sampson & Bent are being worked by a New York company, Mr. Alcott president. They are in the Guijas mountains, six miles north of the Cerro Colorado mine. The owners of the property are grading and preparing to erect a concentrating plant.

MOJAVE COUNTY.

Several members of the Temple Bar Con. M. Co., who recently arrived in Kingman from Paris, have gone to Temple Bar, on the Colorado river, to inspect their property, which consists of placer ground.

Kingman *Miner*: Murphy & Hawkins have sold to M. L. Requa and M. D. Rochford their interests in the Champion, Twins and Blue Lode mines at Cerbat. The mines show big bodies of lead sulphides.——J. H. Johnson has bonded to W. H. Cushing the Stockton mine on Stockton hill. The mine is the north extension of the Prince George. The vein shows a large body of quartz carrying good values.——The Tennessee mill is turning out a carload of clean concentrates daily.——The reported strike in the Alpha mine is confirmed. The sample from 52 inches of ore gave a value of $25 in gold and silver and 12% copper. Ten inches of ore on the foot wall gave 32% copper. The dump ores that were considered worthless gave thirty-five ounces silver, $6 gold and 19% copper. Of this character of ore there are fully 1000 tons. The Nay Bros. have taken a lease below the tunnel level.——Caffery & Dennis will begin shipping several hundred tons of copper ores.

PIMA COUNTY.

Tucson *Star*: The Dragoon M. Co., operating the Peabody copper property at Dragoon Summit, has become one of the largest shippers of high-grade ore to the El Paso Smelting Works.

PINAL COUNTY.

A new water jacket has been put in at the Silver Bell smelter, twenty-five miles from Red Rock station, on the Southern Pacific. This is known as the Old Boot mine, which was operated in early days for silver, but is now a copper producer.

YAVAPAI COUNTY.

G. P. Harrington has men at work on the old Tiger mine in the Bradshaw mountains and three teams are hauling ore for shipment.

Phœnix *Enterprise*: J. M. Ford has his gasoline engine in place at the Copperopolis mine. Ten men are employed.——At the Whipsaw property a large force is employed. The old shaft is being driven deeper and several prospect shafts will be sunk. Supt. Farrish has put additional men to work.

YUMA COUNTY.

A 6-foot ledge of 24% copper ore has been uncovered near the King of Arizona mine.

CALIFORNIA.

Alameda.

Oil has been discovered on the Miner ranch at Orinda Park, ten miles from Berkeley, at a depth of 800 feet.

Amador.

Amador *Record*: Rich rock is being taken from the 1550-foot drift of the Central Eureka mine on Sutter Hill and crushed in the Zeile mill.——Work is being pushed at the Fremont Con. (Gover) preparatory to opening up the mine. The hoisting machinery, which stood close to the old inclined shaft, will be moved. This shaft will be opened and a new one sunk 1600 feet to the south. The old workings are 1362 feet on the incline. A large body of quartz is exposed in the lower workings.

Calaveras.

At the Melones mine, near Robinson's Ferry, work is temporarily shut down, except on the tunnel and mill. Nearly 150 men have been laid off. Work on the dam had to cease on account of the volume of water in the Stanislaus after the storm.

Angels *Echo*: The Stickle mill, at Angels, is undergoing repairs. New mortar blocks are being put in to replace the old ones.——The motors for operating the Utica Co.'s mills by electricity are being put in the Stickle, Madison, Utica and Gold Cliff mills. This will result in a saving of several thousand inches of water.——The wing dam of the Melones M. Co., on the Stanislaus river, has been blown up by the company to prevent the destruction of their ditch and flumes during the heavy rain storm. The dam was built 4 feet high and extended across the river 160 feet.

San Andreas *Prospect*: At the Brunner mine, south of Angels, in crosscutting on the west side of the shaft it is reported that fine rock has been struck.——At Campo Seco, fire was again started in the old smelter of the Satelite mine, and 100 men are given employment. The supply of coke gave out and work was temporarily suspended, pending the arrival of ten carloads. The smelter has a capacity of fifty tons of ore in twenty four hours, but it is reported the company will erect a new one with a capacity of 100 tons. B. G. Randall is Supt.

San Andreas *Citizen*: The Blair G. M. Co. have sold their Maggie Bell quartz claims, in Angels mining district, to the Libra M. Co.——During the week the Utica Co., through C. D. Lane, bought the Bennett-Leeper mill and the site for $679 40. Alvinza Hayward, C. D. Lane and Hobart Estate Co. have bought from J. Cronan a one-fifth interest in the Confidence quartz mine. The Confidence adjoins the Utica and it is said that the Utica Co. now own the property in its entirety.——The Shirly Queen quartz mine, on the Oxendine farm, near Copperopolis, has been sold to C. A. Ducommun, representing Los Angeles capitalists. The mine has been worked, and the people who have bought it have been working it under a bond. There is a 5-stamp mill on the ground.——The Kremer drift mine, on the Mokelumne Hill and Valley Spring road, has been sold to J. K. Carpenter of Oakland. This mine was owned by Cook and Burleson.

Jackson *Ledger*: At the Union copper mine, at Copperopolis, the pumping out of the water from the old workings is under way. It is estimated that it will take two to four months to unwater the mine. The mine was filled to within a few feet of the top. All water taken out will be run through sluice boxes and vats, where the copper in solution in the water will be precipitated on tin scrap with which the boxes are filled.

Stockton *Independent*: The Lightner M. Co., at Angels, have expended $300,000 in developing the mine and making necessary improvements, of which amount the mine produced three-fourths. During the past year the company expended $120,000, of which the shareholders furnished $30,000.

Del Norte.

Del Norte *Record*: McGowan & Crawford have fifteen tons of copper ore ready for shipment at the Copper King, on Myrtle Creek hill. It will be sent to Selby's via Crescent City. The owners report that in the shaft and tunnel there is a large amount of ore uncovered.

El Dorado.

The Melton mine at Poverty Point has started up under lease to a local company, of which J. Fuller is foreman.

At the Mt. Pleasant mine, A. L. Begbie, Supt., is increasing the working force.

Georgetown *Gazette*: At the copper mine near Pilot hill a number of men are employed putting up buildings and opening the mine. It is claimed that the ore goes 40% copper and $15 per ton gold.

San Andreas *Citizen*: The Ritter quartz mine has been incorporated for $100,000. The mine is three miles from El Dorado. Within the past year Mr. Rigney has been developing the mine by means of a tunnel, which is now in 380 feet; at a depth of 200 feet good ore is in sight.

Lake.

Middletown *Independent*: Lobree & Betts are pushing a drift into their copper mining claim on Pine mountain, and prospects are reported good.

Lassen.

Susanville *Mail*: The tunnel of the Hayden Hill Tunnel Co. is in 120 feet. Mr. Frick is Mgr.——The Hayseed Co. is employing a crew of men in development.——The first rich sulphurets ever found on Hayden Hill have been discovered in the Monte Cristo tunnel, owned by Dr. Schloesser and Geo. F. Stone, at a depth of 1020 feet.——Work continues in the Juniper mine by McFarling Bros. and Judge Ritchie.——The vein on the 220, 300 and 400 foot levels, west, of the Golden Eagle mine is now 30 feet wide and in good ore.

Los Angeles.

The King of the West mine, at the side of the S. P. Railroad, half a mile west of Acton station, has shipped a carload of ore to Selby's works at Port Costa. The ore contains copper, gold and silver.

Mariposa.

It is reported that the Washington mine, owned by M. L. Rodgers, two and one-half miles northeast of Hornitos, is to be reopened. This property consists of three claims, and is in a black clay slate country. A dyke of gray rock accompanies the vein. The old workings are 1500 feet deep and it is said the mine has a record of $1,500,000.

Mariposa *Gazette*: At the Princeton mine preparations are being made to set the boiler, compressor and engine. One of the boilers and the hoisting engine have been delivered. A redwood tank, with a capacity of 15,000 gallons, is erected at the Princeton. The water is brought from the spring on the mountain east of Princeton in a 2-inch pipe.

Mono.

Bridgeport *Chronicle*: C. E. Watson has taken the management of the property of the Aimono M. Co., in Antelope valley. A mill will be put in in the spring.——A number of locations for oil on the islands in Mono lake have been recorded at the courthouse recently.——W. P. Brandon has moved a 5-stamp mill from Bodie to the Cameron mine, on Green creek. R. A. Cameron has opened up the mine. Bridgeport has three quartz mills in its vicinity—the Castle Peak, Arnot and Cameron.

Nevada.

Penrose & Harker's new restraining dam at Relief hill is nearly completed, and they expect to mine there next winter under supervision of the Debris Commission.

The Spanish mine, three miles north of Washington, has been closed down. For years the mine has been worked by means of an open cut and made a profit on rock that returned 75 cents per ton. The cut has got so deep that the property cannot properly be worked in that way any longer and it is said the rock will not pay to work through a shaft. The stated cost of mining and milling the rock from this mine was for some years about 60 cents per ton.

Grass Valley *Union*: At the Plumbago mine, Supt. Mather is pushing the work of erecting the additional twenty stamps on the Middle Yuba. The mine continues to yield rich ore.

Placer.

Auburn *Republican-Argus*: E. G. Spencer reports that a rich deposit of gold-bearing ore has been opened on the A. E. French place, near the Algol copper mine. The gold is of a copper color.——It is reported that parties have lately bought 800 acres below the Karchner ranch in the Valley View district, supposed to be a part of the original bed of the Bear river, and will work the ground by dredging. The parties purchasing are from Oroville.

Auburn *Herald*: The Michigan Bluff M. Co., incorporated, has bought the Burns Con. Mexican placer mining claim at Michigan Bluff. The former owners ran a tunnel and struck the channel on the rim. It is now proposed to run a new tunnel 40 feet below the channel and open it, so it may be worked throughout its full length on the ground owned by the company.——The Bullion shaft, Ophir district, under its new owners, has been sunk 10 feet and is down 160 feet. The ledge is of ribbon rock 4 feet wide at the bottom of the shaft and shows good ore. The company has ordered a new hoist from the Union Iron Works. Sixteen men are at work.——At the Boulder, near Ophir, they are preparing to put in an air compressor. Two concentrators have been ordered.——A. Clarke is preparing to put up an air compressor at his Georgia Hill mine.——Laird & Quinn Bros. are cleaning a ditch preparatory to sluicing the ravine on P. Snyder's farm. They have a mile of pipe laid.

Colfax *Sentinel*: The Gold Channel M. Co., whose mine is near Emigrant Gap, are doing successful work in their shaft. They struck gravel at the end of a 100-foot drift recently, and are sinking now to bedrock. The mine is under the management of F. W. Armstrong, formerly of the Big Dipper, near Iowa Hill.

Plumas.

Quincy *Bulletin*: T. Richards has bought a half interest in the Pioneer drift gravel mine, on Bear creek, owned by Mr. Buchanan, and men will be put to work.——The late storm placed 5 feet of water in the storage reservoir of the Quincy Mining & Water Co., known as Silver lake, at the base of Spanish Peak, which is an indication of the heavy rainfall of last week. It is the intention of the company to resume mining at Bean hill.

Quincy *Independent*: W. S. Chapman has a bond on the Johnny Bull mine, in North canyon. Mr. Chapman will put men at work to develop the property.

San Bernardino.

J. Dederichs has designed the stamp mill for De Lamar's Gold Mountain mines at Blairstown, near Holcomb valley. The mill is to have forty stamps, with space for sixty.

Santa Barbara.

The Summerland Oil Co.'s October shipments will go over ninety carloads. Eighty carloads is the usual monthly output.

Lompoc *Record*: It is reported oil development will begin near Gaviota Pass. It is said that options have been taken at a cost of $10,000 on lands sixty miles north of Santa Barbara. This would reach the Lompoc property.

Shasta.

(Special Correspondence) —Behrens & Lievsay continue sinking the shaft on their Oro Fino mine, near Shasta. Like the Mt. Shasta mine previous to the present operators taking hold, the Oro Fino has been several times abandoned. To-day it has an ore body at 225 feet depth that is of good shipping grade.

F. M. Archer is developing a copper property on McCloud river from which the croppings assay 6% copper and $1.80 per ton gold.

Ried & Clendenin, in Old Diggings district, are developing six claims, on which they have an aggregate of 1000 feet of tunnel. The ore body is from 5 to 12 feet wide and averages $7 a ton.

Work continues with good results on the Rabbit mine in Muletown district. This property is yielding gold by the hand mortar process.

Work has been suspended on the Afterthought copper mines at Furnaceville by the Tarbet Syndicate, pending negotiations for an extension of the bond for six months. The company has paid $10,000 on the purchase price and has had above twenty men employed nearly two months.

At the Mt. Shasta mine the force has been temporarily reduced pending the installation of heavier hoisting machinery.

Redding, Oct. 31st, '99.

Redding *Free Press*: F. E. Ware, Mgr. of the Mt. Shasta mine, states that thirty men are employed at the Mt. Shasta mine. They are drifting on the 300 level and stoping. The work of sinking the shaft below the 300 level is delayed because of limited hoisting capacity. Since Mr. Ware and his partners bought the Mt. Shasta a year ago the product has amounted to $95,000. Previous to that time $12,000 had been taken out.——Brake, Wylie and Sleezer, who found the New Discovery quartz mine, in Churntown mining district, have been working the claim for several months, and they say that the first shipment of ore to the Keswick smelters, amounting to twenty-one tons, averaged $42 per ton, and another shipment is ready.——A. J. Oswald, Supt. of the Midas mine at Harrison gulch, states that the new roasters, which were started up for the first time ten days ago, are a success. The roasters are an experiment. Supt. McGill has charge of the cyanide works. Ten stamps are being added to the 10-stamp mill. One hundred men are employed in the mine and seventy at the works.

Siskiyou.

A strike is reported in the Golden Star or old Spencer quartz mine on Humbug. The ledge ranges from 18 inches to 2 feet in width and prospects $200 to the ton. Hollister men form this company.

The reported striking of bedrock in the Greenhorn Blue Gravel No. 2 mine seems to have been premature, as it is thought the supposed bedrock may be a boulder. The shaft is down 40 feet deeper than in the No. 1 Blue Gravel mine.

The Mabel quartz mine and the new ledges lately prospected on McKinney creek, between Oak Bar and Scott Bar, are reported showing rich ore.

Yreka *Journal*: The Commodore quartz mine at Barkhouse creek, Klamath river, has a paying ledge averaging from 3 to 4 feet in width.——Managers of the Yreka Creek mining enterprise have been viewing the ground lately and making arrangements for commencing operations as soon as the dredger arrives.——Collins & Campbell, at Oak Bar, are taking out good pay gravel, making $50 a day.——The China Co. at Buckeye Bar, above Oak Bar, has been taking out rich gravel lately.——The Greenhorn No. 1 claim of Page & Co. continues to yield good pay, with a full force working day and night. Later they will sink a new shaft or raise to the surface at the end of their tunnel.

Etna *Advance*: Work will be commenced at the China Oak mine, at Happy Camp, recently purchased by W. H. Van Brunt. The flume, to carry water to the mine from Indian creek, is to be completed by Jan. 1st.

Sonoma.

Cloverdale *Reveille*: The Cloverdale quicksilver mine is working steadily, and considerable ore is turned out daily. F. Lawley says the first shipment of fifty flasks will be made next week. This mine, when working full force, will employ a large number of hands.

Press-Democrat: At the Great Eastern quicksilver mine a number of additions and improvements have been made. During the past month a 60 H. P. hoisting engine has

been installed at the main shaft, also a smaller engine for sinking prospect shafts. The main shaft is 500 feet deep, from which there runs a drift 435 feet in length. Two roasting furnaces are in operation, that for coarse ore having a daily capacity of 28,000 pounds and that for fine ore 36,000 pounds. The soot from these furnaces contains condensed mercury, which was formerly mixed with fresh charges of ore and roasted a second time, but is now treated separately in a large retort recently added to the plant. A cleanup of the furnaces is made monthly, and the record for last July, August and September was 230, 235 and 228 flasks, respectively. There are fifty men employed at the mines.

Trinity.

Trinity *Journal*: A. Wagner has men working his quartz mine. The mine is equipped with a mill, which is running steadily on good ore.——Work is progressing on J. C. Steele's quartz mine, which is equipped with two mills, concentrators and rock breakers. The machinery is run by water power. The mills are running on free-milling ore. The richest ore, which is base, and the concentrates are shipped to Selby for treatment. Last week $5000 worth of sulphurets were shipped.——The Black Eagle quartz mine, owned by A. Miller, is showing up well. H. Weldon is the Supt.——At the Yellow Rose of Texas on Union creek development work is being pushed. A mill will be erected and a wagon road will be built up Swift creek to haul in the mill. It is owned by Carr & Miller.——R. D. Lawrence is running the arrastras on his tellurium properties.——At Cinnabar large shipments of quicksilver are being made from the Altoona. Good ore is being taken out and reduced under Supt. Porter's management.——At the Integral quicksilver mine Supt. Laws is developing.

Tuolumne.

At the Santa Ysabel, near Stent, work on the new mill is making good progress. The new hoist, which will carry down 2000 feet, has been finished. The ore at the 6th level, according to last reports, has widened to 3 feet.

Sonora *Union-Democrat*: The Free Lance is near the Berger ranch, one and one-half miles above the Ward's Ferry bridge. The mine was discovered and worked by F. Greiner Sr., who bonded it to Gardner & Meyer for $6000. Recently the purchase price was paid. The workings consist of two tunnels, one in 180 feet, the other 360. The vein in each varies from 1½ to 3½ feet, carrying high-grade ore. Grading for a 5-stamp mill is in progress.——The Sonora & Duffield mine at Arrastraville is being reopened.——The Laura mine at Cherokee is sending high-grade ore to the mill.——The Providence is operating ten stamps. Twenty men are employed.——The twenty stamps at the Grizzly were started Tuesday. For some time previous only five had been going.——The Rawhide has started operations full-handed. Electricity furnishes power.——The Golden Gate started up Tuesday after a brief shut down. This mine is favorably located to obtain water after other properties are forced to close down for the lack of it.——The Jumper is running full blast. During the water famine ten stamps were kept dropping by steam. With resumption of operations the force of mine and mill has been increased.——Fifteen miners are at the Green mine, near Confidence, retimbering. The mine has been unwatered and cleaned out.——The Continental mine, owned by Wm. Johns and situated near the Keltz, was bonded last week to Robert Stevenson of San Francisco and C. B. Taylor of Berkeley. Operations will begin in two weeks under supervision of A. S. Graham.——Work at the Kincaid Flat gravel mine, which was discontinued several weeks ago, will be resumed.——The Toledo mine, one mile west of Tuttletown, is being operated under a bond by E. T. Gould and others. This mine is an old one, though long abandoned. The shaft has been cleaned out and drifting commenced on a vein 8 feet in thickness. This mine produces a high-grade arsenical sulphide which gave some difficulty to the former operators in saving the values. Some of the ore of this class contains over $1000 per ton.

Sonora *Independent*: The Arbona mine, at Tuttletown, is down 487 feet. A vein 3 feet wide shows at the bottom of the shaft, the ore sprinkled with free gold. At 500 feet drifting will be commenced north and south. As soon as the mine gets power to run the 10-stamp mill, there is enough ore at hand to keep it running continuously.——At the Draper mine, near Soulsbyville, the compressor, receiver, air drills, etc., are ready for use. A double shift is sinking. A new mill will be erected within sixty days. Grading is in progress.

COLORADO.

BOULDER COUNTY.

The Inter Ocean mine at Sunshine has commenced shipping high-grade ore.

The Victoria and Lucky Star are making regular shipments of high grade ore.

The tunnels on the Big Five property are all being pushed and 1650 feet farther will put the N1 Wot branch 700 feet underground on the Columbia vein.

In the 100 level west the Cross mine at Ward has opened a 2-foot streak of iron in the foot wall, which is making toward the streak in the hanging wall, also 2 feet wide.

John Knight and others of Ward have opened bodies of wolframite in their claims east of town,

CHAFFEE COUNTY.

The Salida M. & S. Co. is figuring on buying and refitting the old Salida smelter, built to treat the Sedalia ore.

The Famous mine at Camp Harrington has opened 10 feet of ore with a mixture of jasper and hematite that carries gold.

CLEAR CREEK COUNTY.

The lessees on the Brazil mine, near the Lamartine, have struck 6 to 18 inches of ore that will run 100 to 300 ounces in silver per ton.

The Maxwell & Hood tunnel has struck the Griffith lode and opened up a large body of iron and galena.

The Dunkirk mine has been leased by a Denver company, which will work it through the Diamond tunnel. The old drifts are being cleared out and repaired. The mine was formerly a heavy producer.

The Newhouse tunnel has installed the largest blower in the State. It discharges 63 cubic feet of air per revolution and has from 120 to 200 revolutions per minute.

GILPIN COUNTY.

The Gunnell Co. will commence shipping to the Black Hawk mills.

In the West Notaway mine the water is held at 425 feet, and drifting is in progress east and west at that level. A good body of smelting iron has been encountered. The station pump will be put in.

HINSDALE COUNTY.

(Special Correspondence).—Lake City, the county seat of Hinsdale, is situated in the narrow but picturesque valley of Lake Fork, an affluent of the Gunnison. Three miles up stream from the town is the lake known as San Christoval. It is three to four miles long, half a mile wide, and is continually fed by the springs and melting snows from the lofty spurs of the Continental divide.

On Hotchkiss mountain, overlooking this lake, is the group of tellurium-bearing mines, the chief of which is the Golden Fleece, whose development is extensive and production of rich ores makes a fine record. Among the others are the Black Crook, Hiawasee and Emerald Isle.

Up Henson creek are the silver-lead producers — the Hidden Treasure and Ute & Ulay. Farther up the same creek are the Star, Ocean Wave, Frank Hough and Czar. Following up Lake Fork are the St. Jacob and others at Carson and the Tobasco near the crest of the range. Henson creek and Lake Fork head near the Continental divide, each making a semicircular curve, meeting at the point near where Lake City is located, and the two forming an elliptical area within which are Hotchkiss, Engineer and other mountains of note.

The Hidden Treasure mill is run by water power. The same power operates an air compressor for drill power and a dynamo for an electric hoist at the mine, a mile away, the shaft over which the hoist operates being 750 feet deep, with sinking continuing. The tramway line, operated by water power also, is 4000 feet in length.

The Ute & Ulay treats 125 to 150 tons per day at its concentration mill, which reduces six tons to one ton, making a concentrate containing 60% lead. This is a heavy silver-lead ore. Supt. M. A. Nicholson states that a new tunnel is being started, 2500 feet of which will be on the vein. The new tunnel will be 500 feet lower than the old workings, an interior shaft in which sinks 175 feet by the side of the vein, with crosscuts to it.

The Golden Fleece mill is ready to start up. It is equipped with crushers, rolls, jigs, Frue vanners and Wilfley tables. The Golden Fleece tunnel, which is to cut the mineral ledge diagonally, starts about 100 feet above the surface of the lake and is in about 100 feet. It is expected to cut the ore body at about 3000 feet from the tunnel entrance and 400 feet below the present lower workings.

The Tobasco group, situate near the top of the range, above Lake Fork, is at an altitude of 13,500 feet. It is developed by a 475-foot drift along the footwall, with several crosscuts from the drift through the ledge, which is said to be 30 feet wide, carrying values of about $15 per ton. The ores are an arsenical iron, with rich streaks of tellurium. The property is owned by the Tobasco M. Co., of Indianapolis, Ind., and is in charge of R. L. Ray of Lake City. It is believed the conditions as found in the Tobasco are characteristic of that locality. There are said to be promising prospects on other claims as well. The State road, being built from Lake City to Silverton, passes near the locality.

In American basin platinum has been found, and in little streams flowing from the range free gold can be panned. Prospecting at that high altitude has resulted in finding free gold, tellurium, copper, galena and lead sulphate and arsenical iron.

The Czar, near Capitol City, is shipping three to four cars per month of ore carrying gold, copper, lead and silver. Some of it runs 45% lead; other portions are said to run half an ounce gold and 15% copper.

Pierce & Kilvert are developing the Star, on Henson creek, by a crosscut tunnel. It is claimed they have a body of silver-lead ore of good value.

The Ocean Wave group of several claims, belonging to A. E. Reynolds and associates, is about three miles above the Ute & Ulay, the ledge on which outcrops a distance of about 7000 feet. A tunnel starts at the level of Henson creek, crosscuts the formation and has been driven about 500 feet. The ores are galena and gray copper, with main values in silver, lead, gold and copper. J. J. Abbott is in charge of all of Mr. Reynolds' interests in this district. A company, at the head of which is A. E. Reynolds, is running into Hotchkiss mountain, near the tunnel of the Golden Fleece. Another enterprise, with which Mr. Reynolds' name is connected, has for its object the construction of a dam across the stream at the foot of Lake San Christoval, raising the water in the latter an additional height of 15 feet, creating greater fall for power, and developing electrical energy to run mills and mines.

Engineer mountain, near the point where Henson creek heads, is attracting some attention. Extensive ledges of ore are believed to have been found, though development work is yet slight. The Frank Hough mine, however, has produced about 2000 tons of high-grade copper ore in sulphide form.

The Lillie mine, being worked by the Red Rover M. Co., comprised of Boston men, is in charge of D. A. Farrell. A crosscut tunnel has been started to cut the vein at 600 feet depth.

WASCOTT.

Lake City, Oct. 21st, '99.

LAKE COUNTY.

Developments in the Penrose show that the ore body is 250 feet wide and from 35 to 40 feet thick, with the breast of the drift 200 feet from the shaft and still in ore. It has been estimated the ore in sight is worth $2,000,000. The Smith-Moffat people drove a drift north 700 feet and another northeast. The ore body lies in the angle between the two, and it was missed by the former operators, who gave up the Penrose and Bon Air leases. In the Bon Air the company are working in virgin ground from the Bon Air shaft. Recently the ore body widened to 4 feet, with ore on both sides of the drift. Assays from this strike gave 360 ounces silver, 40% lead and an excess of iron. The ore is hard carbonates, with chlorides thickly distributed in the ore body, some of the pieces are green with chloride incrustations.

Denver *Republican*: The Revenue No. 1 shaft has been equipped with a large sinker, and when the water is out sinking will be resumed.——A new shaft is to be sunk on the Lady Jane claim of the Chippewa lease. The present shaft, now down 575 feet, is 40 feet in a contact carrying low-grade gold and silver ores. The new shaft will be put down 500 feet.

Leadville *Miner*: The Humboldt and Adelaide mines, on the Adelaide park slope of Breece hill, are among the oldest producers in the district and have been worked spasmodically. A large amount of lead carbonate has been shipped from the upper contacts. These oxidized ore bodies change to sulphides at depth. The lessees of the two claims have a joint agreement to unwater the lower levels and pumps have been installed at the 400-foot level of the Humboldt which will lower the water in both the Adelaide and Humboldt. On the 440-foot level of the latter is a large body of copper-iron sulphide which samples eight ounces silver, .25 ounce gold and 4% copper, and would not pay formerly. The Humboldt is worked under lease by Dr. J. S. Sullivan and E. E. Hinckley, who are also operating the Lonsburry shaft. The Adelaide is leased by Dyatt, Meyer, Polkinghorn & Maxwell.——The A. M. W. Co. have enlarged the Wolftone shaft to the 720 level, also enlarged the station at this point in the shaft, which is 35 feet above the body of water now filling the workings of the Maid of Erin, Adams and Wolftone mines. The fine equipment of pumps and engines for the property have been delayed owing to the scarcity of iron. The present engines at the Wolftone will be installed at the Midas shaft.

Carbonate Chronicle: The Penn mine at Leadville is making an output of 120 tons daily of fine ore, a portion of which runs five ounces gold. It comes from the Nos. 2 and 3 shafts, the latter being 230 feet deep. There are large bodies of smelting ore in sight and little stoping is necessary, the drifts being driven through the masses of ore, which, according to Mr. Sullivan's theory, are segregated bodies in the porphyry.——The Superior shaft to the northwest of the Penn is now going down rapidly.

MONTROSE COUNTY.

Norwood *Leader*: Another copper lead has been found in the Paradox district, showing good values on the surface. It was discovered by Winters & Peterson of Pinion while making a survey. Coal was also discovered in the vicinity. The lead is traced on the surface for a mile, and is nearly parallel with the Paradox valley and two miles south. This lead is found in sandstone.

SAN MIGUEL COUNTY.

Telluride *Examiner*: Shipments for the past two weeks have averaged fifteen cars per week, and this record will be maintained during the season, as nearly all the properties producing during the summer are in shape to continue. The shippers were as follows: Alta 4, Attica 1, Befield 1, Butterfly 4, Carribeau 12, Montezuma 3, Silver Bell 2. Total, 27 cars. The shipments from the Carribeau and Butterfly consist of concentrates.——Since the beginning of winter weather the Liberty Bell people have abandoned building their power plant this fall, but instead will push to completion the 40-stamp addition to the mill. Forty stamps are now dropping in the completed portion of the mill. An order has been placed with the E. P. Allis Co. for the stamps of the new addition, the order for concentrating apparatus being withheld until it is further determined whether Wilfley tables or vanners are the more desirable for the ore to be treated and also to await results of experiments being made in cyaniding the ore.

TELLER COUNTY.

J. M. & F. B. Hower of Buffalo, N. Y., are looking for a suitable site to build a new cyanide mill to cost $100,000. It will have a daily capacity of 150 tons. Florence, Colorado City and Cameron are each endeavoring to secure the plant.

It is reported that another strike has been made at the Isabella mine. A 6-inch seam of ore carrying high values was opened at the ninth and tenth levels, 800 feet from the Lee shaft. A similar strike was made in January, when values of $150,000 per ton were uncovered. The Isabella was considered worked out when taken by Chicago and Boston capitalists. Since the reopening of work on it several good strikes have been reported.

A rich strike is reported in the Union gold mine at Cripple Creek. Some time last winter a streak of very rich ore was encountered in the mine, from ¾ of an inch to 1¾ inches in thickness. Ever since the streak has been rich, though no gold has been found native. Within the last few weeks, however, the streak has been widening and growing richer, with occasional fine streaks of free gold.

The gold output of the Cripple Creek district in October was $2,001,600. This is the first month's production that has exceeded $2,000,000. It is estimated that the total for the year will reach $18,000,000.

Victor *Record*: Whipp & Glenn have another strike in their lease on the Lansing. They have already cleaned up over $60,000. In the second level, south 140 feet from the shaft, the drift, after passing through low-grade mineral, is again in big pay, assays going ten ounces. In the upraise started 57 feet south of the shaft and in the winze from the first level the same shoot is found. In the second level there is now known to be an ore shoot 75 feet, measuring vertically, and over 100 feet in length. In the third the vein has been drifted on 25 feet, and to-day 4 feet of ore is exposed, good for three ounces to the ton. The stopes in the first level are producing forty tons daily. The lessees have shipped 629 tons since Oct. 1st. which will average five ounces.——A contract has been let for 50 feet of sinking and a like amount of drifting on the Little Johnnie, on the southwest slope of Beacon hill—a claim owned by the newly organized Little Johnnie Co. In the bottom of the 35-foot shaft there is a vein, 18 inches of which sampled fifteen ounces to the ton. The balance of the vein is low grade.——The output of the Portland for October will aggregate 5000 tons of a gross value of $300,000. Stoping has been started at the 900 level. The pumps are raising from 700 to 800 gallons a minute.——Stoping has been started on the 500 level of the Burns of the Acacia Co. Shipments will be raised to fifty tons a day, and the grade will also show improvement. The first-class ore is running from eight to twelve ounces and the second $30 to the ton.——The Eclipse Co. have started unwatering the main shaft on that property.

Mining Investor: At the Portland there are 400 men on the payroll. The output is 5000 tons per month with a value of $250,000.——The Lexington Co. have completed a 110-ton shipment of $50 ore from its Clara D. mine on Gold hill.——Dr. Bartlett, of the Zenobia on Bull hill, reports twenty-five tons of $80 to $100 ore taken out in extending the drift into the claim from the Garfield-Grouse workings.——The output of the Gold Coin is eighty tons daily of graded ore. Three carloads of sacked mineral that will run from fifty to sixty ounces gold to the ton will be marketed this month.——The Strong mine is shipping fifty tons of high-grade ore daily. Sinking is in progress and the shaft is nearing the 800 level.——Lessees on the Monument, on Battle mountain, are saving rich ore. Campbell & Kady, on the south end of the claim, are drifting and have 8 inches of ore which assays $600 a ton, and 18 inches assaying $40 a ton.——At the Orphan Boy G. M. Co.'s Spurgeon & Cassidy lease, shipping ore is coming from the third level, where 4 feet of ore is exposed.——Connection has been made between the workings of the Doctor and Jack Pot. The connection, while furnishing good air for the Doctor lessees, has been the means of starting litigation between the two owners. Work has been resumed in the Doctor, with a production of high-grade ore.

Victor *Record*: The Vindicator Con. G. M. Co. have bought of S. Strong the Anna J. property, in the Legal Tender group, above Goldfield, for $120,000. An adverse bill is pending between the Anna J. and the Pinkerton, Harrison and the Protopean, all of the Golden Cycle Co.——An eighteen months lease has been granted to O. W. Jackson by the Gladys A. M. Co. on the None Such, located on the southwest spur of Gold hill. A royalty of 25% is provided for and sixty shifts per month are to be put in.——Giles and others, sub-leasing on the main workings of the E. Porter Gold King, on Gold hill, are stoping 3 feet of ore. The values are saved in two grades. A narrow streak in the middle of the vein runs as high as $2000 to the ton. The rest of the ore is of smelting grade.

Colorado Springs *Telegraph*: T. A. Rickard, consulting engineer of Stratton's Independence, Ltd., states that the work done by the company since May 1st has been principally in the way of widening the ore chutes, and in every instance it has been found that they have found a greater body of ore than was previously known to exist. The ore bodies found in the fourth level since the company assumed control of the property assure the payment of the dividends for the year at the rate of the last dividend of 10% of the capital stock for the quarter.

Investor: Supt. May of the Alert M. Co. sent a 100-ton shipment to a Pueblo smelter recently. The new shaft on the property is down 75 feet, and bunches of ore are encountered.——Lessee May of the Climax, of the Little Puck Co., on Squaw mountain, reports his last shipment of eighteen tons, worth 3.74 ounces gold and 1 ounce silver to the ton. The working force at the mine has been increased.——Lessees Hutchings, Ranson and Roberts have finished unwatering the shaft on the New Hope, on Carbonate hill. In the 100-foot level there are 18 inches of ore that assays from $12 to $56 per ton.——Mgr. Waldron of the Last Dollar has made a shipment of eleven carloads, one of which was of high-grade smelting ore.——Shipments aggregating 150 tons were sent out recently by Carlson & Boyd from their respective blocks on Work territory. The Carlson lease on the Gold hill end of the Morning Glory shipped 100 tons of graded ore, and the Boyd lease, on the Raven hill side, fifty tons of three-ounce ore.

Mining Record: The output of the Gold Coin is eighty tons daily of graded ore. Three carloads of sacked mineral that will run from fifty to sixty ounces gold to the ton will also be marketed this month.——A carload shipment from the Snow sub-lease on Block 4 of the Lonaconing of the Kimberly was settled for on a basis of $50 a ton. Milliken & Brownlee, the original lessees on this block, have

arranged for a steam hoist on these workings, which they will operate themselves. Other lessees on Kimberly ground are getting out shipments.——The Strong mine is shipping fifty tons daily, all of smelting grade. Sinking is still in progress and the shaft is nearing the 800 level.——Lessees on the Monument, on Battle mountain, are saving rich ore. Campbell & Kady, on the south end of the claim, are drifting at 60 feet. They have 8 inches of ore which assays $600 a ton and 18 inches assaying $40 a ton. On the adjoining block Brodie and associates have also made a small shipment from the extension of the same vein. The lessees are sinking for another drift and have 3 feet of good ore in the bottom of the shaft.——W. G. Newman, Gen. Mgr. of the Lasca Co., has cut a fine-looking lead at surface on the Lasca claim, adjoining the May-Be-So on Globe hill.

IDAHO.

BLAINE COUNTY.

Hailey *Times*: The Minnie Moore mine is to be reopened. The Minnie Moore formerly gave employment to 300 miners and nearly 100 persons in other occupations. It yielded between $5,000,000 and $7,000,000 worth of ore. The new owners, who are capitalists of Spokane, Wash., and Montreal, Canada, have ordered an $8000 hoist and intend to use the Queen of the Hills mill, which they own.

LATAH COUNTY.

For several weeks there have been reports of rich discoveries of gold ore in the Hoodoo country, in the northeastern part of this county. The new quartz discoveries are near the Mountain Gulf stream, which empties into the Palouse, and many claims are being prospected.

NEZ PERCES COUNTY.

Lewiston *Tribune*: J. H. Robinson reports the discovery of tin ore in the region between the Lo Lo and Musselshell, twelve miles from the Clearwater. The discovery was made by Mr. Robinson and L. Woodruf of Asotin and two locations made. One of the ledges is 10 feet wide on the surface and the other, which is less heavily mineralized, is 12 feet. Assays show 10.6% tin. Stream tin was found in this locality some months since by the United States Geological Survey party under W. Lindgren.

SHOSHONE COUNTY.

The copper belt which crosses the country south of Mullan is attracting attention locally. It has been shown that there are a number of veins running through there which carry ore assaying well in gold and copper on the surface. The Springfield has more work done than any other. A crosscut tunnel is nearly to the ledge, which it will cut several hundred feet from the surface. The Park Gold & Copper M. Co. commenced work recently in the same neighborhood and are running a tunnel on the ledge, which has shown ore all the way. Ore from these properties runs from 15% to 35% copper, with gold.

MISSOURI.

The Missouri State Mine Inspector, in his thirteenth annual report on the lead and zinc industry of Missouri, shows that the increase during the fiscal year closing June 30, '99, over that closing June 30, '98, was, in money value, $3,071,574. The production by counties was as follows:

Counties.	*1899.*	*1898.*
Barry	$ 4,900	$ 1,876
Christian	287	3,465
Cole	3,062	....
Franklin	7,619	....
Greene	....	35,650
Howell	3,750	....
Jasper	5,527,412	3,085,795
Jefferson	25,824	26,374
Lawrence	769,972	382,815
Madison	146,285	122,944
Morgan	6,416	....
Newton	400,625	224,589
Pettis	12,000	10,319
St. Francois	2,041,060	2,002,192
Taney	80	....
Washington	60,661	60,101
Wright	....	1,290
Totals	$9,009,953	$5,938,379

JASPER COUNTY.

A combination known as the National Lead, Zinc & Spelter Co., with a capitalization of $10,000,000, with a surplus of $500,000, to control and work large interests in the Joplin-Galena district, has been formed. The concern was promoted by Marcus Pollasky, president of the National Mine Co. of Kansas City. The concern will operate and develop properties in the district and lead and zinc stocks will be listed on the stock exchanges of New York, Boston and Chicago. Mr. Pollasky has for months been taking properties in the Joplin-Galena district. The Joplin-Galena district produces seven-eighths of the zinc ore of the United States and fourth of the world's supply. This field, twenty by sixty miles, will this year produce $16,000,000 worth of ore.

With the resumption of zinc mining in Joplin district, the price of jack remains where it was before the shut-down—that is, at $43 per ton for 60% ore. The surplus has been almost entirely cleaned up, the smelters having paid at some times during the shut-down 50 cents more than the fixed price, very few lots of standard grade ore having been sold for less than $43. At the last meeting of the Miners' Association the directors reported that over 90% of all the mines in the district were shut down. The matter of erecting smelters to act in harmony with the interests of producers is said to be assuming more tangible shape.

NEVADA.

ESMERALDA COUNTY.

Walker Lake *Bulletin*: The Vulcan M. & S. Co. has purchased from J. Fagin and partners their interests in Santa Fe mining district, including the Parrot group, lying five miles east of Lunning. It consists of several claims, notably the Kersarge, Parrot and Dewey. The Parrot shows a body of ore 60 feet in width which by surface cuts and outcrops can be traced 700 feet. The formation is limestone. Forty men are employed in and around the mine, and they have 4000 tons of ore which, from shipments to Selby and to Salt Lake, shows a value of 10% copper, two and one-half ounces silver and $1.80 gold per ton.

LINCOLN COUNTY.

De Lamar *Lode*: F. N. Millett has at Stateline large samples of quartz, hanging together with wire silver. There were blotches of horn silver as large as a dime.——Mr. McIntire of Denver recently took an option on the Aggie D at Stateline, which now has a fine showing on the 100-foot level.— The concentrator being erected by W. A. Clark, on the Ophir Hill Con., bought by him during the season for $75,000, will soon be completed. The plant will have a daily capacity of 100 tons.

STOREY COUNTY.

Elevator No. 2 in the C. & C. shaft during the twenty-four hours ending Friday morning lowered the water 119 feet and 3 inches below the 1950-foot level, which is 2 feet and 7 inches above the lowest point reached before a halt was made to test Elevator No. 1. The latest official telegram is as follows:

VIRGINIA, NEV., Nov. 2, 1899.

To Aug. Waterman, Secretary Comstock Pumping Ass'n., San Francisco: At 6:30 this morning the water was 119 feet 3 inches below the 1950-foot level station. No. 2 elevator has been running continuously. JOS. R. RYAN.

NEW MEXICO.

BERNALILLO COUNTY.

J. A. Coram and associates have secured the Lone Star group of mines near the town of Bland. The company, which has been named the Navajo G. M. Co., has been capitalized for $2,000,000. The Lone Star group consists of twenty-one claims and mines, including water rights, timber lands, mill sites, etc., making over 400 acres of mineral land. This property has been developed for six years, and the ore has been milled in a small mill for the purpose of demonstrating the methods of treating.

OREGON.

Sumpter *American*: Men are at work at the May Queen, constructing the frame of the new quartz mill. Pres. Thomsen and Gen. Mgr. Barrett are giving their personal attention to the new improvements. The mortars and mill machinery are from the Risdon Iron Works at San Francisco. C. H. Godfrey, of Omaha, has been engaged as chief engineer and is at the mine. The mill will be increased to twenty stamps when water can be obtained.——The Virginia group at Robinsonville was worked in a primitive way ten years ago by J. H. Mitchell, of San Francisco, who still owns them. He took out $20,000, it is said, in mortars. The amount, it is claimed, was secured by going down less than 40 feet. The richest finds were on the Virginia proper. Since that time an incline shaft has been put down 125 feet. This filled with water and for a long time the property remained idle. Not long since Mr. Mitchell bonded the four claims to McComas & Dunphey, who took out the water. This shaft had gone on the vein for 95 feet, and the ledge was found to be 2 feet wide, containing both free gold and sulphurets.——Hayes & Gilbert, who are among the principal owners of the Bonanza mine, in connection with Mr. Garthing, have men at work on the Butcher Boy and Blue Bird claims, a few miles south of Red Boy. The men are driving a tunnel to cut the Blue Bird vein. ——Snow & Hamilton have bought one-third interest in the Yellow Daisy group from S. B. Dourty. They are driving a tunnel, now in 150 feet. These claims are one mile east of the Red Boy.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Deadwood *Pioneer-Times*: At the Grantz mine, near Poorman gulch, are found masses of gold in layers about ¼ to ½ inch in thickness and as large as a boy's hand, lying upon an iron ore in a crevice and free from the surrounding rock. They will weigh from one-half to three-fourths of a pound apiece. Mr. Grantz has several hundred dollars' worth of these, found in slabs between the layers of rock. The rich ore which was at first found continues to hold out as at first, and any rock broken from the body shows free gold, some being fine but thickly distributed in the rock, while other pieces contain large nuggets of gold. The slabs taken out are gold and silver combined, estimated to be about one-third silver and the balance gold.

UTAH.

JUAB COUNTY.

At the Silver Park, Silver City, a new body of high-grade lead-silver ore has been found.

IRON COUNTY.

The Popkees mill has been bought by the owners of the Johnny at Stateline. They will rehabilitate the mill and the milling of Johnny ores will begin. F. Wilson, who recently purchased an interest in the Johnny, says the milling ores thus far exposed show a valuation of $30 per ton. The stamps will probably be followed by a cyanide treatment.

TOOELE COUNTY.

In the Bunker Hill at Stockton the management has broken into the main ore shoot in the drift off the 200-foot level, which affords 70 feet of stoping ground.

Salt Lake *Tribune*: A deal by which the Midas group of gold claims in the Deep Creek country pass to J. Dern and J. Chipman of Salt Lake has been consummated. The Midas is a gold proposition, located near Clifton. Orders have been given for the erection of a cyanide plant with a capacity of 150 tons per day. They have blocked out ores of the value of $100,000. Careful sampling shows an average of $20 per ton in gold. The Midas G. M. Co. has been organized to operate the property. In deciding upon what process to employ, experiments were made at the Mercur Co.'s mill at Manning and the MacArthur-Forrest plant at Denver, the result of cyanide being satisfactory.——The Geyser-Marion mill is running on a better quality of ore than has been put through it during the year, while a greatly improved saving is reported.——At the Mercur the air compressor is idle, also the power drills, but 400 tons of ore are going daily to the mill and about 130 tons are being put through the tailings plant.

WASHINGTON.

(Special Correspondence).—J. F. Lansing is in Republic preparing for the erection of a custom mill to handle Republic ores. He is understood to represent Montanans. He says the mill will be in operation next March. The boilers and dynamo for the electric light plant are now at Grand Forks on the way to be installed here.

Republic, Oct. 24th, '99.

FERRY COUNTY.

(Special Correspondence). — The Princess Maude will install a compressor plant Nov. 1st.

The Mountain Lion's new cyanide mill is nearing completion. The 125 H. P. engine that will drive the electric generator is on the ground; the battery blocks are in position and the machinery is expected daily. The completion of this plant will mark a new era in Republic's prosperity.

The Tom Thumb people contemplate putting up a steam hoist.

Another rich strike in Tunnel No. 4 of the Republic mine is announced. This tunnel is in 2330 feet and leads directly from the reduction works to the ore body. It cuts the ledge 600 feet underground—the deepest workings in the camp. The ore in the new strike is mixed with dark patches of tellurium. With the exception of a small amount of tellurium found in the Morning Glory and Princess Maude, this is the only tellurium found in the camp. The management give out the information that the ore body is 27 feet wide, of which 7 feet will run $200. It is also stated that the capacity of the present reduction works will be enlarged as the result of the new strike.

The shaft on the Hit or Miss is down 100 feet and a whim will soon be in operation.

It is estimated that 1500 prospectors are at work in Republic and tributary camps.

Republic, Oct. 27th, '99.

Spokesman-Review: The Republic continues to produce large amounts of high-grade ore, and early reports of the late strike have been confirmed by development. There is a body of ore that assays $450 in the stope on No. 3 level. The ore body is 27 feet wide in the lowest workings.——The hoist for the Butte & Boston is on the ground and will be used on the old shaft which will be sunk several hundred feet before any other work is done on the mine. The ledge is the same as the Princess Maud. There is a 40-foot shaft, a 40-foot tunnel and over 300 feet of drift along the ledge. A second tunnel has cut the ledge at a depth of 250 feet. This tunnel is 400 feet in length.

KING COUNTY.

Since January 1st the Seattle Assay Office has received for treatment $11,611,204, and since the office began business, July 15th, '98, $17,280,361.

SKAGIT COUNTY.

Seattle *Times*: The Thompson-Edgar properties near Baker on Thunder creek are being worked. They are putting in pumping machinery. The ore, a copper-gold-bearing sulphuret, shows up well and a deep shaft and tunnel will be driven into the body this winter. —— McGinnis & Morovitz are driving their tunnel on Swift creek. They are working free milling quartz. This property is to be sold to Whatcom properties, who will build a stamp mill.——Dr. Casselmann and partners are shipping molybdenum ore, some of which is almost pure. The mines show two ores of high grade, one a foliated molybdenite of high grade, the other a yellow mineral, the oxide of molybdenum. These mines, seven in number, will be worked all winter and ore shipped.

STEVENS COUNTY.

The Deer Trail No. 2 M. Co. is now in undisputed possession of property in Cedar canyon, comprising an area of 700 acres, the litigation which has threatened on account of the ownership of some minority holdings in the Elephant group, adjoining the Deer Trail No. 2, having been settled. The Deer Trail No. 2 Co. becomes the owner of four-sevenths of the Elephant group. The mine is showing up better ore than before, in the drift which is running from the Deer Trail No. 2 claim into the lately acquired section of railroad land. Late smelter returns on Deer Trail shipments have run $200 per ton.

FOREIGN.

BRITISH COLUMBIA.

The yardmen and samplers at the Trail smelter on the 28th ult. demanded an increase in wages. A compromise was effected on the basis of the Northport smelter schedule. Yardmen will get 20 cents per hour and samplers 27½ cents.

The strike in the Slocan country is critical and the Silver & Lead Mine Owners' Association is importing Italian laborers from Pacific coast States, the first consignment having arrived at the Payne mine. The striking miners are excited over the arrival, but no violence was offered to the Italians when they appeared. The trouble between the mine owners and the mine workers is upon the adoption of the eight-hour law. Mine owners reduced wages from $3.50 to $3 per day, the miners refusing to accept the reduction.

The stope opened in the Center Star mine at Rossland, a year ago, supposed at that time to be 8 feet wide, has been proven, it is reported, to be from 16 to 30 feet wide.

At the 750 level in the Le Roi the workings have disclosed the richest chute of ore in the camp. It is 5 feet wide and has been opened for 30 feet. Values range from $50 to $90 per ton. The chute in the 250 level has proved to contain an unexpected seam of $30 ore, 5 feet wide and 100 feet long.

A rich strike is reported in the Ward gravel mine at Cariboo, in which San Francisco, Cal., people are interested.

Grand Forks *Miner*: A number of mines in the Slocan district recently closed down owing to the demand of miners for better pay. Similar trouble is threatening in the Kootenay and Boundary districts. A struggle between the miners and mine owners in the Kootenays, including the Boundary country, is pending. The miners are dissatisfied with the Rossland scale of wages and have demanded practically an increase of 50 cents a day for all classes of mining labor. They also want the eight-hour law enforced. The Rossland miners have taken the lead in the latest move.——H. Sutherland, managing director of the Dominion Copper Co. operating in Greenwood camp, and a member of the British Columbia Mine Owners' Association, stated that the impression that the Rossland miners have given in completely on this question is erroneous. In conjunction with their fellow-members in other sections, they have demanded an all-round increase of 50 cents per day for eight hours' work. The mine owners have received an ultimatum. They have determined to grant no further concessions, and, rather than submit, all the mines, including the Le Roi and War Eagle, will close down. The Rossland scale paid in all the Boundary mines, with one exception, is as follows: Power drill men, $3.50 per day; hammer men, $3; timber men, $3; muckers, $2.50. Fifty cents is added to this scale for shaft work.

MEXICO.

Nearly $20,000 worth of silver ores have been reduced to bullion in the Guadalupe reduction works since their beginning in 1883.

Mexican Herald: Modern processes are not a failure in treating Mexican ores. The new 20-stamp mill put in recently at Guanajuato by the Guanajuato M. & M. Co., it is reported, show a saving of 90%, and the plant will be increased to eighty stamps.

Recently Declared Mining Dividends.

Victor M. Co., Colorado, $50,750; Oct. 20.

Raven G. M. Co., Colorado, $10,000; payable Nov. 20.

Standard Con. G. M. Co., Bodie, Cal., 10 cents per share; payable Nov. 22.

Anaconda C. M. Co., Montana, $3; Nov. 1.

Boston & Little Circle Zinc Co., $1 per share; payable Nov. 10.

Boston & Montana, $15 per share; payable Nov. 20.

Homestake G. M. Co., South Dakota, 50 cents per share, $105,000; Oct. 25.

Montana Ore Purchasing Co., $1 per share; Oct. 27.

Rio Tinto Copper M. Co., Spain, 35s per share.

Alaska-Treadwell, quarterly, 37½ cents per share; Oct. 28.

Le Roi M. Co., British Columbia, $25,000; payable Nov. 7.

Commonwealth Zinc Co., Nevada, $10,000; Nov. 1.

Grafton M. Co., Colorado, $10,000; Nov. 1.

Last Dollar M. Co., Colorado, $20,000; Nov. 1.

Mary McKinney, Colorado, $30,000; Nov. 1.

Moon-Anchor M. Co., Colorado, $45,000; Nov. 1.

Petro M. Co , Utah, $5000; Oct. 31. Total, $32,500.

Swansea, Utah, $5000; payable Nov. 10.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; payable Nov. 4.

Commercial Paragraphs.

SCHAW, INGRAM, BATCHER & CO. of Sacramento, Cal., are sending large quantities of pipe for hydraulic mining into Trinity Co., Cal.

THE Vulcan Iron Works of San Francisco have the contract for furnishing and erecting a hydraulic hoist for slip No. 7, San Francisco harbor.

IN the past five months the Colorado Iron Works Co., of Denver, Colo., have built and installed fourteen smelter blast furnaces in the U. S. and Mexico.

ON the 1st inst., Newton M. Bell, representing the Trenton Iron Co. of Trenton, N. J., removed his offices from 109 California St. to 308 Market St., San Francisco.

S. W. TRAYLOR, representing the Colorado Iron Works Co. of Denver, Colo., has finished putting in the reduction works for the Black Warrior Copper Co. at Globe, Arizona.

THE Denver Engineering Works Co., of Denver, Colo., have shipped a complete pyritic smelter plant to Dahlonega, Georgia, the first shipment of the kind ever made to that State from Colorado.

TWENTY-FOUR traction engines and fifty trucks are being sent to South Africa. The Daniel Best Mfg. Co., San Leandro, Cal., report large demand for their locomobile freighting trains throughout western America.

Books Received.

"*The Building and Ornamental Stones of Wisconsin.*" Bulletin No. IV, Economic Series, Wisconsin Geological and Natural History Survey. Treats on the building and other stones found within the State of Wisconsin, their uses, etc.; 544 pages; illustrated. Published by the State.

"*Transactions of the American Institute of Mining Engineers,*" Vol. XXVIII; 948 pages; February, 1898, to October, 1898, inclusive. Published by the Institute, New York. Illustrated.

Industrial Notes.

—The Floriston, Cal., paper mill wants a daily carload of lime.

—The telegraph rate from Atlin to Dawson is $4 for ten words or less.

—A new railroad is projected between Ensenada, Lower California, and San Diego, Cal.

—The Snoqualmie Falls, Wash., Electric Co. has begun to supply Seattle with light and power.

—Nearly $250,000 has been invested in new pumping plants in the vicinity of Pomona, Cal., this year.

—Over 1100 men are closing the gap on the California coast line railroad between Surf and Elwood, Cal.

—The Truckee River, Cal., General Electric Co. expects to be ready to deliver power on the Comstock June 1st, 1900.

—The hydraulic system put in by the Risdon Iron Works of San Francisco is draining the entire Comstock from end to end.

—All the holdings of the Mount Nebo Land & Irrigation Co. in Juab county, Utah, have been sold to Eastern investors for $600,000 cash.

—For the first ten months of '99 the United States has furnished Mexico with $338,335 worth of electrical material, about double the sales of the same period of '98.

—Great Northern trainmen say they will refuse to sign bonds, and if the company deducts cost of same from their October pay checks they will go out in a body.

—The annual report of Commissioner Hermann of the General Land Office, shows a total of 929,308,068 acres of unappropriated and reserved public lands in the United States.

—The Butte County, Cal., Electric Power & Lighting Co. begins operation next week. Power is to be used by manufacturers, dredgers, farms and mines. The plant adds 5000 H. P. to the 8000 H. P. brought from Folsom, Cal.

—Exchange of money order business between the United States and Mexico will take effect Jan. 1, 1900, when money orders may be drawn in Mexico on all points in the two countries, payable at all money order offices in Mexico.

—P. L. Shuman of San Andreas proposes to build a canal nine miles to bring water from the Mokelumne river to Mokelumne Hill, Cal., with fall sufficient to drive an electric plant. The power is the used on the Boston and other Mokelumne Hill mines.

—The Blue Lakes Water Co.'s power plant at Blue Lakes, Cal., was destroyed by fire on the 1st inst., involving a loss of $30,000 and cessation of operations in mines, factories, etc., supplied thereby. A new and enlarged plant will be installed at an improved adjacent site.

—Scarcity of iron causes singular trade conditions in San Francisco. Old mining camps have been scoured for old iron; machinery, once costing large sums, dismantled and shipped to the bay; Cuban cannon balls have been imported; iron is on the way from Scotland; and pig iron, once sold and shipped to Japan, is now being returned to California, costing, laid down, $17 per ton.

—The transcontinental railroads, together with their connecting transpacific steamer connections at San Diego, San Francisco, Portland, Tacoma, Seattle and Vancouver, have just issued a new tariff, advancing freight rates 25%. Cotton alone, which is shipped in large quantities from Texas to Japan, is exempted from this increase. An advance of rates by the way of the Suez canal is given as a reason for the increase by way of the Pacific ports.

—Tampico, Mexico, wants bids for the construction of an aqueduct to supply 8000 liters water per minute for public and domestic uses, and also for a complete system of sewerage for the purifying and cleansing of the town, in which latter shall be included the work of paving the streets. The water is to be taken from the river Tamesi, twenty kilometers from the town, and will require about 10,000 meters of distributing pipe.

—The American consul at Berlin writes that vexatious postal and tariff charges on mail matter between the United States and Germany have been abrogated, and that henceforth it will be possible for shippers in both countries to send, prepaid, postal packages not exceeding five kilograms (ten and one-half pounds) in weight with absolute certainty that they will be delivered without any other charge than import duty, which can be accurately calculated, all German duties being specific.

—Improvements costing almost $8,000,000 have been agreed upon by the board of managers of the Carnegie Steel Company, of Pittsburg, to include the erection at Rankin of two blast furnaces, each with a capacity of 700 tons of pig iron per day, a double-track steel bridge across the Monongahela river to connect the Rankin furnaces and the Homestead works, a new open-hearth plant and a reversible blooming mill at Duquesne. The two new blast furnaces will be the largest in the world, and will give employment to 5000 additional men.

—The Canal Commission in Nicaragua is straightening the proposed route and otherwise lessening the cost of constructing the waterway. It is estimated that the Commission will decrease by several million dollars the amount mentioned by Admiral Walker in his recent report to Congress. Capt. A. P. Davis of the Commission has charge of the hydrographic division which is to examine the five proposed routes across the Central American isthmus and report the result of their investigations to the Government of the United States. Capt. Davis has under his command a number of engineers who are taking the measurement of streams of water that flow into the lakes along the course of the projected canal. He reports that there is plenty of water for canal purposes in Nicaragua.

—The Philippine Trading Association is trying to do business with the islands. It recently shipped one and one-half barrels flour, in packages, to Manila, to introduce it. These are the charges the Government collected on the flour at Manila:

Specific duty, 129 kilos, at $3.10 per 100 kilos	$2 71
Consumer's tax, ½-cent per kilo	65
Ad valorem duty, 8% of $7.25	58
Surtax, 10% of specific duty	27

The total duty collected was $4.21 Mexican, or $2.10 American money. A milling company has received returns on a shipment of 500 barrels of flour made to Manila last June. Freight from Portland to Hong Kong was $5 a ton, gold; from Hong Kong to Manila $3.50 a ton, gold, and lightering charges at Manila $2.50 a ton, gold. Total freight charges were $11 a ton, or $1.10 a barrel. By the time a barrel of flour was landed at Manila it was worth:

Cost price at Portland	$3 00
Freight charges	1 10
Specific duty	1 00
Surtax	10
Consumer's tax	25
Ad valorem duty	24
Lightering at Manila	25
Total	$5 94

Flour at $5 94, gold, or $11.88 Mexican, is an expensive luxury for Filipinos.

Personal.

GILL S. PEYTON has returned from Boston to Salt Lake City.

E. L. BALLOU has returned from Pony, Montana, to Igo, Cal.

SAMUEL NEWHOUSE has returned to Salt Lake City from Europe.

C. M. COE is the venturesome projector of a newspaper at Cape Nome, Alaska.

J. A. AMES, a Utah mine promoter, is examining property in northern California.

L. C. TRENT has returned to Salt Lake City, Utah, from a business visit to California.

BERTRAM HUNT expects to return to San Francisco from Australia about Jan. 1, 1900.

C. B. WINGATE of Plumas Co., Cal., has gone to Scotland in his company's interests.

W. S. EDWARDS, formerly Gen. Mgr. Silver King, Ltd., M. Co. of London, is in New York City.

D. C. JACKLING of Salt Lake City, Utah, is cyanide experimenting on ores of Republic, Wash.

MESSRS. DONAHUE AND JENNINGS of Utah left San Francisco on the 28th ult. for Sinaloa, Mexico.

R. U. GOODE of the U. S. Geological Survey is superintending topographic work at Bingham, Utah.

H. P. GORDON of Oakland, Cal., has returned from Alaska and will winter in Amador county, Cal.

ROY D. HUNTER, Colorado Agt. Sullivan Machinery Co., has returned to Denver from Salt Lake City, Utah.

EMIL MELZER is Supt. North Pole mine, seven miles from Sumpter, Or., the deepest mine in that State.

W. W. BOSWELL of Julian, Cal., has gone to Darwin, Inyo county, Cal., to assume charge of the Darwin mine.

H. G. MURRY, late Supt. Lightner, Cal., mine, has gone to Korea in the employ of an Oriental mining corporation.

C. E. WATSON, of Carson, has been appointed Supt. of the Almono M. Co., in Antelope valley, Mono county, Cal.

ISAAC TRUMBO says he will put in a 1000-ton cyanide plant on the Free Gold Co.'s property, Hedges, San Diego county, Cal.

PROF. W. L. WATTS has returned to San Francisco, Cal., from a visit of several weeks in the Los Angeles, Cal., oil field.

PRES'T W. H. EDGAR of the Dearborn Drug & Chemical Works, Chicago, has returned from a business visit to Honolulu.

E. H. BENJAMIN, Sec'y California Miners' Association, leaves San Francisco, Cal., on a two months' trip to Port Dick, Alaska.

M. L. REQUA of Oakland, Cal., is in Arizona, investigating the mineral veins of Stockton Hill region, in company with M. D. Rochford.

ROBT. J. LONG, assistant manager of the Hidalgo M. Co. of Parral, Mexico, has returned to the mine from an extended Eastern trip.

PROF. S. F. EMMONS of the U. S. Geological Survey, reports that on Oct. 28th he proposed climbing Popocatepetl, Mexico's biggest volcano, and then determine its altitude.

H. E. RAYMOND, representing the General Electric Co., is at Charlotte Plains, Australia, supervising the erection of an electrical plant for the Deep Leads Electrical Transmission Co.

EDWARD KANE, who has been superintending the Ford mine at San Andreas, Cal., will take charge of the Oro Fino mine in Big canyon, El Dorado Co., Cal., owned by Hayward & Lane.

ALEX. TARBET, W. G. BENHAM AND A. J. SCHUMACHER of Utah and Montana are examining the Afterthought, Shasta county, Cal., to determine whether they will pay $150,000 for that property.

VICTOR M. CLEMENT of Oakland, Cal., one of the sixty "Uitlanders" who paid a fine of $10,000 each four years ago in Johannesburg, South Africa, and who was a prominent mine manager there for three years, thinks that after the British have subjugated the Boers the Transvaal Republic will not be destroyed, but that the Uitlanders will be given a vote and special privileges abolished.

HENRY GAGER proposes to build a custom smelter to treat ores by the Loder pyritic system at Grand Forks, B. C. Associated with him are J. MacDonough and E. T. Bradford, Pres. and Gen. Mgr. of the Southern Smelting Co. of Denver, Colo.

C. K. BANNISTER has been appointed consulting engineer of electric power and irrigation plant to be built at Payette, Idaho, on the Payette river, to have a capacity of 6000 H. P., to operate a street railway and to light the towns and mines within a radius of forty miles.

ANDREW JOHNSON, Gen. Supt. Deadwood-Bear Gulch M. Co., thirty miles southwest of Deadwood, South Dakota, says he has found tin ore in large quantities in the Bear Gulch district. According to him the tin-bearing veins run from 2 to 18 feet in width and carry values in tin from 1% to 6%. He claims that there is also a great quantity of stream tin, or cassiterite, about 72% pure tin. He says this stream tin is found in the gravel and gold placer miners save it. "Many of the miners have saved from six to a dozen tons, and have it sacked up in their cabins."

A. C. HINKSON of Sacramento, Cal., says that Major Heuer, who is at the head of Government engineering work on the coast, has reported to a sub-committee of the Committee on Dams of the California State Miners' Association that the Government Debris Commission had been engaged the past eighteen months in making investigations and surveys for a site for a dam to restrain the debris in the Yuba river, that it had finally located a site for such works and that Major Heuer had told the committee that the plan was entirely feasible and that, with the appropriation of the $500,000 which is available for such purposes, works can be constructed with sufficient capacity to take care of all the debris which is now deposited above the proposed works, and also all of that to be carried down from the hydraulic mines during the next twenty years, and that the works can be enlarged as necessity may require.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FRUIT DRYING TRAYS.—S. H. Chase, San Jose, Cal. No. 635,423. Dated Oct. 24, 1899. The object of this invention is to provide improvements in trays which are designed for drying fruit by exposure to the sun and atmosphere. The tray consists of sides and ends, the ends having less depth than the sides and bottom slats nailed longitudinally to the end pieces having open spaces between the slats, and a thickness equal to the difference in depth between the side and end pieces of the tray so that the bottom of the slats are flush with the lower edges of the side strips. Transverse bars are nailed across the bottom and sides at intervals, and strips of less thickness beneath the end of the trays. Side strips are nailed to the bottom of the cross bars in line beneath the side rails of the tray, and these strips curve upwardly at each end where they are nailed. Blocks are nailed upon the sides of the tray having the upper and lower ends beveled in such a way that when one tray is piled upon another these beveled ends prevent the trays sliding out of place. By the curvature of the supports for the trays the trays themselves are raised from the ground so that there is a free circulation beneath them, and when the trays are piled or nested together they are in the same manner separated to allow the air to circulate.

CAR FENDER.—Wm. Morck, Oakland, Cal. No. 635,445. Dated Oct. 24, 1899. This invention is designed to provide a fender extending from the front of cars and like vehicles, to prevent persons from being injured by passing under the wheels. The guard comprises forwardly projected inelastic curved arms having their rear ends hinged to a permanent part of the car structure. Vertical arms are fixed to the guard and rods slidable through the support to which the guard is hinged above and below the hinge point. Spiral springs surround the rods, the lower one in front of the support and the upper one in rear of it, so that whenever the fender strikes anything the two springs will yield their opposite sides. The fender is normally carried a slight distance above the surface over which it is passing, but will be forced down by a weight falling upon it, the springs yielding for that purpose and returning it to its normal position as soon as the weight is removed.

DISCHARGE GATES FOR TANKS.—C. W. Merrill, Alameda, Cal. No. 635,442. Dated Oct. 24, 1899. This invention is designed to provide a discharge gate for that class of vats or tanks of large diameter which are used in the treatment of valuable precious metals by what is known as the cyanide process or similar processes in which the pulverized ores are subjected to solutions for the purpose of removing the precious metal. The tanks have one or more openings in the bottom, and in my invention I employ vertically movable hollow conical gates having packing rings fitted in the bottom, and these are closable upon annular seats around the periphery of the opening. The interior of the gates have convergent guides which, first entering the openings, serve to guide and center the gates so that they will close accurately upon their seats. The gates are movable by means of screw shanks extending upwardly and turnable in suitable nuts above. The screw shank is fixed in the gate stem by keys which project and are slidable in vertically slotted exterior tubes so as to form gates to prevent the parts from being turned around when moved up or down the screw.

LETTER OPENER.—H. Markham, San Rafael, Cal., assignor of one-half to W. I. Thayer of same place. No. 635,495. Dated Oct. 24, 1899. The object of this invention is to provide a convenient device for rapidly opening letters which is particularly desirable where there is a large mail to be handled. It comprises a fixed base, an inverted blade fixed to the base having a cutting edge presented downwardly and tapered to a rounded point. In conjunction with this is an elastic guide adjacent to the point of the cutter, and a depression beneath the blade through which the part to be cut is moved. The blade is provided with a screw by which it may be adjusted and upon the side of the blade is a spring which presses the fold to be cut against the blade so that the latter passes through the fold and slits it open.

WATER LIFTING APPARATUS.—P. S. Nowacki, San Francisco, Cal. No. 635,504. Dated Oct. 24, 1899. This invention comprises a device for lifting water in considerable quantities. It comprises oppositely inclined cylinders, the lower ends of which are submerged within the source of supply, and the upper ends inclining towards each other and made to discharge into a receiving tank or chamber. Within these cylinders are right and left hand spirals respectively, and by means of suitable gear mechanism connected with the shafts of said spirals they are rapidly rotated within their cylinders, thus collecting the water at the bottom and forcing it up to the discharge end at the top. Divergent directing flanges at the upper end serve to deliver the water and prevent its being thrown outwardly as it escapes from the upper end of the cylinder. Wedge-shaped plates extend from the shafts outwardly between the spirals, and these serve as a sort of shake to prevent the water flowing backwardly when the speed of the apparatus may be temporarily checked or reduced.

SLIDABLE SWINGING WINDOW SASH.—B. Hausmann, San Francisco, Cal. No. 635,437. Dated Oct. 24, 1899. This invention relates to that class of windows in which the sashes are vertically slidable for ordinary use, and they are also so connected that they may be opened about hinges independent of the sliding movement. In this invention there are slides having connected with them the cords of the counterweights, and these slides are guided and movable in suitable grooves between the stops and parting beads of the window. The sashes are hinged to these slides so as to open about them, the hinges being peculiarly constructed so that the pintles are exterior to the stops, and the sashes, when opened about the hinges, are carried outwardly so as to be clear of said stops. An automatically operating hook is connected with the hinge so that when the sash is to be opened this hook engages with a fixed plate or holder in the pulley stile and thus holds the sash above the window seat while it is being opened about its hinges. This is necessary because, after it has been disengaged from the slide upon the opposite side, the single counterweight would not be sufficient to prevent a heavy window sinking down and resting upon the window seat. When the opposite edge of the sash is disengaged from the slide with which it is normally connected it is also necessary to prevent this slide moving up by reason of the connected counterweight, and the slide having been relieved of the weight of the sash, I have therefore shown a locking key which is designed to fit into suitable engaging holes or devices in the pulley stile, so as to retain the slide in place after the sash has been unlatched therefrom. When it has again been closed and latched this key is removed and the act of closing also disengages the hook by which the opposite side of the sash was held and the sash is then in condition to move vertically in its slide.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING OCTOBER 24, 1899.

635,642.—GRAIN ROLLER—E. Berg, Woodland, Cal.
635,652.—SMELTING FURNACE—J. H. Canavan, Kirkland, Ariz.
635,423.—FRUIT DRYING TRAY—S. H. Chase, San Jose, Cal.
635,713.—RAISIN SEEDER—N. B. Converse, Fresno, Cal.
635,303.—LUBRICANT—F. T. Cook, Antelope, Or.
635,667.—AIR COMPRESSOR—C. Cummings, S. F.
635,372.—OPERATING MECHANISM—W. G. Dodd, S. F.
635,532.—ACETYLENE GAS BURNER—F. C. Faxon, S. F.
635,378.—TELEPHONE—J. B. Gill, S. F.
635,476.—SAW FILING DEVICE—S. P. Gudmundson, S. F.
635,437.—WINDOWS—B. Hausmann, S. F.
635,495.—LETTER OPENER—H. Markham, San Rafael, Cal.
635,586.—ASSAYING FURNACE—Martin & Petter, Los Angeles.
635,412.—DISCHARGE GATE FOR TANKS—C. W. Merrill, Alameda, Cal.
635,445.—CAR FENDER—W. Morck, Oakland, Cal.
635,341.—DOOR—J. Nash, Dayton, Wash.
635,504.—WATER LIFT—P. S. Nowacki, S. F.
635,390.—PUMP—S. W. Rehart, Lakeview, Or.
635,516.—AIR COMPRESSOR—J. P. Simmons, S. F.
635,517.—AIR COMPRESSOR—J. P. Simmons, S. F.
635,703.—STEAM TRAP—J. St. Mary, S. F.
635,522.—MINING APPARATUS—J. E. Stuart, Winchester, Cal.
635,619.—SOIL PIPE—F. Walker, Los Angeles, Cal.
635,454.—ELEVATOR—M. A. Wheaton, S. F.
635,456.—GASOLINE LAMP—Wood & Eddy, Eugene, Or.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Expected Meteoric Shower.

About the 14th or 15th inst. is expected the appearance that every thirty-three years takes place of millions of "falling stars." In 1800, 1833 and 1866 the phenomena were universally observable, and it is predicted that this year the November display will be unusually spectacular.

Since the first noted flight, in 1833, meteoric astronomy has been studied, and it has been found that the tracks of shooting stars seen on certain dates, when traced backward, point to a particular point of the heavens, or that meteors appear to radiate from a certain point among the stars, situated in the constellation of the Lion, on which account these shooting stars have been called Leonides or Leonids. None who behold the cataclysm of fire which will pour from the sky when the orbit of the Leonids intersects that of the earth will fail to bear forever in mind the memory of the spectacle. Every year a few scattered fragments of the shattered heavenly body are seen, but the appearance of the main groups is relatively rare.

The single meteor or meteorite which makes, when it strikes the atmosphere of the earth, the so-called shooting star is often a mere tramp of the heavens—the detached fragment of some burst planet, too small for observation with the best telescope, wandering in space until it comes within the circle of attraction of some larger body, when gravity causes it to fall. Generally in the course of its descent through the atmosphere of the larger body the meteorite generates so much heat that it is entirely consumed; but, if large enough, a part remains and strikes the earth. But neither the single meteor nor meteorite can be observed except in the brilliant fashion of its death.

The comet, on the contrary, is a creature of the skies more to be reckoned with; for, erratic as its wanderings may seem, in reality it pursues a definite course among the stars. The lengths of the orbit which comets travel vary from a few hundred millions of miles to thousands of billions. The time which different comets take in completing their orbits varies from three and one-half to a hundred thousand years. The preciseness of astronomical knowledge is such that the exact distance of one of these bodies moves in a second can be determined. Hence the time at which it will arrive at any given point in its orbit can be predicted to the second. As the Leonids are but the fragments of a former comet, and as those fragments are following the course pursued in bygone ages by that comet, there is nothing remarkable in the further statement that modern astronomers can predict the time at which the November meteoric showers will appear. The swarms of particles which formed the once glorious orb known as Tempel's comet now pursue in the outer darkness of space the identical path which they followed when parts of a composite whole.

This year the earth will strike the center of the comet, and on the principal night—which will probably be that of November 14th—the meteoric shower is expected to present a scene of beauty. Before midnight there will not be much to reward the watcher.

Reckoned by the figures of the heavens, the Leonids are but infants. According to Prof. Newcomb, Tempel's comet has been dead only 3300 years. The cause of explosion was probably the intense heat generated by the terrific rate at which the comet revolved. But for the fragments of the burning body there could be no rest. The forces which compelled the larger body to follow through countless ages a certain path were at work as well among the flying particles. They fell into line, the larger fragments taking the head of the line and the smaller particles falling in behind for a million miles and more, and the unending journey, interrupted for a while, was taken up again along the old path. The course of Tempel's comet and of its subsequent particles completely encircles the orbit of the earth, touching it only at one point on its outer edge. Continuing, it crosses the orbit of Jupiter and Saturn and extends a few millions of miles beyond that of Uranus. Its orbit is elliptical and twenty times as long as that of the earth.

No one is able to predict the exact hour at which the November meteoric showers will begin. Although these meteoroids revolve around the sun in a definite orbit, the point of that orbit's intersection with the orbit of the earth moves forward at the rate of one and one-half degrees a year, thus throwing the advent of the meteors a few hours later at each succeeding fall. For example, the fall of 1833 occurred on the night of November 13th; the fall of 1899 will take place on the evening of November 14th and probably will be of some hours' duration. It will be visible throughout the whole of the North American continent and in Europe and Asia. The November meteors receive the name of Leonids from the fact that they seem to pour out from that part of the heavens wherein is located the constellation of Leo. In weight these meteors vary from a few grains to many pounds. On striking the earth's atmosphere they begin to burn at the height of seventy-four miles and are generally entirely consumed at a height of fifty miles.

The Arch Principle in Dams.

The application of the arch principle to dams is of comparatively recent date, for though some old structures have curved outlines, convex on the upstream side, they were so made for the sake of appearance and cannot rightfully be called arch dams. The arch dam proper is virtually a masonry arch with which the pressure of the water, impounded on the convex side, takes the place of the load, but the weight of the masonry does not add to the load as in the case of the railway arch. Like the railway arch, however, the load on the arch dam is resolved into a lateral thrust transmitted to the abutments on the banks of the river. It is, however, difficult to determine with any degree of accuracy the magnitude of the reaction at the abutments, as the weight of the masonry and the adherence of the structure to the foundations introduce disturbing influences and a large part of the water thrust is absorbed in overcoming these dissatisfactions.

Considerations of cost limit the use of the arch dam to small spans. A narrow river bed bounded by steep, rocky embankments is especially adapted for this type, and engineers have not been slow to take advantage of such natural inducements in some parts of the world.

In the mountainous regions of California, where many rivers utilized for water power and water supply purposes rush down narrow gorges bounded by precipitous cliffs, the conditions are most favorable for the arch dam, and many of the boldest structures of this kind may be seen in that beautiful country. Perhaps the most famous is the Sweetwater dam, 90 feet in height and 340 feet long, a narrow wall, bending upstream in a graceful curve, the slender outlines of which cause feelings of distrust in the non-technical observer as to its competency to perform the steady and unremitting duty of holding back the waters of the river, for it has been well and truly said that an arch never sleeps, an aphorism which might be applied to arch dams where the water never fails.—Robert S. Ball, Jr., in Cassier's Magazine for November.

ARRANGEMENTS are being made by the Signal Corps of the War Department to conduct elaborate experiments in wireless telegraphy. The experimenting will be conducted under the supervision of Col. Squier, the telegraphic expert of the corps. He will be aided by Mr. Marconi. It is proposed to go to some point along the seashore where the practicable utility of the wireless system may be fully demonstrated.—Electricity.

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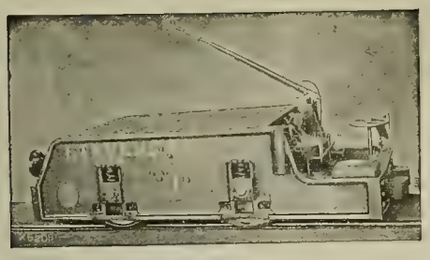
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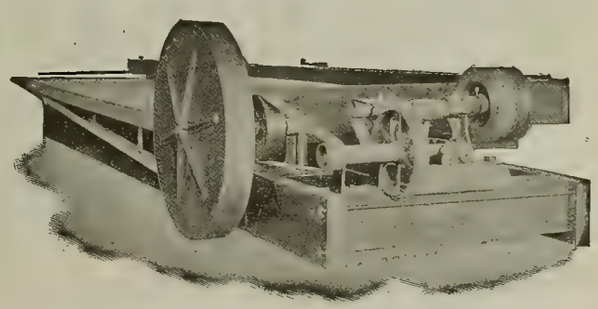
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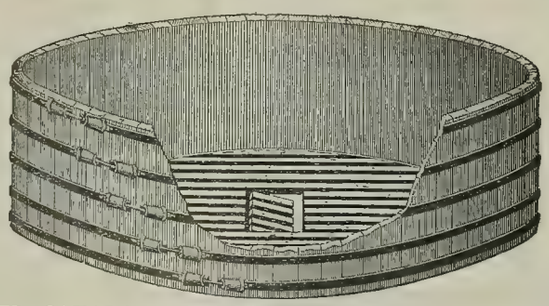
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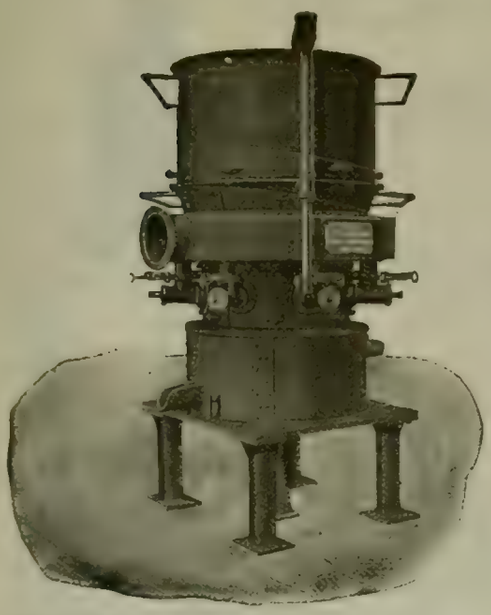
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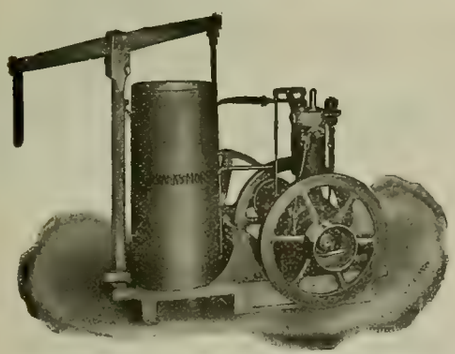


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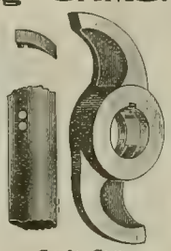


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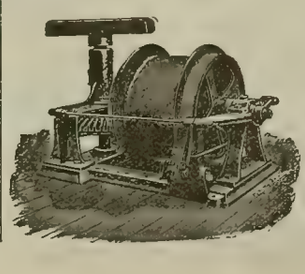
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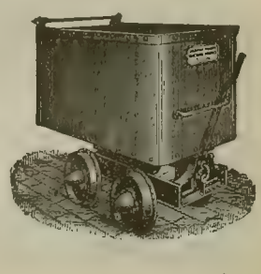
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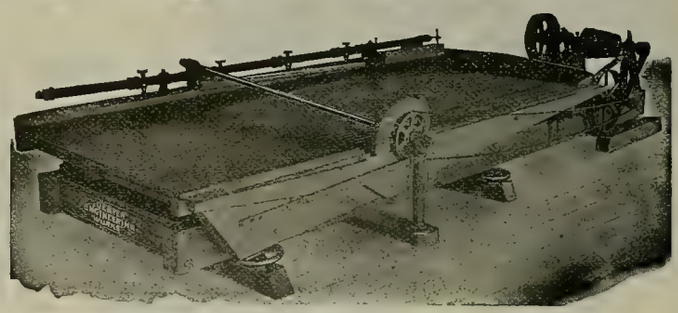


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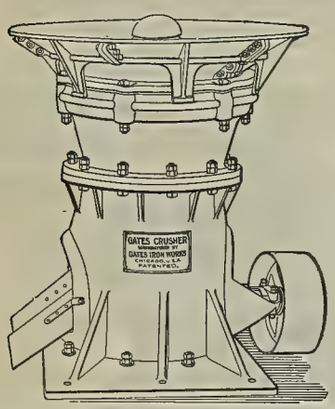


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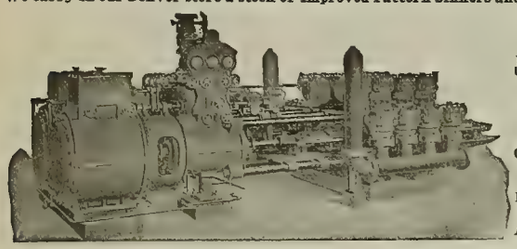
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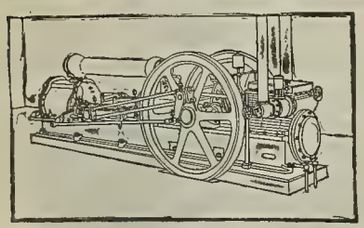
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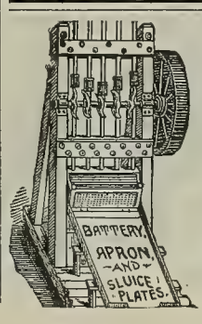
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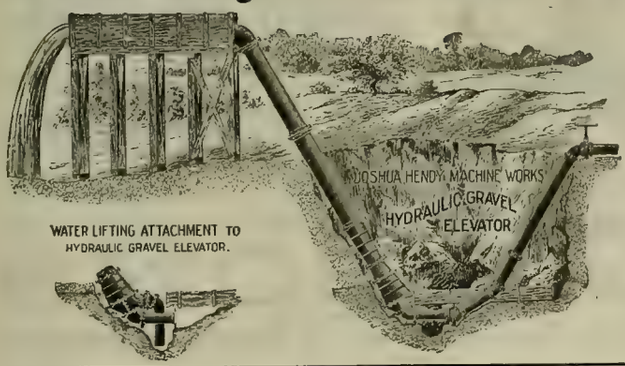
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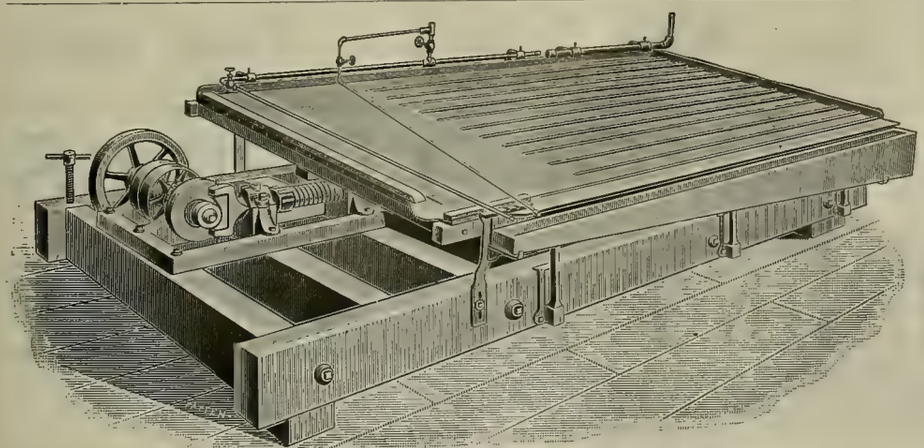


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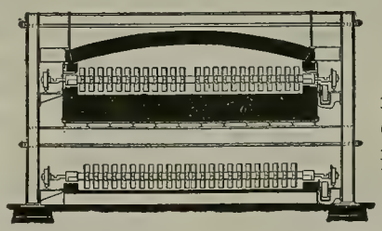
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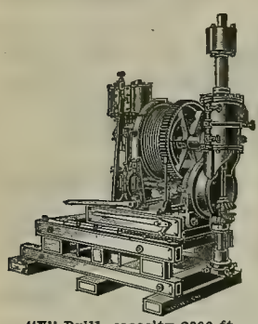


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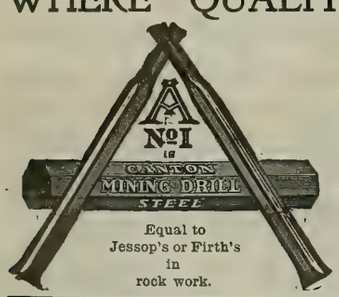
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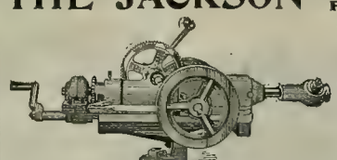
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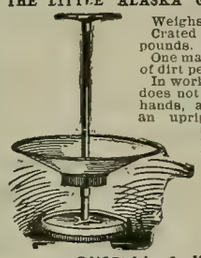
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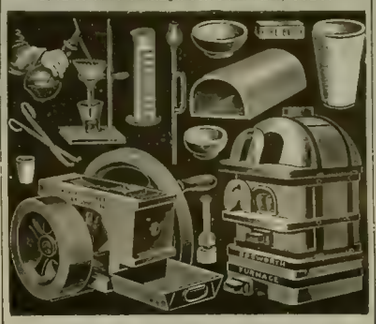


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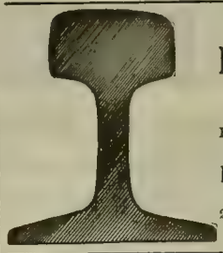
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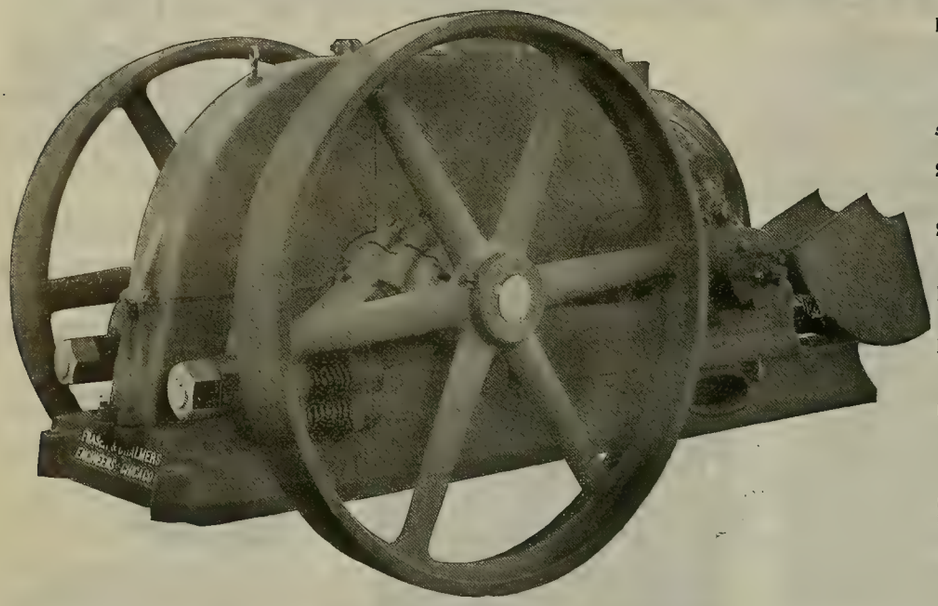
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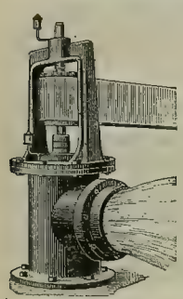
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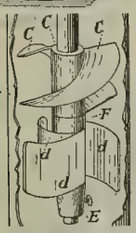
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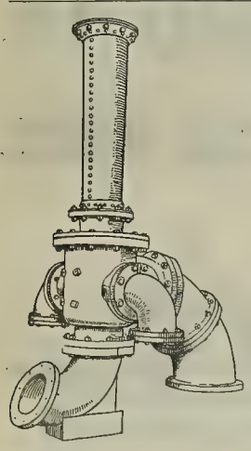
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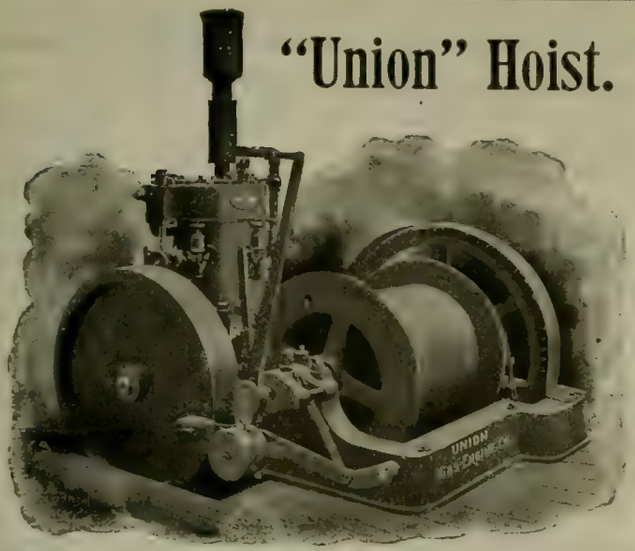
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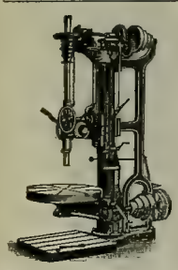
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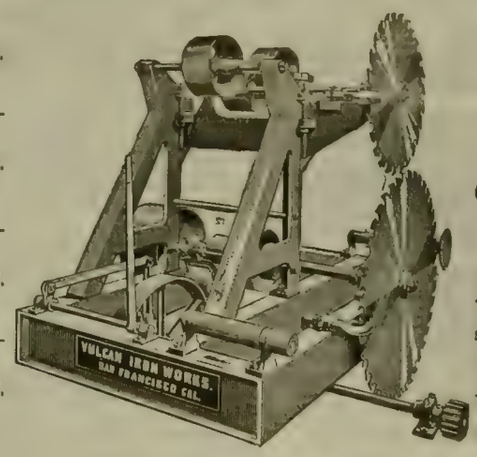
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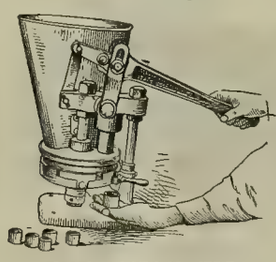
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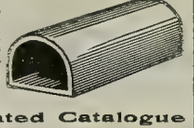
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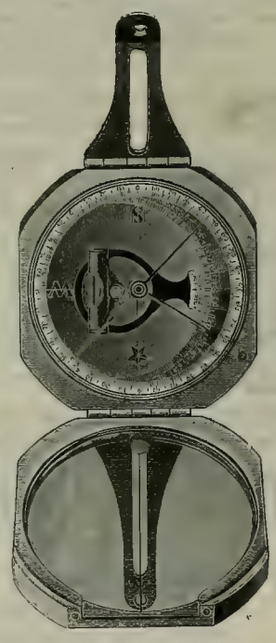
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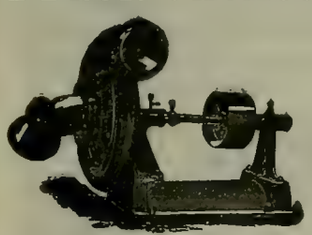
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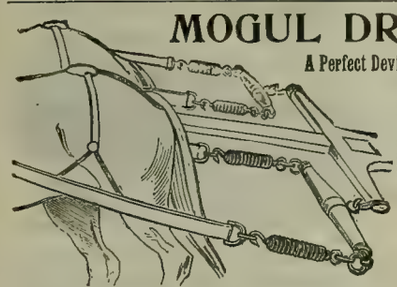


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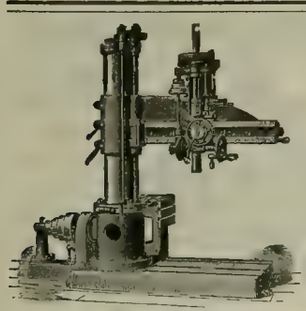


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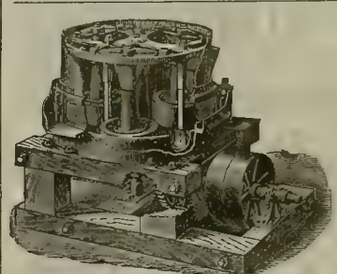
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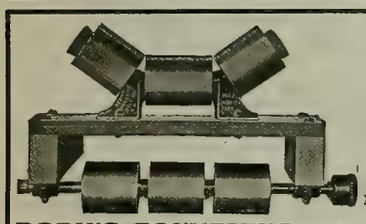
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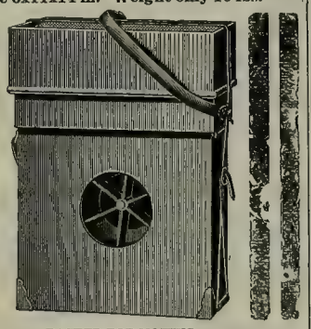
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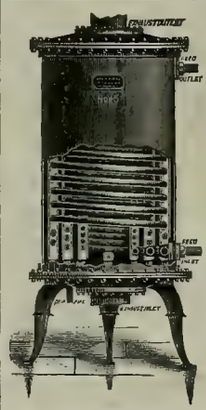
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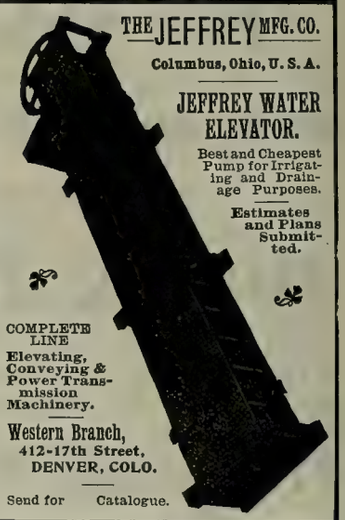
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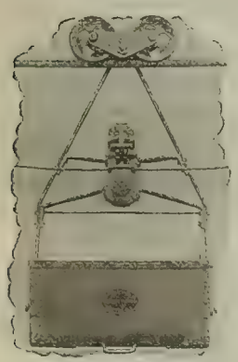
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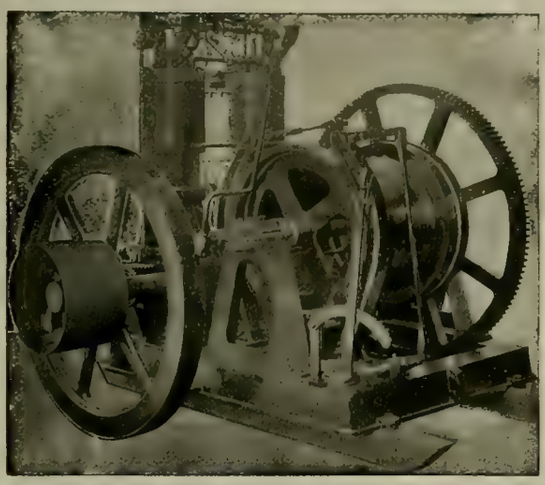


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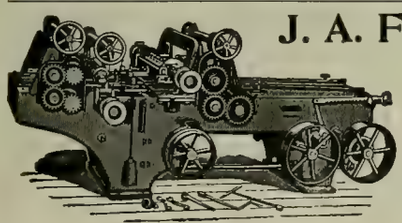
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say they are the best cars on the market.
OVER THREE THOUSAND IN USE.
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Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

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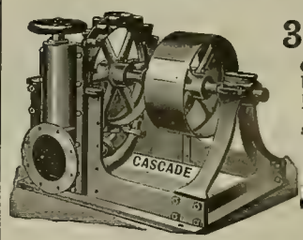
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THE
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Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

Send for pamphlet to THE PNEUMATIC CYANIDE PROCESS CO.,
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Market Reports.

SAN FRANCISCO, Nov. 2, 1899.

SILVER.—London, 26¾d; New York, 58½; San Francisco, 58½; Mexican Dollars, 47½@48½; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.62½ asked; brokers' price, $4.40.

Local, pipe, 7¼@7¼c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake quiet at $17; brokers' price, $17. Local—Mill copper plates, 28¾c.

The copper market seems uncertain and rather weak. The price has slowly declined to 17 cents. With the fall of the market price of the metal comes a decline in the copper shares which had been inflated to a high figure. Consumers continue to postpone purchases. In the absence of trade orders there is no supporting buying from other sources, and the market is left to take its course. In the meantime there is more copper being shipped abroad, and exports so far this month are in the neighborhood of 7500 tons.

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 - Local bar, 2¾c per lb

The iron and steel situation is a subject of discussion among consumers of material. A multitude of large enterprises is calling for material, and promoters and manufacturers are at a loss to know what to do. The present upward tendency appears to be strong. Should prices advance further, it would interfere with a good many of the enterprises now in hand.

STEEL.—11¼@20c per pound.

TIN.—$30.60 bid and $30.85 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $50; export, $45@45.50; carload lots, special rates.

Quicksilver has made another decided advance, going from $47 last week to $50 to-day. The London price is £9 5s, and in New York $50 for 100-flask lots and $51 for small lots. The Rothschilds have withdrawn from the American market, and there seems to be almost a famine in quicksilver. Quotations are higher to-day than they have been for several years. The strength of the situation is based upon the shortage of supplies, there being at present less than one month's supply in this country, the approximate number of flasks at present being only 2500, while consumption per month averages between 3000 and 4000.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 66s per ounce; New York, $17.75; San Francisco, $17.25.

ZINC.—Dull and easy; $4.85 bid, $5.00 asked.

After a shutdown of 90% of the zinc mines in the Joplin district for two weeks, operations have been resumed. The smelters questioned the price of ore fixed by the Miners' Association, and threatened a shutdown. The Miners' Association took the matter in hand and made the shutdown itself. There is a difference of opinion among the miners as to the wisdom of holding the price at $43 per ton for 60% ore, as this price is based upon 6c per pound for spelter, and there is much justice in the contention of the smelting men that 6c is an extreme price. The smelters say that for from 5c to 5¼c per pound the entire zinc output can be absorbed, but that at 6c per pound the manufacturers use substitutes for zinc. There is no substitute for zinc in either electricity or galvanizing, but there are many places in which other metals can be used as a substitute.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c per 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¾c; 6s, 12 oz., 5¼c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7¾c; 6s, 10 oz., 6¼c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.,	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE.—Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 2, 1899.

9:30 A. M. SESSION.

100 Best & Belcher	41c	800 Utah	08c
100 Con. Cal. & Va.	$1 45	200 Overman	14c
400 Hale & Norc's	31c	100 Union Con	28c
500 Alpha	03c	100 Caledonia	47c
100 Belcher	39c	500 Andes	12c
100 Sierra Nevada	41c		

2:30 P. M. SESSION.

100 Ophir	65c	200 Belcher	35c
100	66c	200 Bullion	07c
300 Con. Cal. & Va.	$1 55	100 Overman	15c
500 Potosi	32c	200 Crown Point	12c

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WANTED.—For Eastern syndicate, developed and paying gold mine; no limit as to price. FOR SALE.—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

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Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

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Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.
For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Staloknecht, Durango, Mexico.

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Gold Properties in Various Stages of Development.

Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

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FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

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Copper, croppings 50 ft. and over. Good percentage at surface. Gravel and gold mines.

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PATENT AGENTS, 330 Market St., S. F., Cal.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 2. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

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2500 MINERS

To work in the Metalliferous Mines of British Columbia, at the following prices per day of eight hours:

Hand Drillers,	$3.00
Machine Men,	3.50
Miners in shafts,	3.50 to $4 00
Carmen,	2.50 to 3.00
Shovellers,	2.50
Laborers,	2.50
Blacksmiths,	3.50 to 4 00
Timbermen,	3.50 to 4.00

Apply to THE SILVER-LEAD MINES ASSOCIATION, Sandon, British Columbia.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Henry H. Meyer et als., in the French Claim, at Alabama Hill, near Downieville, Sierra Co., to deposit tailings in a ravine below the mine; from R. J. Sinnott and F. M. Spencer, in the Hopkins Creek Tailing Claim, in Goodwin Township, Plumas Co., to deposit tailings in Hopkins Creek; and from James C. West, in the Eagle Gulch Mine, in Butte Co., near Strawberry Valley, to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 30, 1899, at 1:30 P. M.

WEST COAST OF MEXICO.

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Bankers, Importers, Exporters and Commission Merchants.

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It repairs a blemish in iron castings with a durable metallic iron finish that can be polished and will withstand a red heat. It makes a superior flange joint for steam, water or oil.

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Powell's Patent Swing Check Valve.



SIMPLE, EFFECTIVE AND TIGHT.

Can quickly and easily be reground at any time. Works equally well in either a horizontal or vertical position. Try them. Jobbers on the Pacific coast can furnish them. Manufactured by

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Quicksilver

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SAN FRANCISCO.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 16th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
G. A. Hinckelbein, Trustee.....	9	1.000	$50 00
G. A. Hinckelbein, Trustee.....	10	1.000	50 00
G. A. Hinckelbein, Trustee.....	11	1.000	50 00
G. A. Hinckelbein, Trustee.....	32	200	10 00
P. A. Wagner, Trustee.....	90	980	49 00
P. A. Wagner, Trustee.....	91	1.000	50 00
P. A. Wagner, Trustee	92	1.000	50 00
P. A. Wagner, Trustee.....	93	1.000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of September, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento St., San Francisco, California, on WEDNESDAY, the 15th day of November, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary.

Office—217 Sacramento St., San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 13th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Jno. L. Bradbury, Trustee	75	100	$200 00
S. L. Harris, Trustee.....	45	50	100 00

And in accordance with law, and an order from the Board of Directors, made on the 13th day of September, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 28th day of November, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

Assessment Notices.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of October, 1899, an assessment (No. 9) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of November, 1899, shall be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on THURSDAY, the 21st day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given that, at a meeting of the Board of Directors, held on the 27th day of September, 1899, an assessment (No. 13) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 5th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

INYO MARBLE COMPANY OF CALIFORNIA.—Location of principal place of business, San Francisco, California; location of works, Inyo, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1899, an assessment (No. 33) of five cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, 10th floor Mills building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES E. ANDERSON, Secretary.

Office—Room 31, 10th floor Mills building, San Francisco, California.

ANDES SILVER MINING COMPANY.—LOCATION of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 2nd day of October, 1899, an assessment (No. 49) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 27th day of November, 1899, at 1 o'clock P. M., to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20-22, Nevada block, 309 Montgomery street, San Francisco, California.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of October, 1899, an assessment (No. 8) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

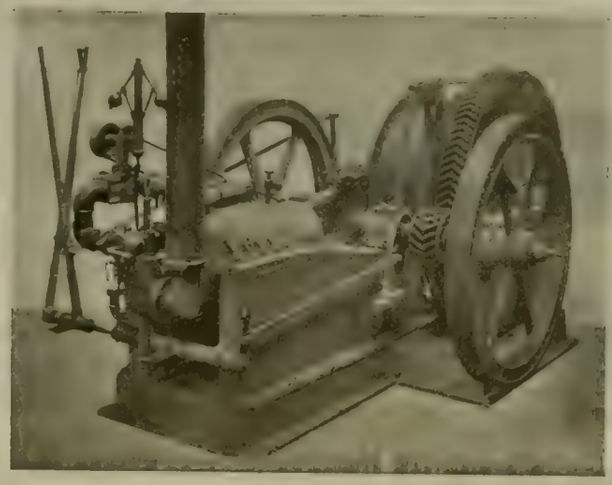
Any stock upon which this assessment shall remain unpaid on the 11th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

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Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

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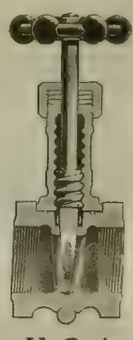
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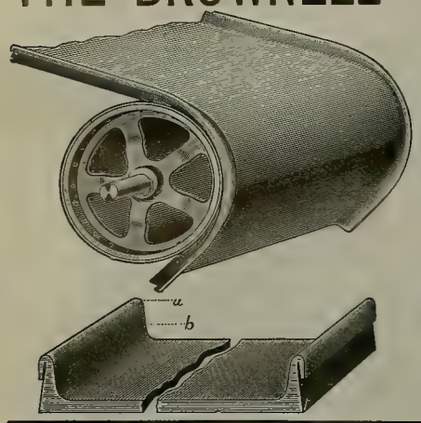
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Are You Confronted With a Difficult Ore-Separating Problem?

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may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.

THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.



It has taken [illegible] ceaseless testing and experimenting to produce the superior belt which we now offer, w[illegible]tic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 4, 1897.

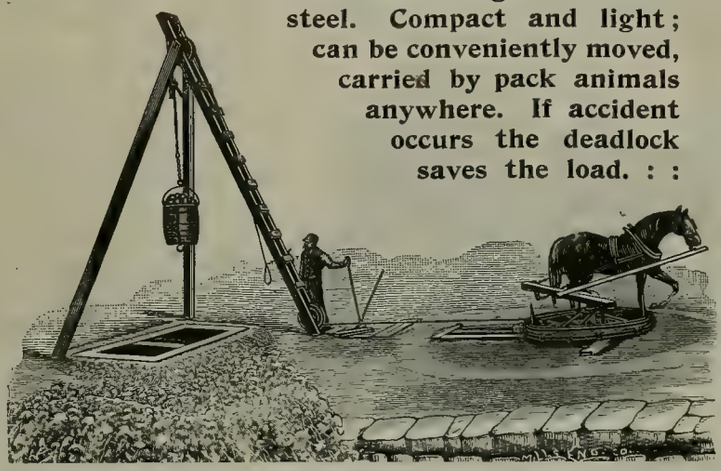
MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY.
Per G. M. WILDE, Acting Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
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THE COMMON SENSE WHIM

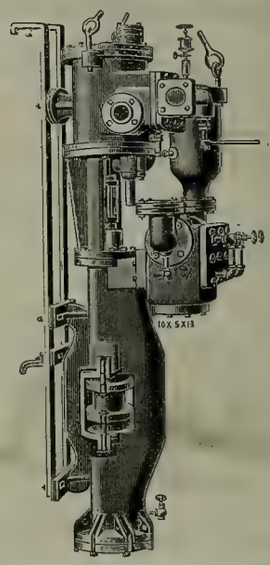
Is made of the best wrought iron and steel. Compact and light; can be conveniently moved, carried by pack animals anywhere. If accident occurs the deadlock saves the load. : :



SINKING PUMPS,

Indispensable in sinking mining shafts or pumping out flooded mines. Easily raised or lowered by cable or rope. Equipped with outside packed plungers. Handles gritty or dirty water. Operates bolted to shaft timbers or only suspended by cable at any angle. Packing glands external. May be adjusted while in motion. Removable parts hinged. Steam movement positive and simple.

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LOADS MECHANICALLY. DUMPS AUTOMATICALLY. Send for Ropeway Pamphlet No. 20.

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THE "JAMES" AUTOMATIC ORE FEEDER.

THE "JAMES" ORE FEEDER,

as illustrated on this page, is a machine of improved design for the automatic feeding of ores to stamp batteries and other crushing machinery. It is perfectly adjustable while in operation, and will feed equally well ores wet or dry, coarse or fine.

Shipping weight, with wood frame, - 800 pounds.
" " " iron " - 1000 "



ADVANTAGES

The advantages of this ore feeder, over any others that are in the market, are, that the feed is positive and will not gig back no matter how slight the motion to the arm; it can not possibly spill ore of any character and will definitely measure out from one to fifty tons per day of any class of ore.

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INGERSOLL-SERGEANT ROCK DRILLS and AIR COMPRESSORS.
KNOWLES PUMPS and PULSOMETER PUMPS, BULLOCK DIAMOND DRILLS.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2053.— VOLUME LXXIX. Number 20. SAN FRANCISCO, SATURDAY, NOVEMBER 11, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

American Steel & Wire Co.'s California State Fair Exhibit.

Wire probably plays a more important part in modern life than any other one product of our industries. The extent to which it is used may be realized perhaps from the statistics of the iron and steel wire manufactures of the United States. Every year this country produces about 1,000,000 tons of iron or steel wire. Reduced to pounds this gives 2,000,000,000 as the annual output of the wire mills, or about thirty pounds of wire for every man, woman and child in the United States. If all of this were drawn down to a diameter of $\frac{2}{1000}$ of an inch, one of the larger sizes used for banjo and mandolin strings, it would make a string more than two hundred million miles long, or enough to wrap around the earth 40,333 times, or to form a two-wire metallic telephone line to the sun. The metal which goes to make up this enormous mass of wire is about 10% of the entire output of our iron mines, and the finished product is equal in amount to the average production of railroad rails, and is probably more than enough to form the frames of all the great steel sky scrapers erected in the whole country during the year.



EXHIBIT OF THE AMERICAN STEEL & WIRE CO AT THE CALIFORNIA STATE FAIR AT SACRAMENTO

It would be as easy to enumerate the things in which wire is not used as it would be to give a list of those of which it forms a part. Your spectacle bows are made of wire, the rivets of your pocket knife are wire, your shoe heels are held together with a wire product and you wipe your feet on a wire mat. Your wife is apt to have wire or wire products spread about her costume from head to foot. Her hat frame is often of wire, its flowers are built on wire stems; she fastens it to her head with pins of wire; her girdle and its dependent ornaments are often of wire products, while her parasol or umbrella is largely made of wire. We sleep on wire mattresses, we travel on cars drawn by wire cables and we depend upon wire for all the communications we have with one another over the telegraph or tele-

(Continued on Page 554.)

Propeller Pump on the American River, Cal.

The accompanying illustration is a scene on the American river, Missouri bar, near Folsom, Cal., and shows the working of a propeller pump which is proving useful and advantageous for much of the work in and around mines, combining in itself many desirable features. The pump is shown on the right of the cut, the flow of water from the flume being more than 100 miners' inches, which is the inflow and seepage from a coffer dam up the stream, from a restraining dam below and from a large flume into which the river is diverted. The dams are 1110 feet apart; the river bottom is nearly 100 feet wide and when the pump was first started this area was covered with water averaging 12 feet deep. Despite this inflow, the hole was pumped out in less than thirty-six hours, when the speed of the pump was reduced to accommodate the inflow as is shown. The belt from the pump pulley leads to a common threshing engine, but a more convenient and economic power is a direct connected motor to the pump shaft. The bottom was kept dry and about fifty men were kept at work during the whole summer. The pump here shown is a lift of 30 feet.



WOOD'S PROPELLER PUMP AT WORK ON AMERICAN RIVER, CAL.

The pump itself is an arrangement of simple brass screws and plain spring steel guides along a steel shaft from 3 to 5 feet apart, all being installed in oil well casing. Onto the bottom of the casing may be seen a sinking section, which is simply a section of a casing of larger diameter than the pump casing, and provided with a stuffing box at the top and a foot valve at the bottom, and is lowered by block and tackle, a few inches at a time.

(Continued on Page 554.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Largest Circulation of any Mining Journal on the American Continent.

Office, No. 330 Market Street, San Francisco, Cal.
Telephone Number, Davis 771.

ANNUAL SUBSCRIPTION:
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All Other Countries in the Postal Union..... 4 00

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J. F. HALLORAN.....Publisher

San Francisco, November 11, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Exhibit of the American Steel & Wire Co. at the California State Fair at Sacramento; Wood's Propeller Pump at Work on American River, Cal., 541. View of Buildings and Tunnel Entrance, Camp Bird Mines, Imogene Basin, near Ouray, Colo.; Boarding House, Camp Bird Mines, Imogene Basin, Ouray, Colo.; Interior View of Camp Bird Mill, near Ouray, Colo.; View of Revenue Mill and Other Exterior improvements of Caroline M. Co., Sneffels, Colo., Looking Toward Ouray, 545. Latest Mining and Metallurgical Patents, 546. Belt Conveyors, 550. Tunnel in Little Mamie Mine, June 24, '99, Mameva Mining District, Inyo Co., Cal.; The Ideal Stamp Mill, 554.

EDITORIAL.—American Steel & Wire Co.'s California State Fair Exhibit; Propeller Pump on the American River, Cal., 541. The Genesis of Ore Deposits; The Slocan Labor Trouble; Risks in Mine and Oil Stocks; Miscellaneous, 542.

MINING SUMMARY.—551-552-553.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 566.

MISCELLANEOUS.—Concentrates, 543. Prehistoric Rivers of California; The Most Notable Electric Transmission Plant in Existence, 544. Mines of Ouray County, Colorado, 545. Latest Mining and Metallurgical Patents, 546. The Use of Vats in Place of Zinc Boxes; The Production of Gold; Removing the Chinese Wall; The Transvaal at the Paris Exposition in 1900, 547. Forest Ranger System; Manganese Ore; To Revive Gas Wells, 548. Notes on Mine Surface Sampling; California at the Paris Exposition; Don't; Running a Blast Furnace, 549. Belt Conveyors; Filtration of Cyanide Solutions; Cyanide Poisoning, 551. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inntors; Notices of Recent Patents; Recently Declared Mining Dividends; Commercial Paragraphs; Catalogues Received, 553.

THE present high price of tin and quicksilver is having its effect in stimulating prospecting for the ores of those metals. New tin discoveries are reported from Idaho and southern California, and numerous old and abandoned quicksilver producers are active again, while prospecting for new deposits is in progress.

ON the 14th inst. a convention will be held in San Francisco, Cal., to take some action looking to the conservation of the flood waters of the Sierra Nevadas. This is a proposition so vast in its scope that it is not likely that anything farther than the preliminary steps will be taken by the convention. A succession of comparatively dry years in California has seriously retarded development of mining and industrial enterprises, and the necessity for activity in the direction indicated is now fully realized.

WHEN first undertaking the development of a new mining property it is always well to accomplish the preliminary work and development at as small a cost as possible, employing light machinery and erecting modest, inexpensive buildings. A hoisting engine with a capacity to lift from 500 feet need not have capacity for large daily tonnage, as that is not required in a prospecting or developing plant, nor is a large and elaborate office building essential to the equipment of a prospect. Many a mining enterprise of apparent merit has been wrecked by the extravagance which characterized its preliminary operations.

AMONG the most recent absurdities in the metallurgical process line is that announced in a prospectus of a liquid air company, which sets forth in positive terms its ability to extract from ores and sands containing gold 90% of their value by means of a "mercurial process," in which liquid air plays no part. They have chosen as a field of operation the Adirondacks, where, they claim, is a large tract of sands containing gold. The process is to be introduced in the Western mining region later. The selection of the Adirondacks as a trial field indicates the shrewdness of these new process people, who doubtless realize that in the "Western mining region" their process would quickly be proven by its true merit. Still, in the West fake process men meet with occasional success—in finding credulous investors, who build mills and furnish money for the demonstration of the claims of those who have a process which will "revolutionize mining and the treatment of ores."

The Genesis of Ore Deposits.

No study in geology is more interesting or important than that of the genesis of ore deposits. There are many ideas in regard to the depth to which veins will carry value, and a favorite one is that veins increase in width and richness with depth. That the facts do not bear out this pleasing theory is to be regretted, nor do they disprove it. The exploration of a large number of veins in every portion of the world has shown that as a general principle the width and value of mineral veins bear no relation to depth. In many regions vein croppings on the present surface represent what was at one time at a depth of thousands of feet from the original surface.

There is still a diversity of opinion as to the origin of the minerals found concentrated in veins and ore deposits of various forms, some maintaining that the metallic minerals are derived from the enclosing wall rocks, and others believe that they come from great depth—a depth far below that which human ingenuity and progress can ever hope to reach.

Some eminent authorities suggest that chemical analyses of massive crystalline rocks, made with greatest care, will determine that the minerals found in veins and ore deposits are derived directly from these rocks. If this were so it would seem that valuable accumulations of such minerals would be found in these rocks at a distance from veins, but none have been reported, though miles of tunnel and shaft have been cut through massive eruptive and crystalline rocks. In some mining regions the country rocks have been found to be gold and silver-bearing in proximity to veins and deposits, but there has been no conclusive proof advanced that these values, whether great or small, did not come from the same source as the minerals in the veins. The ascending waters which carried the values from great depths and deposited them in the fissure or zone of pulverized rock, forming a vein or ore deposit, would also penetrate the surrounding rock as well, and, percolating through them, possibly deposit small quantities of their metallic contents. A porous rock dipped in a solution of gold or silver, and allowed to become saturated with it, dried and tested, will be found to contain the metals which were in solution. Massive rocks are dense and in their normal condition not well suited to the deposition of metallic minerals, but in close proximity to veins these rocks often undergo more or less alteration, some of their normal constituents being replaced by others, and in many instances such rock is found to be gold or silver-bearing to a notable extent, while the sulphides of the base metals are of common occurrence.

Probably these minerals were mostly, if not entirely, deposited by ascending waters, while in mines the only waters with which we come in contact and have any opportunity of observing are those descending from an upper to a lower point. Often in shaft sinking a flow of water is observed coming from below with much force; but, if sinking be continued, the level from whence came this particular flow is passed and the water follows the workings downward. It cannot be conceived that the waters coming into even the deepest workings of mines, far below not only the immediate drainage level, but of the sea, as well, have any connection with the deposition of the minerals found in the veins or deposits, and the genesis of the ore deposits must be studied by means of excavations made long after the ore deposition was complete.

Some thermal springs, in the vents of which minerals are being deposited, afford the most satisfactory basis for a theory of ore deposition, but comparatively little importance appears to have been attached to this evidence. Undoubtedly these heated waters have a deep-seated source, and some of them are known to contain a variety of minerals, including those most commonly found in veins, and in some instances these minerals are being deposited about the vents of the springs. The Steamboat Springs of Nevada, a few miles from the Comstock lode, are a notable example.

Risks in Mine and Oil Stocks.

The great industrial activity that now prevails throughout the United States is no where more marked than in mining of every class. Not only are the precious metals being exploited more generally and more vigorously than ever before, but copper, iron, quicksilver, lead and zinc mines are being operated to their fullest capacity. Oil, also, is attracting attention, particularly in California. This widespread activity, taken together with the creation of trusts and combinations of industrial enterprises, large and small, has proven a great incentive to many scheming men to seize the passing opportunity and make something out of nothing, and, as a result, the country is flooded with prospectuses of this or that mine or oil well. Nearly all of these alluring pamphlets contain more or less extravagant statements, but some of them deal in absurdities, and were very evidently written by persons wholly unfamiliar with either the subject of mining or of oil boring.

Mine promoting is not a new enterprise by any means, but the mine promoters have a large stock in trade of "glittering generalities," extravagant statements of the great value produced—by other mines—and the inestimable wealth that may be expected to come from the property, stock in which is offered for sale. Some of these statements are plainly and simply made and are calculated to catch the unwary, when a moment's thought would convince the intended victim that if any such conditions as are stated in the prospectus actually existed, he would not be asked to subscribe for a single share of stock.

The oil promoting scheme is comparatively new, and, as most people are thoroughly unfamiliar with the subject, there is likely to be a large amount of money lost in useless prospecting. Many people think or are led to believe that all that is necessary is to sink a hole in a county where oil is found, and a flowing, or, at least, a pumping well results. The very large percentage of failures clearly shows this not to be the case. In California oil occurs along certain lines of uplift in sandstones and shales, and of the wells bored along these lines a large number become profitable investments; but of the wells sunk at random all over the district in which oil occurs, the greater number are failures. Those contemplating an investment in oil should take the precaution to employ some competent person to investigate the geological conditions before assuming the risk of such investment; for only those who have made a study of the geological structure of the oil regions are competent to pass judgment on the likelihood of striking oil. Some of those who secure large tracts of land and incorporate oil companies have not the required knowledge of the subject, but, as they are on the inside, will lose little in any event.

The Slocan Labor Trouble.

In the Slocan and Sandon districts of British Columbia the labor troubles have not been adjusted, nor does it seem likely that they soon will. The mine managers have been importing miners from the United States and elsewhere, but the trouble seems to be spreading to other districts. The whole difficulty is clearly the result of an act of the last Provincial Legislature in passing an eight-hour law, for which there was no demand. When the time for the law to go into effect arrived the miners were willing to accept the change from ten to eight hours, but demanded the same pay for eight hours' work as had previously been paid for ten hours. This the managers refused. For a time the mines were mostly idle, when a contract system was inaugurated, by means of which it was thought that both parties to the controversy would be satisfied, but some of the miners, taking contracts at a price which earned for them less than the rate of wages they had asked for, demanded that the managers insure them $3.50 per day of eight hours when on contract. This demand was also refused. It seems evident that the trouble would have long since been satisfactorily adjusted if it were not for the labor agitators, but at present there does not appear to be a disposition on either side to make any concession, and the situation grows worse.

Concentrates.

TIN ORES occur in Mexico in the States of Durango, Zacatecas and Sonora.

CRUCIBLE STEEL was invented by Benjamin Huntsman in 1792 near Sheffield, England.

NEXT Saturday's issue of this publication will comprise a total of 52,144,128 square inches of surface.

THE International Mining Congress at Paris will devote June 18 to 23, 1900, to mining and metallurgy.

THE Sierra Blanca mine, near Garland, Colo., is 14,400 feet above sea level, and is said to be the highest mine in the United States.

THERE remain but fifty days in which to do the required annual assessment work on unpatented mining claims for the calendar year 1899.

BAUXITE is a mineral containing a large amount of aluminous oxide. Its hardness, color and density often change in the same deposit.

A NEW alloy of aluminum and manganese has been discovered, which has been found useful for various purposes, and possessing valuable properties.

ADVERTISING consists in describing what one wants to sell in such a way as to create a demand for it. Anything that will sell goods is good advertising.

WEAK solutions of potassium cyanide—.5 of 1% and less—will dissolve compounds of some of the base metals, more particularly those of zinc, copper and manganese.

PEROXIDE OF HYDROGEN is a more powerful antiseptic than bichloride of mercury, and will keep for months without deterioration in properly stoppered bottles.

IT has been estimated that within the past sixty years nearly 300,000,000 tons of rock have been broken down by the Niagara Falls, which is slowly cutting its way up stream.

ANY attempt to form an amalgam of mercury and stibnite or native antimony will result in "sickening" the quicksilver. Antimony cannot be obtained in this manner from ores.

DURING 1898 Great Britain imported 1857 metric tons quicksilver, and exported 1157 tons. German imports and exports for the same time were 560 and 97 metric tons respectively.

THE large profits made by some of the mines of the Witwatersrand is due to the treatment of the tailings by the cyanide process. The gold thus recovered would otherwise be lost.

THE deepest mine shaft in Colorado is said to be at the California mine, Quartz Hill, Gilpin county—2230 feet, though the Geyser mine, Gilpin Co., is now reported to have a shaft 2650 feet deep.

THE signatures of the president, secretary and general manager of an incorporated mining company would make a contract so signed binding on the company were its conditions complied with.

ACCORDING to the "basis of representation," California would be entitled to 2045 delegates at the Milwaukee session of the International Mining Congress next June, though it is doubtful if that number will attend.

CINNABAR occurs in Texas near the Rio Grande river, eighty miles south of Alpine Station. The ore occurs in massive limestone and silicious shale and in brecciated rocks. Calcite is usually associated with the ore.

ELECTROLYSIS—the corrosion of metal by electric current—is caused by difference of potential, distance, etc., and influenced by the character of the soil. A difference of potential of two and one-half volts may destroy water pipe in two years.

WITH extremely dilute solutions of cyanide of potassium some workers have found that in order to get a good precipitation from solutions containing copper it is necessary to pass the solutions very slowly through the precipitation boxes.

AT the nickel mines near Riddles, Or., several hundred tons of ore are being prepared for shipment to Chicago as a test of its value. These mines have been closed down nearly five years. At one time 150 men were employed and an extensive plant erected.

NATIVE GOLD is not infrequently found in the undecomposed portions of crystalline and eruptive rocks. This is not an uncommon occurrence in the mines of the granite area of California. As far as observed, these occurrences are in the immediate vicinity of lodes.

COPPER ores occur in Texas, in Archer and Wichita counties, in the Peruvian formation. The ores occur as pseudomorphs after wood and various fossils. These ores are carbonates and silicates of copper and are found in the marls and clay slates and in part also in sandstone.

A GENERAL answer to a question the answer to which must take note of numerous and varying factors will be of little value. Questions to "Concentrates" should state plainly the proposition and not require averages where there is a wide latitude in conditions and results.

THE occurrence of gypsum in the rock strata of the California oil field is frequently noted, and some have looked upon gypsum as an indication of oil. Such is not the case, as gypsum has nothing in common with the occurrence of petroleum, and either may occur without the other.

THE gold-bearing ore bodies found in the mines at Raposas, State of Minas Geraes, Brazil, are found in the form of rudely circular chimneys, following the dip of the argillaceous slates. They are composed chiefly of quartz, with 8% to 10% auriferous pyrite and pyrrhotite, with iron oxides.

DRY ground containing gold must be thoroughly disintegrated to make a saving of the gold possible in a dry washer. Lumps containing clay must be pulverized, and these machines are not usually provided with any mechanism for accomplishing this. In dry regions where this method of mining is practiced and stamp mills are cheaply accessible, a good plan is to partially concentrate the alluvial and treat the concentrates in the stamp mill. This saves much time and consequently increases the capacity of the machine, while saving the fine gold which escapes most machines.

WHEN mineral veins have been located in accordance with legal requirements on the public domain the title to town lots to be acquired shall be subject to such recognized possession of the mining location and the necessary use thereof. This applies to all except the Federal Government itself.

WHENEVER possible, it usually pays to catch up surface water on the upper levels and pump or hoist it to the surface, not permitting it to go to the bottom of the mine. Where this is done, many mines are comparatively dry in the lower levels, such water as there is coming largely from the surface.

THE United States statutes do not require a mining claim location to be placed upon record, though most State and local district laws make this necessary. For the purpose of security of title locators should record their claims with the local district recorder, if there be one, and also with the county recorder.

THE construction of ore pockets under the floor of levels at shaft stations is found to effect a great saving in handling ore or waste. Skips or buckets may be used, the former being better suited to the requirements. By this arrangement neither underground trammers nor the skip men are kept waiting.

THE large skips in use in the Kimberly diamond mines are hoisted through a portion of a 1400-foot lift at a speed of 6000 feet per minute. The necessity for having shaft timbers absolutely true under such circumstances is obvious. The round trip is made from surface to 1400 level and return in less than one minute.

TELLURIUM was discovered by Muller von Reichenstein in 1781. It is now found to occur much more abundantly than was at first supposed. The two most important districts where gold tellurium ores occur in the United States are in the Cripple Creek district, Colorado, and the Terry Peak region of the Black Hills, South Dakota.

IN shaft sinking, where a steam pump is in use, a lever may be attached to the steam inlet valve and wires attached, allowed to hang within reach of the miners below, who can by this means regulate the operation of the pump to the quantity of water coming in, saving much time and rendering much signalling to the engineer unnecessary.

SOME of the South African mines are being worked under Boer martial law at Johannesburg, but an interruption of the usual gold supply for six months is to be expected. Still, with an entire year's gold production of the Transvaal cut off, the world's product would be over $10,000,000 more than the average for the four years ended with 1898.

THE Stetefeldt furnace was designed for the chloridizing-roasting of silver ores which were to be subsequently treated by amalgamation or lixiviation. It was first introduced for actual practical work on a commercial scale at Reno, Nevada, in 1869. The pulverized ore mixed with salt is fed at the top of the upright shaft, falling through the flames resulting from burning gas or wood.

THE ores of the Boston & Montana Con. Copper Co. are mined at Butte, Montana, and transported by rail 170 miles to Great Falls, on the Missouri river, for treatment. The higher grade ores are smelted in blast furnaces, reduced to copper matte containing 50% to 55% copper. The low-grade ores are concentrated and roasted in rotary furnaces and reduced to 50% or 55% matte in reverberatory furnaces.

MAGNETIC separation has been suggested as a practicable means of concentrating the black sands found in the gravels of many gold-bearing river beds and ocean beaches. A difficulty will probably be found in effecting a complete separation, as much of the iron in these sands is not magnetic. It has not been ascertained whether the gold values are in the magnetic or the non-magnetic portions, or in both.

THE Ducktown copper mines are in the southeast corner of Tennessee. The ore occurs impregnating silicious schists. It is all sulphide material of low grade. In the early history of the mines large amounts of black oxide of copper were mined, leaving the purer sulphide ores for later years, when cheaper labor and supplies and advanced methods of mining and treatment made the operation of these mines again profitable.

IN the issues of Aug. 5th and Aug. 12th, '99, appeared two articles on the oil-yielding formations of California, and conditions under which petroleum is found, written by the best local authority on that subject and giving all the information asked in a scientific, practical and intelligent way. Some of the numerous oil stock companies are traps for the ignorant, and their handsome stock certificates likely to be of most value for wall papering purposes.

IN deep mine pumping, where is employed an electric motor coupled direct, an efficiency of about 85% given out from the generator might be expected. There would probably be 3% loss with transformer and line, 8% on the motor, and, probably, 8% in the gearing, etc., of the pump, giving about 68% for actual work. An engine driving a dynamo continuously, to do as well as one on the direct-coupled pump, using thirteen pounds of steam per indicated H. P., would take 624.5 pounds of coal per day, a duty of 71,937,405 foot pounds for every 112 pounds of coal.

IN the California oil fields the general topography of the country has little apparent relation to the oil-yielding deposits. In the general uplift of certain hills and mountains the oil lines do not always conform to the main axes of uplift or folding, but are most commonly found along subsidiary sharp folds whose existence would remain unknown but for careful geological investigation, as the erosion of the hills has been influenced mostly by the larger folds and not affected materially by the smaller ones, along which the oil is usually found. Oil lines found in the hills may, and sometimes do, extend out under the level adjacent valley, the crest of the fold having been planed off by erosion.

THE Broken Hill Proprietary lode in New South Wales, Australia, is in places over 300 feet in width. It has yielded large amounts of silver which is found associated with sulphides of lead, iron and zinc, together with other bases of less frequent occurrence. The Broken Hill Consuls, near the Proprietary mine, is a distinct vein 18 inches in width which has been opened 1300 feet and found persistent. It strikes east and west and has a variable dip. The valuable ore deposits worked along this vein are found where cross veins intersect it. In this lode was found a mass of dyscrosite (antimonial silver) which weighed 1600 pounds and yielded over $21,500. Six tons of this mineral yielded 142,000 ounces silver.

NICKEL has physical properties similar to iron and copper. It is less malleable and ductile than iron and less malleable and more ductile than copper. It forms alloys with these metals in all proportions. Its specific gravity is about the same as that of copper, but is heavier that iron. Its melting point is about 3000° Fahr., though a small percentage of carbon in metallic nickel lowers the melting point considerably. When alloyed with other metals it generally adds hardness, toughness and ductility to them. German silver is an alloy of copper, zinc and nickel. Variations in the percentages of the several metals give different names to the composition, as British plate, white metal, argentan, Chinese metal, etc.

AT large mines where many samples are taken daily from the stopes, headings and exploratory openings, an effective sampling works may be cheaply made by mounting a power drill upon an upright frame of timbers, substituting a small stamp head for a drill and placing a heavy circular mortar beneath to receive the rock. A brick oven with an iron plate for a top will furnish a good drying surface, upon which the samples may be placed in steel pans to dry before pulverizing. With an arrangement of this kind 100 samples of two pounds each may be made daily at small cost. Either air or steam may be employed to run the stamp, and a single man can attend to the drying and pulverizing of all the samples, keeping check of them by a running number. When the ore is free-milling gold, the samples may be panned, but in most cases assaying will be necessary.

IN the *Annales des Mines* appears some data regarding the Laurium mines in Greece. In ancient times the deposits, which consist of zinc blende, pyrites and argentiferous galena, were worked for silver. At the time of Pericles the population of Laurium exceeded 20,000. The mines were worked by slaves, the shift lasting ten hours, and work going on continuously. The system of slavery led to the miners being treated with comparative kindness, as the death or illness of a slave represented a direct monetary loss to his master. In the fourth century the average price of a mine slave was £6 10s. Owing to the varied applications of silver at that date there was no overproduction of the metal. Its value in relation to gold was 1 to 14 in the year 438 B. C., and 1 to 10 in the year 300 B. C. The Laurium mines made Athens the silver and lead market of the ancient Greek world.

THE silver mines of Cerro de Pasco, Peru, were discovered in 1630 by an Indian shepherd. They are estimated to have produced since their discovery $565,000,000 in silver. They are at an altitude of 14,250 feet above the sea. The argentiferous deposit is described as consisting chiefly of a ferruginous sandstone, in the neighborhood of limestone, conglomerate and slate. A tunnel 3500 feet in length was run at a cost of $100,000 to drain these mines. It required twenty years to complete it. A second tunnel, 88 feet lower, was run 8250 feet in forty-six years at a cost of $1,000,000. At a mile from its entrance the tunnel branches, these branches having a total length of a mile. A third tunnel was started in 1877, but when in 900 feet was abandoned. These mines produce gold, silver, copper and lead. Most of these ores are amalgamated by the patio process in seventy mills. The higher grade of lead ores are smelted.

THE cost of concentrating sulphide ores in California or elsewhere varies at each mine and is dependent upon the character of the ore, quantity treated per stamp or otherwise, method of concentration, and to a great extent upon the percentage of sulphide mineral occurring in the ore. An average cost would be difficult to obtain and having been gotten would signify nothing in any particular case. In a single instance the cost of labor for concentration was 13.5 cents per ton of ore treated, and for power about 6 cents per ton. At another mill, where the ore contains 2% sulphides, 100 tons are crushed daily. The cost for labor is $18 per day, or 18 cents per ton of ore treated. The stamp capacity is two and a half tons per stamp. Power costs about 5 cents per ton for concentration. In a third mill four tons are treated per stamp daily, and the concentrates average 3%. The cost of concentration for labor is 75 cents per ton of ore treated, and power costs 4 cents per ton of ore for concentration.

IN some of the large Spanish mines a system of mining is followed by means of which large veins of ore are wholly recovered without the use of timbers and with a minimum of accident to men. The ground is blocked out by running lateral drifts and crosscuts, and connecting them by raises, to be used later for passing ore and for ventilation. A main working shaft is sunk in the wall, and a second shaft is provided for lowering waste rock into the workings, for filling the excavations left by the removal of the ore. When the level has been thus prepared by blocking out, the crosscut run from foot to hanging wall, opposite a raise, is filled by hand with waste rock broken on the surface; this being done, two additional crosscuts are run, one on either side of the first, and these filled in like manner from hanging to foot wall. In this way, working cut after cut, an area previously determined is mined and filled. A crosscut is then run immediately above that first made, opposite the mill hole, down which the ore is thrown to the level below. When completed, this crosscut is also filled like those below. The ore may then be mined in comparatively inexpensive manner, being undercut and cut out on one side. Slice after slice is cut off, the space being filled with waste until an area on this floor is removed equal to that below. The third and fourth floors are removed and filled in like manner, and so on until the level of the block above has been reached. All the waste used consists of good-sized rock, no small material being employed, and this is placed by hand, as in a wall. The labor is cheap, and the expense not greater than timbering and subsequent filling, and the system admits of the recovery of all the ore, which cannot be accomplished at all times by other systems. The amount of subsidence is small in a level thus mined and filled. It would seem that the placing of heavy lagging on the sill floor would afford an advantage in stoping up under an old level. This system affords great security to workmen, and, as no ores are lost, it might be employed in some of the large gold mines of the United States to greater advantage than some of the systems now in use, by which disastrous caves and the loss of life and often of large bodies of good ore often occur.

Prehistoric Rivers of California.

Written for the MINING AND SCIENTIFIC PRESS.

The ancient rivers of California are always an interesting subject for study. In the course of their investigation one cannot help wondering how long a period has elapsed since their formation. These channels are found in the foothills of the Sierra from the most northerly counties of California to the most southerly, and they lie at elevations varying from 200 to 9000 feet above sea level. The greater number of these channels and those producing by far the greater amount of gold are found at altitudes varying from 1000 to 4000 feet.

In some sections these channels occur singly; and being capped with a lava flow the hardness of which has resisted better than the underlying country rocks the process of erosion which has been in progress for ages, these channels are found outlined against the sky when viewed from the neighboring valleys, forming long, gently sloping flat-topped ridges. In other sections of the State are found numerous channels of varying ages, these often intersecting each other, the newer cutting across the older channels, and each with its separate lava flow. These latter often differ in character, thus affording an additional means of determining the relative ages of the underlying channels.

One of the most complex and most interesting channel systems in California is that in the vicinity of Mokelumne Hill, in Calaveras county, where are found no less than ten channels, each distinct from the other and each possessing distinctive characteristics in the material composing the gravel beds themselves and in the overlying volcanic capping. There are other channels in the region, the identity of which has not as yet been satisfactorily established. Some of these Mokelumne Hill channels were among the richest ever discovered in California and produced large amounts of gold in the early days of mining in the State.

In making a study of these channels it was found that their relative altitudes could not be taken as indicating their respective ages, though, generally speaking, the higher channels are the older and the deeper channels the later. To this there are important exceptions.

Those channels of higher altitude lie far above the recent drainage system, of which the canyon of the Mokelumne river is the deepest. Some of these old channels are 700 to 800 feet higher than the bed of the river canyon, though the deepest of the ancient river channels are deeper than the gulches in their vicinity, but still far above the canyon of the Mokelumne.

With two exceptions, so far as observed—the channels known as the Concentrator, which enters Calaveras county from Amador county on the opposite side of the Mokelumne river, and the Kreamer channel, which lies under Golden Gate ridge—the respective ages of the various channels may be determined by their relative altitudes. The two channels forming this exception not being intersected by or intersecting other channels, where a study of the occurrence—if such these be—could be made, no determination of their ages as related to other channels of the district was possible. Upon a petrographical basis the Kreamer channel, containing abundant lava, cobbles and boulders, would be classed among the more recent channels, it being evident that its formation has been subsequent to the andesitic eruption which covered some of the older channels, as its detritus is found forming a large part of the Kreamer channel, which is gold-bearing. This channel also contains quartz and bedrock material, derived directly from the bedrock series and also in part possibly from some preexisting channel, which it may have intersected in its course.

The Concentrator channel, as above stated, enters Calaveras county from Amador, lying side by side with the more recent Duryea channel for several miles, but about 80 feet lower than the latter. They pass underneath Stockton ridge, a lava-capped eminence extending several miles in a southwesterly direction from Mokelumne Hill, and underneath this ridge these two important ancient streams suddenly diverge, the Duryea channel maintaining its southeasterly course and the Concentrator channel bending abruptly to the southward, becoming lost by erosion about four miles southwesterly from Mokelumne Hill. The Duryea channel passes through Stockton ridge, emerging on Chili gulch, and is cut out by that modern stream; but as it fails to reappear anywhere in the vicinity, there is reason to believe that it joins the Tunnel Ridge channel on the opposite side of Chili gulch. The Tunnel Ridge first appears near the head of Indian gulch, east of Mokelumne Hill, in the Happy Valley mine, and flows southwestward—a broad, well-defined channel, and one which has been extensively worked by both hydraulic and drift methods. The point at which the Duryea channel joins the Tunnel Ridge channel, if such be the fact, is obscured; but either this must have occurred or the modern stream—Chili gulch—has completely eroded the ancient stream, usurping its bed and eventually cutting into the underlying bedrock 100 feet or more. This latter supposition, however, has little to support it.

The devious course of the numerous channels of the district is directly due to the process called superinduced erosion, by which streams have cut their channels in the lava beds capping the previously existing rivers, either flowing along the edge of contact between the lava and bedrock or meandering across a broad expanse of the volcanic material. Having once established their course, the erosion of the channel progressed regardless of the superior or inferior hardness of the underlying rocks. In a rude way the courses of some of these channels have a certain parallelism, indicating that of two streams whose courses lie nearly parallel, the later had first cut its way along the edge of the lava flow overlying the earlier channel. The Concentrator and Duryea channels and the Tunnel Ridge and Old Woman's gulch deep lead, on Spring gulch, are examples of this condition.

The lava flows which cap the numerous channels in different portions of the State vary greatly. Some are covered with snow-white rhyolite tuff, above which may be a breccia of andesitic materials. Others are covered with a mud of volcanic origin, with tufa and breccia overlying. Some have a cap of black basalt, though they are mostly capped by either hornblende or augite andesite. When the former, the volcanic rock occurs as a mass of broken, angular fragments in an andesitic mud. The augite andesites are more massive, and, like the basalt caps, are consolidated from a flow of molten rock. These frequently assume a columnar structure, the prisms being from a few inches to 2 feet in diameter, having four, five or six sides. They are often 8 to 15 feet in length.

The hornblende andesites are apparently older than the augite andesites and basalts. In the southern portion of the State, south of the Tehachapi mountains, the gravel channels have no lava cap, so far as observed by the writer. In the Mokelumne Hill region all of the lava caps are composed of rhyolite tuff and andesitic breccia.

Of the deepest channels—that is, those of lowest altitude, there still remain large amounts unworked by reason of the great volume of water contained and the consequent expense of mining. The Old Woman's gulch channel is one of this class and its only exposure is on Indian gulch, a mile east of Mokelumne Hill; but, unfortunately, it is where it passes under the lava hills on its downward grade, and within a mile it has passed below the drainage level of the vicinity, rendering pumping necessary to mine the deposit.

Notwithstanding these difficulties, numerous inclined and vertical shafts have been sunk along its course for several miles and a large amount of gold recovered. The gravel from this channel is of a dark olive to bluish color and the channel is called the "Deep Blue Lead." There appears to be a belief, almost universal among the miners, that channels in which the gravel is blue must necessarily be richer than those channels in which the gravel is red or yellow. The history of mining on these channels does not support this theory, nor is there any reason for such belief. The red and yellow channels (they are mostly red) owe their color to oxidation, being at or near the surface, where the drainage and atmospheric agencies during ages have completely oxidized the iron minerals, the iron oxide coloring the gravels a deep, rich red or a tawny yellow. The extensive hydraulic operations carried on here in early days has left numerous large pits, the banks of which are red or yellow, and there form a very striking and picturesque feature of the landscape.

One of the most noted ancient streams of the district is the Chili gulch channel. It has several distinguishing features and the character and color of the gravel in this channel proves that the color of the gravel has not material connection with the richness of the channel. All of those channels occurring above the drainage level of the country are red or yellow; all of those below it, as the Old Woman's gulch blue lead and the lower end of the Chili gulch channel, are blue, though the upper end of the Chili gulch channel, northeast of Mokelumne Hill, is bright red. This channel has a width of 20 to 60 feet and is very crooked in its course—the most erratic in the district. The lava cap has been removed by erosion from its upper end, which appears in scattered remnants, the recent erosion having cut out considerable portions of it, the gulches below being consequently enriched. This channel strikes directly into the north end of Stockton ridge, under which it runs for some distance, reappearing in Chili gulch winding from side to side, and at a depth of 100 feet or more below it.

The material in this channel consists of white and dark bluish quartz bowlders and cobbles, silicious brown iron stone, masses of flint, a small amount of hematite in pebbles and cobbles, considerable slaty and schistose bedrock and more or less rock of eruptive origin. The character of this material shows clearly that it is derived from the Calaveras formation lying east of Mokelumne Hill, and the channel probably has its source in Amador county in the vicinity of Volcano. It cuts through several channels under Stockton ridge, indicating that it is not the oldest channel in the district.

The Tunnel Ridge channel is a broad, remarkably straight one, which, as previously stated, first makes its appearance in the Happy Valley mine, a mile east of Mokelumne Hill. It also undoubtedly has its source in Amador county in the direction of Volcano, though its size and the volume of material it carries indicate that its source is probably in the Sierra Nevada. In this channel are found boulders of white and blue quartz weighing many tons. It also contains a large amount of slaty material and rocks derived from quartzite beds and silicious schists. Among rocks of the latter type are found pieces which may be classed as itacolumite—a flexible sandstone, this being slightly so. This rock is said to be of frequent occurrence in the Brazilian diamond fields; and although no diamonds have ever been reported from the Tunnel Ridge channel, they have been found at Volcano and at Rancheria in Amador county, a few miles distant from which direction the Tunnel Ridge channel undoubtedly came. There are no eruptive rocks in this channel, and the gold is high grade. It was noticed that in channels of this vicinity having a high grade of gold there was an absence of eruptive rocks derived from the bedrock series, though such channels might contain the later volcanic rocks.

In the Green Mountain claim of the Tunnel Ridge channel have been found some remarkable deposits of opalized wood and tons of quartz crystals of large size, some of them weighing more than 100 pounds and of unusual transparency, having nearly perfect hexagonal forms with pyramidal terminations. They are found embedded in the tufa. The opalized wood also affords specimens of great beauty, though silicified wood is not unusual in the ancient rivers. In many places the petrified stumps of large trees are found embedded in the lava or mud, on the rim of the channel, showing clearly that the trees had grown upon the bank of the ancient stream and had been enveloped in the rush of volcanic mud and sand, becoming subsequently altered to stone.

One of the most noted channels of the district is the French or Nigger Hill channel, northeast of Mokelumne Hill. Only a small remnant remains of this channel, which is said to have been the richest ever found in the district. The remnant lies on the western slope of French hill. On the east side the bedrock rises to the summit of the ridge; on the west it has been eroded till only a small portion remains. The gravel is covered by a tough, mud-colored tufa which is overlaid by red hornblende andesite. The channel was dry, accessible at each end of the remnant and consequently quickly exhausted by the early miners who employed six-shooter and shotgun, as well as pick and shovel, in the maintenance of their claims. A large amount of coarse gold was taken from this small remnant of channel. It is said upon one occasion, while contending owners temporarily left their claims and were endeavoring to adjust matters before a magistrate in the village half a mile distant, several gamblers, taking advantage of the opportunity, hastened to the mine and in less than two hours secured over $3000 with pans and rockers.

An estimate of the amount of gold taken from the channels of the Mokelumne Hill is a difficult thing to arrive at, as the sources of information have long since disappeared; but that there still remains a large amount in the unworked portions of these channels there is no doubt.

In fineness the gold of the district ranges from $17.50 to $19.50 per ounce, the latter being found in the upper part of the Tunnel Ridge channel, in and near the Happy Valley mine.

The Most Notable Electric Transmission Plant in Existence.

To-day the most notable transmission plant in existence is that of the Southern California Power Company, designed to carry 10,000 H. P. at 33,000 volts over eighty-three miles of line from the power house to the city of Los Angeles. The southern California power house is situated at the base of the San Bernardino mountains, on the Santa Ana river, and the power water intake is at the junction of Bear creek and the Santa Ana river, about seven miles below the famous Bear creek dam. The water in this river, like all waters in southern California, is owned by water companies, and as soon as it reaches the valley it is led off in irrigation ditches in different directions. Under these conditions, any power company using the water must not interrupt the flow, and the regulation of the Pelton water wheels which are used must be by deflecting nozzles. The water is carried about two and a half miles, 80% of which is through tunnels, and the rest of the canal is open masonry and wooden flumes. The elevation at the intake is 3422 feet above sea level, and that of the power house 2670 feet. The difference, less the grade of the canal, gives a static head of 735 feet on the wheels.—Cassier's Magazine for November.

Mines of Ouray County, Colorado.

The American-Nettie M. Co. of St. Louis own and operate the American-Nettie mine, and work the O. & N. Tunnel mine under lease. The two properties adjoin each other and are situated along the rocky cliffs, nearly 2000 feet above the valley. The Nettie ores are found in a contact ledge that cuts the mountain almost horizontally, the ore occurring in irregular shoots and kidneys, extending from shale above into the quartzite below. The earlier workings were in oxidized ore, very rich in gold; later workings have brought them into iron and copper sulphides at greater distance from the surface. The property has been operated about ten years and the underground workings aggregate about five miles of drifts and tunnels. Present limits are about 2000 feet from the surface in a horizontal line. About 100 tons per month are being mined which is sufficiently high grade to ship direct to the smelters. Forty-two men are employed.

The Bachelor mine is developed by three tunnels. The lower one of these runs 750 feet as a crosscut to the vein, then follows on the latter 1300 feet. At a point in this tunnel, 730 feet from entrance, a shaft sinks 115 feet by the side of the ore body. The second tunnel, 265 feet above the first, and the third tunnel, 90 feet above the second, each crosscuts 300 feet to the lead, then drifts on the latter about 1300 feet. This system of tunnel work is all connected by winzes and shoots. About twenty-two cars per month are shipped direct to the smelters and the remainder is run through the Bachelor mill, the product of the latter being eighteen cars of concentrates per month. The mill is equipped with crushers, rolls, revolving sizers and Bartlett concentrators, and operated by a gasoline engine. The Bachelor milling ores are of gray copper and zinc base, carrying values of 8% to 10% lead and 20 to 25 ounces silver. The concentrates carry 30% to 35% lead and 100 to 150 ounces silver.

The Caliope, belonging to C. H. Nix, and in charge of F. A. Sparks, is operating successfully. At a point in the tunnel, 1650 feet from the entrance, a shaft has been sunk 75 feet on the ore body, from which present product comes. The principal value in the ores is silver and lead. The output is six to seven cars per month of concentrates and eight cars per month of crude ore for the smelters, making 360 tons of ore per month.

The Neodesha, which is supposed to have the same ledge as that of the Bachelor, is being worked under lease. A tunnel has been driven to the ore body, which comprises gray copper, silver and lead, shipments of which amount to about three cars per week.

The Camp Bird mine has a location at the head of Imogene basin, at an altitude of over 11,000 feet, and is only about two miles from the Tom Boy mine in Savage basin, a lofty mountain spur separating the two basins. The Camp Bird vein trends eastward and westward along the northern slope of the range and the Tom Boy parallels it on the opposite side. A crosscut tunnel strikes the Camp Bird ledge at right angles, 700 feet from tunnel entrance. The vein is between well-marked trachyte walls, runs from 20 inches to 8 feet in width and dips slightly toward the south. The ores are a rather hard sugar quartz, fine in texture, bearing free gold, with streaks of sulphurets. The walls, while of a trachyte nature, show evidence of being sedimentary in character. On the tunnel level there are 4000 feet of drifting on the vein—2000 feet east and same distance west from the crosscut. This work shows that while the ledge waves considerably, it maintains a straight east and west course. At a point farther down the slope a new tunnel, 7x8 feet in size, is being driven to crosscut the ledge 300 feet lower than the present workings and about 2000 feet from the tunnel entrance. At present the breast is in about 1400 feet. When this tunnel shall have reached completion the output of the mine will doubtless come through it, as it will be equipped with electric haulage facilities. At the mouth of the new tunnel is the terminal of the tramway line which delivers the ore to the Camp Bird mill, three miles farther down the canyon. Near the same tunnel is the new mine boarding and rooming house, 40x150 feet and three stories high, with dining room 40x82 feet; forty-seven rooms 14x14 feet, heated throughout by hot water and lighted by electricity, with bath and wash rooms equipped in the same fashion. The kitchen is provided with steam cooking apparatus. The power and light at the mine are furnished by electric currents transmitted from Ames in Ophir canyon, twenty-three miles away.

The Camp Bird mill has forty stamps, 800-pound weight, dropping ninety to the minute, which crush from 100 to 120 tons of ore per twenty-four hours. The machinery is run by water, assisted by steam power in the winter season. About 70% of the values are saved on the amalgam plates, the remainder in concentrates from twenty Frue vanners. An addition is being built to the mill for the purpose of milling lead-silver ores which come from a different mine under the same ownership. The entire property belongs to Thos. F. Walsh of Ouray; it is under the active management of J. W. Benson, with W. H. Coates as mill superintendent and E. Collins as mine superintendent.

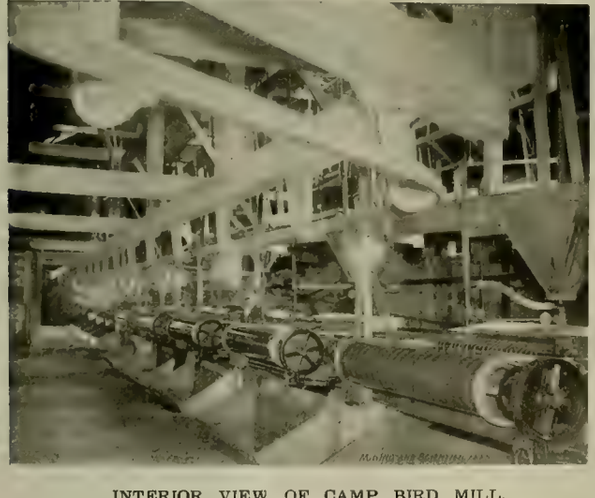
As Imogene and Savage basins are complements and opposites, as above described, so Marshall and Yankee basins similarly match each other, the former facing toward Telluride and the latter toward Ouray. On the lower benches of Yankee is the deep shaft and incline of the Virginius mine; on a bench 2000 feet below it is the entrance to the Revenue tunnel and the 80-stamp concentration mill, all the property of the Caroline M. Co. The tunnel and mill are at an altitude of 10,300 feet and the shaft house of the Virginius mine 12,300 feet. The Revenue tunnel, equipped with electric haulage apparatus, has reached a point 7600 feet from the entrance, giving a vertical depth of 3000 feet to the surface. The Virginius shaft starts from an interior tunnel station, sinks vertically 1100 feet to a point where it connects with an incline, which sinks to the Revenue tunnel, a vertical depth of 1100 feet farther, making a continuous passage of 2200 feet from tunnel level to collar of shaft. Near the breast of Revenue tunnel a new vertical shaft is being sunk adjacent to the hanging wall of the ore body. It is to be sunk to 1100 feet depth, with the intention of running crosscuts through the ledge at 600 and 1000-foot stations. Shipments from this property amount to about 1000 tons per month of sorted ore and concentrates. The ore is a silver-lead composition, that which is milled being reduced in the ratio of six to one. The output all comes through the Revenue tunnel and from above the tunnel level. Mill, compressor, tunnel cars, etc., are run by electric power, generated by water pressure at two power plants several miles down the canyon. However, a new 90 H. P. engine has been installed at the mill to supplement the electric power during the winter season. The illustration presented herewith gives a view of the mill and other buildings, including the covered car trackage



VIEW OF BUILDINGS AND TUNNEL ENTRANCE, CAMP BIRD MINES, IMOGENE BASIN, NEAR OURAY, COLO.



BOARDING HOUSE, CAMP BIRD MINES, IMOGENE BASIN, OURAY, COLO.



INTERIOR VIEW OF CAMP BIRD MILL, NEAR OURAY, COLO.



VIEW OF REVENUE MILL AND OTHER EXTERIOR IMPROVEMENTS, OF CAROLINE MINING CO., SNEFFELS, COLO., LOOKING TOWARD OURAY.

from mill to tunnel. E. A. Krisher is mine superintendent and W. A. Garrett mill superintendent.

The Grizzly Bear mine, located up Bear creek, on Red Mountain road, is developed through three tunnels, a vertical distance of about 100 feet apart, each going in on the vein of siliceous ore, bearing gold and silver. The lower tunnel has been driven 600 feet.

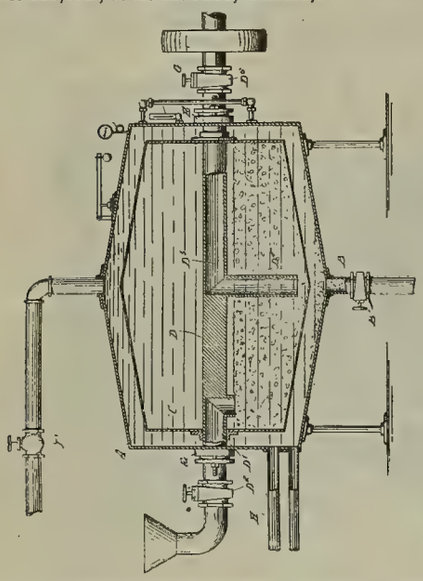
Ouray, Colo., Oct. 28th, '99. WASCOTT.

Latest Mining and Metallurgical Patents.

Patents Issued Oct. 31, 1899.

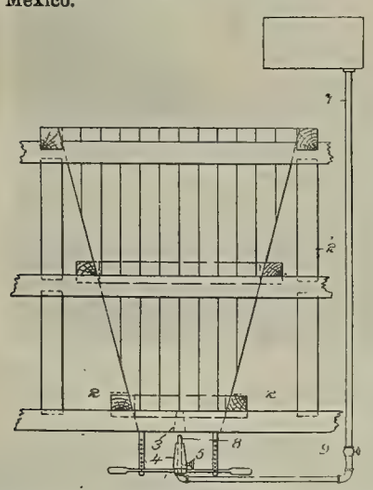
Specially Reported for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR SEPARATING SULPHUR FROM ORES.—No. 635,574; J. B. McCabe, Buffalo, N. Y.



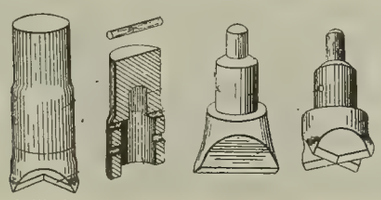
In an apparatus for separating sulphur from ores, the combination with a barrel-shaped boiler having a discharge opening in its bottom at about the center, of a barrel-shaped cylinder having a perforated rim and hollow trunnions by which it is mounted in the boiler, one of the trunnions serving as an inlet and the other as an outlet, and a pipe leading from the outlet to within a short distance of the rim of the cylinder. The combination with a boiler having a discharge opening in its bottom, a shaft mounted in the boiler and having hollow ends projecting out through the ends of the boiler, a cylinder secured to the shaft and having a perforated rim, and a pipe secured to the shaft and communicating with one of the hollow ends thereof, pipe extending to within a short distance of the rim of the cylinder.

ORE FEEDER.—No. 635,781; R. H. Jeffrey, Pinos Altos, Mexico.



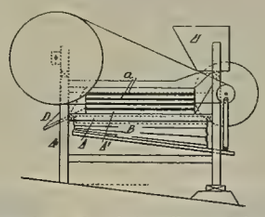
In combination, a hopper provided with a lower tapered discharge opening, a water supply pipe terminating in a nozzle, vertically adjustable with respect to discharge opening, and a conical peg adjustable upon the nozzle.

DRILL.—No. 635,415; H. Aylmer, Richmond, Canada.



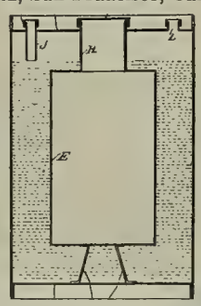
In a drill the combination with the stock having the receiving socket therein, of a bit having a shank with an inwardly tapering or inclined portion, stock having an opening leading therethrough to the inclined portion of the shank whereby an instrument can be inserted in opening and brought to bear on incline portion to dislodge the bit.

APPARATUS FOR CONCENTRATING DRY PLACER MATERIAL.—No. 635,886; A. Chaumeil, Caborca, Mexico.



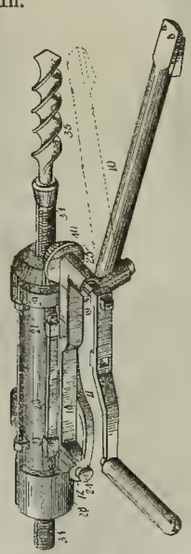
The combination of a laterally and longitudinally inclined flexible surface or support carrying a plurality of riffle bars disposed parallel with the sides of the surface or support, a hopper arranged to deliver material at the higher end of the surface or support, spouts at the lower end and along the lower side of the surface or support, and an air blast generating device arranged to deliver air blast against the under side of the surface or support. The combination of a laterally and longitudinally inclined open work framing, a flexible surface of canvas or the like on framing, a plurality of riffle bars carried by the canvas and disposed parallel with the sides of the framing, a hopper arranged to deliver material at the higher end of the canvas, a partition operating to guide the material from the hopper to the canvas, a spout at the lower end of the framing, a spout at the lower side of the framing, and a bellows below the framing adapted to deliver an air blast upon the under side of the canvas.

APPARATUS FOR THAWING EXPLOSIVES.—No. 635,945; W. J. Smith, San Francisco, Cal.



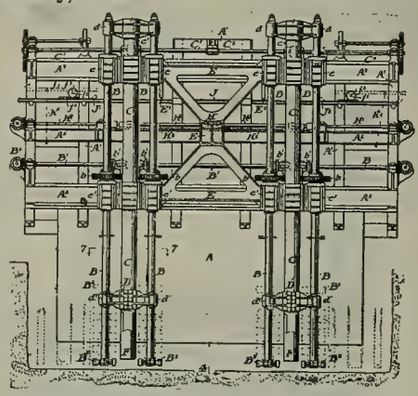
In a thawing apparatus, the combination of an outer tank, an inner tank, the walls of the tanks being spaced apart to form a chamber around the inner tank, the outer tank being provided with a chime at its upper end having openings, and with a head having an opening for the passage which communicates with the inner tank, and with an inlet and an outlet for the heating medium, the passage inlet and outlet extending above the openings in the chime.

MINING DRILL.—No. 635,905; W. R. Wallace, Mount Vernon, Ill.



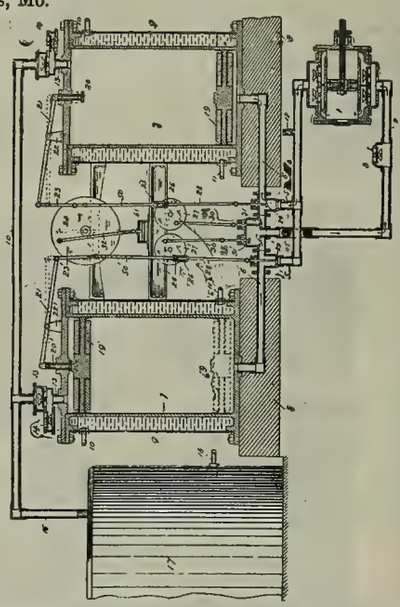
In a mining drill, the combination with a sectional boxing having a plane unthreaded bore, and means for holding the sections of the boxing in locked position, of a feed nut having an unthreaded exterior face and fitted therein to rotate on its axis, means for restraining the nut against endwise movement in the boxing, a bit shafting engaging with feed nut, and a latch device adapted to be connected to feed nut to hold the latter in a stationary position within the boxing or to permit feed nut to rotate in the boxing with the bit shaft. In a mining augur, a sectional boxing consisting of a base member having the flange and keepers on one side, and the upper member hinged to the base member and flanged to fit the flanged edge and keepers of base member, combined with a feed nut fitted in the boxing, a bar key fitted to the keepers and engaging the flanged edge of the hinged member, a latch pin separate from the bar key fitted to the hinged member to engage with the feed nut, a bit shaft, and a driving mechanism.

DREDGING MACHINE.—No. 635,890; S. A. Hill, Atlantic City, N. J.



In a dredger, the combination of a pump mounted thereon, a suction pipe vertically movable with relation to pump, a revoluble cutting shaft, means for revolving shaft, means for transversely reciprocating shaft with relation to the pump and means to adjustably shift shaft in the direction of its length and with relation to the pump, whereby the described adjustment of the cutters with relation to the dredger may be effected without moving the pump.

AIR COMPRESSOR.—No. 636,013; G. W. Tolle, St. Louis, Mo.



In an air-compressing apparatus, a suitable air pump, a storage tank or receiver, two communicating cylinders interposed between the pump and receiver, pipe connections establishing communication between the cylinders, and the pump, a piston for each cylinder, pipe connections between cylinders and receiver, suitable valves controlling the several pipes, the pump being adapted to force atmospheric air under the piston of either cylinder, and subsequently circulating such compressed air alternately from one cylinder to the other, and a check valve located in the path of the supply pipe of the pump for permitting the flow through the pump of additional atmospheric air into the cylinders to effect the reciprocation of the pistons and forcing the air in front of such pistons into the receiver. A receiver, a series of two cylinders communicating therewith, pistons for cylinders, an air pump, a pipe connecting the bottoms of the cylinders with the air pump, an air-induction pipe leading from the pump to connecting pipe, an air-delivery pipe leading from the pump and termining in two branches which in turn communicate with connecting pipe, a series of controlling and air valves located in proper positions in pipes, whereby the pump is adapted to first pump air into one cylinder under the piston thereof, and subsequently pump the air so forced into the other cylinder, and then back into the first, and a check valve located in the path of the supply

pipe of the pump, for automatically permitting an increase of the initial quantity of air by fresh additions from the atmosphere with the consecutive reciprocations of the cylinder pistons, the latter in their operations forcing the air which is in front of or above them. A valve-revolving disk, slotted links connecting valve-reversing disk to valve-actuating disks, a plunger for each cylinder, link or lever connections between the plungers and valve-reversing disk, a piston for each cylinder, suitable inlet and check valves for the several pipes, an air cylinder or dash pot and valve-reversing disk.

PROCESS OF TREATING ORES CONTAINING PRECIOUS METALS.—No. 635,793; F. W. Marting and F. Stubbs, Sheffield, Eng.

The treatment of ores or tailings containing the precious metals by finely dividing the ore, mixing it with calcium carbide and moistening the mixture with water.

The Use of Vats in Place of Zinc Boxes.

The rectangular extractor box, as used for zinc shavings or a zinc couple in the precipitation of gold from cyanide solutions, has undergone practically no change, except increase in size, since its adoption by J. S. MacArthur and introduction here in 1890, says W. A. Caldecott in the Journal of the Chemical and Metallurgical Society of South Africa. As is well known to the majority of our members, it has certain mechanical disadvantages, the most obvious being the tendency of the solution passing through it to travel up the sides and particularly up the corners of the compartments, thereby forming channels. Other objections in practice are the frequent liability, from faulty construction of the boxes, of the solution to leak from one compartment to another without coming in proper contact with the zinc, and the inconveniences this leakage produces in cleaning up. I am inclined to think that imperfect precipitation has occasionally in the past been attributed to chemical considerations, or to certain constituents of the solution, when the reason has been really mechanical, or the want of proper distribution of the solution so as to ensure actual contact with the zinc. Naturally, the shape of the vessel containing the precipitating agent does not influence the chemical or electro-chemical reactions upon which the precipitation of the gold depends, but the use of small vats in place of the usual type of extractor boxes obviates the mechanical disadvantages already mentioned, and in addition these vats contain about one-half more zinc per square foot of floor space than boxes. An ordinary extractor box contains zinc shavings to the extent of 35% to 50% of its total capacity, while a zinc vat of the type referred to contains 67%. The vat is designed with the object that the path of least resistance, which the solution naturally takes, shall be through the mass of the zinc, thus ensuring proper contact, rather than between the zinc and the sides of the vat. The vats have an internal diameter of 5 feet and depth of 3 feet and may be arranged in a series of three; each vat contains about 40 cubic feet of zinc. The even distribution of the solution in the vat may be readily seen in practise from the uniform rising of the bubbles of gas to all parts of the surface. The method of introduction of the solution, the packing of the zinc between the ring and the side of the vat, the large cross-sectional area of the vat, and the absence of corners all tends to prevent the formation of channels. For convenience in cleaning up, the ring to which is fastened the sieving, is made removable. The details of construction of these vats may be considerably modified, and a little consideration shows various ways of introducing the solution at the bottom and taking it off at the top. For instance, the inflow pipe may be brought down the side of the vat or introduced from the bottom, and in place of an elbow turned square down over the center, may terminate in a ring of perforated pipe. Similarly, for convenience in cleaning up, the bottom of the vat may be made slightly conical or sloping to an outlet on one side, which delivers by a launder into a settling vat, or is connected with the pump of a filterpress. The arrangement of the side pipe line, as shown in the plan, enables one vat to be cut out at a time without shutting off the other while cleaning up or dressing the zinc, and the open T-piece allows the vat to be readily emptied of solution, and likewise prevents any accumulation of air or other gas at the angle. With a precipitation plant composed of small vats as units, ease of re-arrangement or extension to any degree required is readily apparent.

As mentioned in the S. A. *Mining Journal* of the 22nd of July last, the use of these vats was begun last month on the Witwatersrand G. M. Co., and the precipitation has since been showing excellent results. W. R. Dowling, the company's cyanide manager, has kindly furnished me with the following information on the subject. Two sets of vats, of three in each series, have been employed in the precipitation of about 200 tons per day of weak (.04%) cyanide solution by means of the lead-zinc couple, the rate of flow being one ton of solution per cubic foot of zinc per twenty-four hours. The average value of the solution entering from July 24th to August 16th was 3 dwts. and of the solution leaving 2 5 grains, so that 96.5% of the gold was precipitated. Special samples, taken on August 16th, showed the following results:

	Per ton.
Solution entering first vat	2 dwts. 20 gr.
Solution leaving first vat	10 gr.
Solution leaving second vat	5 gr.
Solution leaving third vat	4 gr.

The high efficiency of the zinc in a single vat is shown by the large proportion (85%) of the total gold in solution precipitated in the first vat, the flow through which was equivalent to three tons of solution per cubic foot of zinc per twenty-four hours, or only fifteen minutes contact. These results indicate, as is likewise shown by the appearance of the zinc, that the second and third vats only require cleaning up at comparatively long intervals.

The plant has been seen in operation by several of our members, and I am sure that should any others desire to see it at work they will be afforded every facility by the Witwatersrand Co. for doing so.

In conclusion, where zinc boxes show imperfect results from any of the mechanical causes mentioned, or where the installation or enlargement of a zinc precipitation plant is contemplated, I think that the system of using small vats in place of the ordinary type of zinc boxes is worthy, for reasons given, of serious consideration.

The Transvaal at the Paris Exposition in 1900.

Of all the foreign exhibits at the Paris Exposition of 1900, the most advanced is that of the Boers of the South African Republic. Just what effect the war between England and the Transvaal will have upon this exhibit of the Boers depends upon the result of the war. The Transvaal exhibit, if carried out, will be one of the most interesting of the exposition. The French authorities have allotted the Boers about 40,000 square feet, and this limited space President Krueger proposed to fill with novel displays from the Transvaal.

The pastoral life of the Boers, with its particular originality, will be shown under the aspect of a Boer farm, and all the rustic objects for many years and now in use. This will give in the most vivid way the life of the first colonists of the Transvaal—a lifelike portrait, picturesque, amusing and instructive.

In the National Pavilion of the Transvaal, which is built in architecture after the Holland style, President Krueger intended to display all geographical documents, also exhibits of the military administration, public instruction and the very interesting Ministry of Mines.

In the Boer farm will be exhibited wild animals of the Transvaal, which the Boers take great delight in hunting and shooting. The farmhouse will be equipped with the curious household furniture used by the Boers, such as furniture, linen, dishes and kitchen utensils. In fact, it will be a picture of home life exactly as it is seen in the Transvaal. The means and methods of transportation in the Transvaal, original, primitive and unique, will also be displayed.

In the two other Transvaal pavilions will be shown how gold is taken from the earth, how it is refined, and how the ingots are worked, chiseled or struck and transformed into jewelry or coins.

The mill building for the treatment of gold ore will be composed of two parts, between which will be installed the cyanide plant in the open air, as practiced. In one of the parts will be the apparatus for crushing the ore. A battery of five stamps will be in operation. In the other buildings will be established a workshop and a laboratory.

The driving force, in the form of electric energy, will be furnished by the large central mills established by the Superior Exposition of the Champs de Mars.

Leaving the mill of the Boers, the visitors will have access to the subterranean galleries, where will be installed mine workings for the exploitation of the two great industries of South Africa—gold and coal. The Subterranean Society of 1900, to whom has been given by the French authorities of the exposition a concession of all the ground under the Trocadero, has contracted to give space to the South African Republic for the installation of underground galleries of ore and coal, and veritable work yards exploiting gold and silver will here be established.

Among the exhibits of the Transvaal, unless the war with England destroys all their plans, will be a great variety of the products and curiosities.

The display of rough metals, such as gold, iron, silver, brass, lead, zinc, silica, tin, cobalt, diamond material and cinnabar, with the machines for extracting and working the same, will be most interesting.

Under the head of military administration, will be displayed artillery projectiles, firearms, swords, knives, a graphic representation of the forts of the Boers and legislative and statistical documents.

President Krueger appointed M. Samson Commissioner General, who commenced work on the exhibit, and has pushed it with vigor and enthusiasm ever since.

The Production of Gold.

Of the $10,000,000,000 worth of gold produced in the world since the discovery of America, more than one-half has been produced since 1860 and more than one-fourth since 1885.

These facts regarding the gold production of the world are presented by compilations of the Treasury Bureau of Statistics anent the temporary suspension of gold mining in South Africa and its possible effect upon the gold supply of the world. The compilation when summarized shows that the total of gold production from 1493 to and including the estimate for 1899 amounts to $9,833,059,600.

The following table shows the gold product by centuries and fractions of centuries from 1493 to 1860, and by decades from 1860 to the close of 1899. The estimate of the Director of the Mint for the the year 1899 was $350,000,000, and, deducting $25,000,000 for the suspension of work in the Transvaal during the closing quarter of the year, would put the 1899 production at $325,000,000. The statement of the world's gold production for the period 1493–1899 is as follows:

	Production.	*Average annual production.*
1493-1600	$ 501,640,000	$ 4,644,815
1601–1700	606,315,000	6,063,150
1701–1800	1,282,805,000	12,628,050
1801–1860	2,120,444,000	15,745,280
Decade 1861–1870	1,263,015,000	126,301,500
Decade 1871–1880	1,150,814,000	115,814,000
Decade 1881–1890	1,060,055,600	106,005,560
1891–1899	1,867,971,000	204,773,555
Total 1493–1899	$9,833,059,600	

An examination of the above table and the average for each of the periods stated indicates the rapid increase in production during recent years. During the 368 years from 1493 to and including 1860 the average annual product was $12,204,087, and during the period 1861–1899 the average annual production was $136,945,015, or more than ten times the average of the earlier period. Coming down to still later years, the period 1891–1899 shows an annual average of $204,773,555 per annum, and the single year 1899, by conservative estimates, $325,000,000.

Regarding the effect of the suspension of gold production in the Transvaal, a statement of the amount of gold produced from the mines of that country, and beside it another showing the amount produced in other parts of the world, gives an opportunity to determine the probable effect.

Removing the Chinese Wall.

It is somewhat remarkable that when China is on the eve of the introduction of Western methods of engineering she should be threatened with the demolition of the most important engineering work she possesses—namely, the Great Wall, which, stretching from the sea at the 120th degree of longitude and fringing the northern frontier of the empire to the 100th degree, stands as a monument to one of the greatest rulers China ever had. Erected two hundred years before Christ, for the purpose of keeping back the warlike Tartars, the great wall of China is older by three centuries and a half than the walls of Hadrian and Antonine, in our own country. These latter are insignificant in comparison with the Chinese work, neither of them being nearly 100 miles in length, while the engineering feat of the Emperor Shih Hwangti extends from the shores of the gulf of Pe-chi-li to the remote inland Chia-yu barrier gate, a distance of 1200 miles.

The British walls have almost disappeared, being only traceable here and there by great mounds or shapeless fragments of masonry, except at a few points which owe their preservation to the care of the archæologist. The hand of time, aided sometimes by the hands of the utilitarian builder, who has found some parts of the walls convenient quarries, has slowly but surely removed almost the whole of the work of the Roman engineers. Shih Hwangti did his work in a most substantial manner, for his wall remains to-day in almost perfect condition. The conservative tendencies of the Chinese saved it from the ravages of the builder, and it has stood for centuries, not only as a wonderful monument to human industry, and patience, but also as a symbol of the immobility of the Chinese civilization. The wall proved to be of no avail to keep off the invader, and probably its demolition may be intended to show, now that China has made a start in Western civilization, she means to make up for her stationary condition during the past 2000 years.

It is stated that an American engineer is en route to China on behalf of a syndicate of Chicago millionaires, on whose behalf he is to take a share in the expected big contract to be given out by the Chinese government for the demolition of the wall. It is further stated that one French, two British and three German firms are also bidding for the work, payment for which is to be ample in the shape of rich concessions, so that out of the ruins of the wall there may arise great engineering and industrial works which may change the whole future of China.—Engineering.

Forest Ranger System.

In the eleven States and Territories of Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming there are thirty-six forest reserves, containing an aggregate area of about 46,000,000 acres. These reserves are divided into nine districts, each having a general officer, known as a forest superintendent, in charge. Each district is divided into supervisors' districts, the number depending on the number of reserves, total area and difficulties of supervision, as affected by topography and liability to fires and depredations of all kinds. For each of these supervisors' districts there is appointed an officer called a forest supervisor, who has direct charge of the reserve or a portion of a reserve forming his district. There are thirty-nine such supervisors' districts. Each reserve is divided into patrol districts, the size of each patrol depending upon topography and the liability to fires and depredations, and a forest ranger, whose headquarters shall be at some central point in his subdivision, is appointed for each such district. There are 350 patrol districts, or rangers' subdivisions, in the thirty-six reserves. Two hundred and fifty rangers for immediate duty were authorized May 2, 1899, to serve until October 15, 1899. One hundred additional rangers were authorized to enter upon duty July 25, to serve until October 15, 1899. The rangers report to the supervisors and are under their immediate supervision. The supervisors report to the superintendents and the superintendents report to the Commissioner of the General Land Office at Washington.

The forest superintendents are directly responsible to the Commission of the General Land Office for the proper administration of the reserves. They receive from the commissioner all orders and instructions, and are required to see that they are carried out. The forest supervisor is responsible for the work pertaining to his district, and for the proper discharge of duty by the rangers, and reports to the superintendent. The respective duties of these officials are described in detail in the following:

The forest superintendents are required to post themselves thoroughly as to all the rules and regulations governing the reserve, as laid down in a general circular of instructions issued June 30, 1897, and reissued with amendments August 5, 1898, and to see that these regulations are enforced, to observe the results of their operation and to report thereon. They are to obtain information against persons violating the provisions of the forest fire law, and report it to the proper United States Attorney, and to render all necessary assistance in their prosecution. They are to give special attention to the instructions regarding forest fires and to co-operate with the supervisors in all large and important fires which are liable to get beyond the control of the supervisors and rangers, and, when necessary, to employ additional help to extinguish the fires.

They are required to study the effect of sheep grazing upon the reserves; to examine as to the question of the free use of timber and stone as provided by the regulations; timber trespasses; lands in the reserves more valuable for mineral than for timber; areas in the reserves more valuable for agricultural than for forest uses. They also have charge of the appraisement of timber to be sold, and many other similar duties. They promulgate all orders from the commissioner, and examine and pass upon all reports made to him by the supervisors and rangers.

The supervisor must have his headquarters in or near the reserve of which he is in charge. He must familiarize himself with all the conditions existing in his district, especially in regard to forest fires. He must see that notices of the forest fire Act of February 24, 1897, which are printed on cloth, are posed in conspicuous places in the reserve; that all campers, hunters and others found in the reserve are duly warned as to their camp fires and their attention called to the Fire Act. They have immediate supervision of the rangers and are required to be in and through the reserve to see that the time of the rangers is fully occupied in patrolling their districts, clearing up old trails, cutting new trails and performing their duties generally. They make weekly reports of daily service rendered and monthly reports on the general conditions existing on the reserve. They also make detailed reports to the superintendent on forest fires, showing:

First Class—The number of camp or small fires found left burning, which were afterward extinguished by the forest officers or rangers.

Second Class—The number of fires (not included in the first class) which had gained considerable headway before being located and extinguished; total area in acres burned over; number of volunteers, if any, who aided; number of extra men hired, if any, to aid; total amount paid for the extra help; amount of other extra expense incurred (not including amount paid for extra help and for tools).

Third Class—Number of large and important fires requiring extraordinary effort, time and expense to extinguish (not included in the first or second class) which were extinguished; total area in acres burned over; number of volunteers, if any, who aided; number of extra men hired to aid; total amount paid for the extra help; total amount of other extra expense (not including amount paid for extra help and for tools).

All Classes—Total amount expended during the month for tools, the dates of fires, the names and addresses of the parties responsible for their starting, the origin, the damage done, the probable market value of the timber burned and the effect upon the forest cover and water supply.

The rangers are required to be constantly on guard, to patrol their districts, to extinguish camp and other fires, to report to the supervisor all fires as indicated above, and to carry out their instructions as prescribed by a general circular dated May 12, 1899. They make monthly reports of daily service rendered, which reports are examined by the supervisors and superintendents and are then forwarded by the superintendents to the United States General Land Office.

A ranger must provide himself with horse and equipment, while the Government furnishes him with the various implements necessary to open trails in the dense forest, to construct fire barriers and to extinguish and surround fires. Each ranger is provided with a nickel badge, which is worn as an evidence of his official authority.

Arizona and New Mexico.—The superintendent of the six reserves in Arizona and New Mexico is W. H. Buntain of Santa Fe, N. M. These reserves have an aggregate area of 7,234,080 acres, consisting of, in Arizona, Grand Canyon, 1,851,520 acres; San Francisco mountains, 975,360 acres; Black Mesa, 1,658,880 acres, and Prescott, 10,240 acres; in New Mexico, Pecos river, 411,040 acres; Gila river, 2,327,040 acres.

Twenty-eight rangers were assigned to this district in May for immediate duty, and on July 15 nine additional for the Arizona reserves and five additional for the New Mexico reserves, making the total force of rangers for the superintendent's district forty-two.

The twenty-eight first assigned were distributed as follows: Grand Canyon reserve five, Prescott reserve none (the supervisor acting as ranger), San Francisco mountains eight, Pecos river five and Gila river five. The fourteen additional rangers were appointed as rangers-at-large, being assigned from time to time to such reserves as the superintendent sees fit.

Northern California.—The superintendent of the three reserves in northern California is Charles S. Newhall of Fresno, Cal. These reserves contain an aggregate area of 4,923,535 acres, and consist of the Stanislaus forest reserve, 691,200 acres; Sierra forest reserve, 4,096,000 acres, and the Lake Tahoe reserve, 136,335 acres.

There are four supervisors' districts, with W. C. Bartlett, Tallac, Cal., as supervisor of the Lake Tahoe reserve, having also the general supervision of the Stanislaus, of which last-named reserve George Langenberg is the supervisor in immediate charge, reporting to Mr. Bartlett, J. W. Dobson, Raymond, Cal., supervisor of the northern division of the Sierra reserve, and Harrison White, Visalia, Cal., supervisor of the southern division of the Sierra reserve.

Twenty-six rangers were first authorized and eight additional, on duty at large, for assignment to duty on July 15. Of those for immediate duty there were assigned to the Stanislaus four and to the Sierra reserve twenty-two.

Southern California.—The superintendent of the five southern California reserves is B. F. Allen of Los Angeles, Cal. These reserves contain an aggregate area of 3,784,594 acres, consisting of the Pine Mountain and Zaca Lake reserves, with an area of 1,644,594 acres; San Bernardino, 737,280 acres; San Gabriel, 555,520 acres; San Jacinto, 737,280 acres, and the Tabuco Canyon, 109,920 acres. They are divided into five supervisors' districts.

Forty-five rangers in May and June, and ten entering on duty July 15, were authorized.

Colorado and Utah.—The superintendent of the five reserves in Colorado and the two in Utah is W. T. S. May of Denver, Colo. These reserves have an aggregate area of 4,046,720 acres, comprising, in Colorado, the Battlement Mesa, 858,240 acres; Pike's Peak, 184,320 acres; Plum Creek, 179,200 acres; South Platte, 683,520 acres, and the White River Plateau, 1,198,080 acres; in Utah, the Fish Lake, 67,840 acres, and Uintah, 875,520 acres. This district is divided into seven supervisors' districts, each reserve constituting a district.

Sixteen rangers were assigned in June for immediate duty, and eighteen additional entered on duty July 15. Of the first-named on duty two were assigned to the Pike's Peak reserve, two to the Plum Creek, three to the South Platte, two to the Battlement Mesa, three to the White River Plateau, one to the Fish Lake and three to the Uintah.

Idaho.—The superintendent of those portions of the Bitter Root and Priest River reserves lying in Idaho is James Glendenning of Grangeville, Idaho. This area consists of about 3,997,160 acres—about 3,456,000 acres of the Bitter Root and 541,160 acres of the Priest River reserve being in this State.

There are three supervisors' districts, the Bitter Root having two. Benton Mires, Elk City, Idaho, is the supervisor for the southern part of the Bitter Root and W. D. Robbins, Grangeville, Idaho, for the north end. Robert S. Bragaw, Priest River, Idaho, is the supervisor of the Priest River.

Fifteen rangers were assigned for immediate duty: ten to the Bitter Root and five to the Priest River reserve. Eleven at large for duty from July 15 were authorized.

Montana.—The superintendent of all the reserves in Montana is J. B. Collins, Missoula, Mont. These contain an area of 5,040,000 acres, comprising that portion of the Bitter Root lying in Montana, with an area of 691,200 acres; the Flathead, 1,382,400 acres; the Lewis and Clarke, 2,926,080 acres, and the Gallatin, 40,320 acres. Each of these constitutes a supervisor's district.

Twenty-nine rangers were assigned to these reserves in June for immediate duty, eight being for the Bitter Root in Montana, nine for the Flathead, six for the Lewis and Clarke and six for the Gallatin. There were also authorized for these reserves on July 15 nine additional rangers, for assignment to duty at the discretion of the superintendent, making a total force of thirty-eight rangers.

Oregon.—The three forest reserves in Oregon—the Cascade Range reserve, area 4,492,800 acres; the Bull Run, area 142,080 acres, and the Ashland, area 18,560 acres, or an aggregate area of 4,653,440 acres—constitute a superintendent's district, of which S. B. Ormsby, Salem, Or., is the superintendent.

There are three supervisors' districts, the northern division of the Cascade Range reserve and the Bull Run being under the supervision of W. H. Dufur, Dufur, Or.; the central division of the Cascade Range forming another supervisor's district, under Ralph B. Dixon of Roseburg, and the southern division of the Ashland another, in charge of Nat Langell, Jacksonville.

Forty rangers were assigned for the entire season—thirty-seven for the Cascade Range, two for the Bull Run and one for the Ashland.

South Dakota and Wyoming.—The Black Hills reserve in South Dakota and Wyoming, the Teton, the Yellowstone National Park timber land reserve and the Big Horn reserve make a district, of which C. W. Carbutt, Sheridan, Wyo., is the superintendent. The total area of these reserves is 4,407,840 acres, the Black Hills in South Dakota having 1,166,080 acres, and in Wyoming 45,600 acres; the Teton, 829,440 acres; the Yellowstone, 1,239,040, and the Big Horn 1,127,680 acres. There are four supervisors' districts.

Washington.—The superintendent of the reserves in Washington is D. B. Sheller, Tacoma, Wash. These contain an aggregate area of 8,121,880 acres, comprising that part of the Priest River reserve which lies in this State, area 103,960 acres; the Washington, 3,594,240 acres; the Olympic, 2,188,800 acres, and the Mount Rainier, 2,234,880 acres.

The Washington and Priest River form a supervisor's district, of which Edward Burin, Custer, Wash., is the supervisor; F. C. Matheson of Shelton is the supervisor for the Olympic, and George McCoy of Napavine for the Mount Rainier.

Twenty-three rangers—eight for the Washington, six for the Olympic and nine for the Mount Rainier—were authorized for immediate duty, and for duty on July 15 eleven more as rangers-at-large.

Only persons physically, as well as otherwise, qualified are selected for the position of ranger. Old age, indolence, weakness and intemperance are disqualifications which, when made known to the department, will lead at once to the dismissal of the objectionable ranger. These officers are the sentinels in the forest, and absence from their post of duty is not permissible. This regulation guarantees constant vigilance in the hour of fire peril or timber depredation.

In recent years a considerable quantity of manganese ore for use in the steel-making industry has been imported into the United States from Chili. The mines in the Carrizal district have been worked only a few years, but the ore is considered to be superior in quality to that found in other parts of the country. Recently it was announced that 25,000 tons of Chilian ore were contracted for to be delivered at Philadelphia. At a point thirty miles south of Serena, the capital of the province of Coquimbo, at an elevation of 1431 metres, it is stated that there are forty manganese mines within a radius of five miles. These mines are twenty miles from the railway at Angostura and forty miles from Coquimbo. No blasting is required. The only implement for mining is the crowbar.—Modern Machinery.

Indiana wire nail companies have made a contract with a Knightstown, Indiana, man to revive gas wells. He reports having brought in two big flows from abandoned wells, and claims to have demonstrated that the old wells are not worthless. He uses a chemical which, lowered to the bottom of the well, eats its way through the Trenton rock, dissolving and cleaning out a cement which had formed in the pores and clogs the way for the gas to pass to the well. Another charge is put down with nitroglycerine on top and shot into the rock. It is claimed the revived wells are as good as new.

Notes on Mine Surface Sampling.*

NUMBER II.—CONCLUDED.

Written by S. H. PEARCE.

Pulp Leaving Mill.—This is usually sampled, either by the automatic sampler, or by hand sampling. The latter operation consists of passing a cup, or other suitable vessel, along the stream flowing from the bottom of the plates. In some mills an arrangement of mercury traps prevents its being taken at all; in many others the space is not sufficient to allow of a large enough cup being used, in which case the cup overflows, and the sample is concentrated. There is also the danger of the cup touching the edge of the plate, where there is always amalgam present, the least fragment of which renders the whole day's sampling of no value.

This sample, under proper conditions, is a very good one, and I should always recommend its adoption as a check upon other methods.

The automatic sampler consists of a mechanical contrivance for taking a section of the pulp stream, by means of a slotted pipe, which is mechanically passed twice through the stream at each operation; for its motive power and automatic action it depends upon a supply of water, which gradually fills up a small receptacle; this, upon reaching a certain height, changes the center of gravity, overbalances, tips out the water and returns to its original position; the amount of water supplied regulating the intervals of tipping.

The two main imperfections are: that a pipe being used, there must be considerable disturbance caused in the stream when passing through it, and, therefore, the sample is affected; the other is that the position of the slot is necessarily movable, which is a drawback, inasmuch as it can be so arranged as to take almost any proportion of either pyrites, sands or slimes at will.

The wet pulp sample, when collected from the sample box, which is usually performed by first running off the clear water by means of plugs in the side of the box, and shoveling it all out into a bucket, is by no means an easy thing to deal with. The only really satisfactory way is to dry the whole sample and pass through a sieve before quartering down.

In a few cases, where the circumstances warrant, a bucket may be used, and the surplus clear water be allowed to overflow, and in such cases the pulp settles in hard layers and the water may be poured off without carrying any appreciable amount of slime. If this is the case, time and trouble may be saved by sampling the buckets with a small rod, which is made slightly smaller at the end, only great care must be taken that clean sections are obtained and nothing is left at the bottom of the hole.

Spitzlutten Concentrates.—This material is an unsatisfactory subject to handle, and one is apt to be much puzzled at the erratic results obtained at times, but it should be remembered that the object of the spitzlutte is to separate from the bulk of the mill pulp a proportion to which it is advisable to give a longer period of treatment; the material so obtained will therefore consist of coarse particles and include amalgam, etc., which has passed the traps designed to catch the same. This is one of the chief reasons why sometimes an assay of 30 dwts. is obtained where less than half that amount per ton would represent the actual value of the charge.

The only way that I am aware of that will give anything like consistent results is to take a measured quantity, say, a bucketful, of water and concentrates, every hour or like period, and collecting in a common receptacle for reduction at the end of the charge, or the twenty-four hours, as desired.

Where more than one spitzlutte is used, which is generally the case, it is of no use to take some from each, as the value of each is different, and a proper proportion cannot be obtained. The whole stream should be led into one launder, at the end of which the sample should be taken. In cases where it is not convenient to adopt a permanent arrangement, a temporary launder should be used. Silting in the launders is apt to cause concentration, and coming away irregularly seriously affects the sample.

Beyond this, the main thing is to see that the spitzlutten are working regularly and, as nearly as possible, under the same conditions always; the water supply sometimes varies and other things require attention, and I think it well to note here that it is not a good thing to regulate the concentrators first and then take the sample, or the result will be that the sample will not be what is actually in the tanks, but, rather, what ought to be obtained.

The same advice in regard to all irregularly constituted material will apply here, viz: To take as big a sample as you conveniently can, and not too quarter down too far before drying. It is advisable afterwards to grind to a 60-mesh sieve for the latter stages, as the particles are usually coarse, and the results are otherwise liable to be erratic.

Sands Originals (Hose Filled).—In the case of double-storied tanks, this is a difficult subject to sample, as in the upper or collecting tanks it is deposited unevenly, either horizontally or vertically, or in any other direction. Vertically, it differs according to the value of the rock milled; horizontally, it has a higher value in the center, and decreases with more or less regularity towards the edges of the tank, according to the method of filling adopted. The variation may be from 5 dwts. or more in the center, to 8 dwts. or less at the sides, even in a well-filled tank, and for these reasons I do not at present see how any system can be efficient.

Samples from the hose are too high, owing to a large amount of slime leaving the tank.

Cutting sections from the sides of the holes made to lower the tank is about as satisfactory as any of an unsatisfactory lot.

Rod sampling, generally, is not satisfactory, as there is a tendency for the rod to get choked up with the first few inches driven, and after that you drive down a solid rod, the bottom not being sampled at all. In the case of a closely packed mass like a hose-filled tank, this may be overcome to a great extent by taking sections of about a foot at a time; as far, however, as sampling the whole tank is concerned, this will not help you much. It is simpler to calculate from the automatic samplers, as is the present general practice.

Sands Residues.—With these we have an opportunity of sampling each truck on its way to the dump; even here we are not free from difficulty. To-day, owing to better precipitation, there is not the same need for care in the matter of draining out of gold-bearing solution, which, in many cases, by giving too low a result, was a cause of discrepancy.

In quartering down, the whole sample should be passed through a ¼-inch sieve, so that the whole can be more intimately mixed before reducing.

Slimes.—This material, on account of its uniform character, presents the least difficulty of all. Sometimes there are some sands associated, but which, with ordinary care, should give no trouble. The automatic sampler gives excellent results in any case.

In collecting this sample some care must be used in running off the supernatent water, after which it should be bailed or otherwise transferred to a bucket, seeing that nothing is left behind; here, if sufficiently thick, it can be mixed up by hand and a portion taken for assay; if preferred, a dividing funnel may be used, which is better if the pulp is very thin, or there is much sand present.

Slimes Residues.—For this material there are two methods in use: 1. From the tanks. 2. From the end of the discharge pipe.

In regard to the first one, it should be borne in mind that the residues are homogeneous, horizontally, but not vertically, and that this same requires care to obtain by any method a proper proportion of the whole. The advantage of this way is that there is less moisture, or gold-bearing solution, and therefore it is easier to handle subsequently. The disadvantages come in when the depth of charge is very great, or the tank is for any reason not well settled, in which case there is a tendency to get an undue proportion of solution, which should carry most of the gold.

One of the most important things to remember is care and regularity and cleanliness above all things.

*Condensed from Journal Chemical and Metallurgical Society of South Africa.

California at the Paris Exposition.

The mines and minerals of the State of California will be well represented at the Paris Exposition in 1900. The California Paris Exposition Commission has recently made a large shipment of minerals for the Exposition. Some of these were selected from the State Mining Bureau and the remainder is made up of collections from a number of the producing mines in the State. Another shipment of minerals and ore samples will be made at a later day, including several models of different mines, mine timbering and mining methods. A modern California quartz mill, with all its appliances, rock breaker, grizzlies, ore bin, concentrator, dynamo, etc., made to one-tenth scale, is being constructed by the California Paris Exposition Commission and will also be shown. Among the contents of the mineral exhibit is a large number of specimens, very rich in free gold, and also gold with sulphides of copper, iron, lead and telluride. An extensive display of silver, copper, lead and zinc ores is now in preparation. Illustrations of the different methods of gold mining in California will be made, and in this department a fine collection of photographs of mines will be found. Special space has been obtained for showcases, in which gold specimens are to be exhibited, and it will be the effort of the commission to secure as many valuable gold specimens as can be obtained during the next two months. Absolute insurance against loss is guaranteed to public-spirited and liberal mining men who have kindly loaned their most valuable specimens to swell this particular exhibit. A large collection of economic minerals, such as clay, slates, sandstones, marbles and other building materials, has also been made. The special exhibits of such minerals as are rarely found in the United States except in California, such as chromite, quicksilver, magnesite, bituminous rock, asphaltum, mineral oils, borax, soda, etc., will occupy a prominent place. A much larger space has recently been obtained from the United States Commissioners, which will enable us to make a much larger and better exhibit than was first anticipated. The commission has spacious offices in the prominent business center of Paris, where a fine collective exhibit of California's resources, industries, products and arts will be tastefully displayed. A. Ekman has charge of the mining department, and will go to Paris about March 1st, 1900. His present headquarters are at the California State Mining Bureau, Union Depot, San Francisco.

Don't.

Regretfully is noticed an apparent spirit of hostility to the larger city in several Western commonwealths. Among the 300 or 400 clever journals daily received are many caustic references to what is said and done in the metropolis, evincing a spirit of carping criticism, a cynical misjudging of motives that is not good for anything. Especially is this the case when reference is ordinarily made to the metropolitan press. The papers that happen to be published in the metropolis are charged with a great many sins of omission and commission and share with the citizens of the larger city in the general denunciation by a portion of the press published in less populous communities. This paper is an exception. Acknowledgement is here made of the universal kindliness of reference to this paper, and the courtesy is sincerely appreciated and heartily reciprocated. It is just because of this friendly feeling and mutual good will that this paper in all kindness ventures to suggest to some of its colleagues and coworkers in so many newspaper offices in this west half of America that it is not wise nor fair to say so many cutting things about the motives and intentions, the deed or misdeeds of the press or public happening to be resident in the metropolis. Not that such opportunity does not constantly arise; not that the metropolitan press and public are not abundantly able to take care of themselves; but because it is not business. There is nothing so cheap as a sneer, nothing so easy as to misjudge good intention and ascribe wrong motives; nothing so hard as to bridge over the rifts made by hard words. The city and the country are interdependent; one is the complement of the other; their fortunes rise and fall together, and it is bad for any commonwealth that does not realize this.

In California it is long the fashion for the interior press to "roast" San Francisco. San Francisco can do nothing good; if it, unaided and unostentatiously, raises $60,000 to welcome returning soldiers without asking a cent outside, and from motives of the purest patriotism, at once the cry goes up, "'Tis an advertising scheme; how hoggish is that town!" If a wealthy San Franciscan gives a public endowment in life, his generosity is travestied as a bid for popularity, and the inquiry is made, "What office is he after?" The same in Denver. The citizens of Colorado's metropolis have with great expense furnished the fine spectacle of the Mountain and Plain Festival, an enterprise of great value to Colorado, but from the bitter tone of some of the Colorado papers it would seem as though the idea prevailed that Denver was "cinching" the entire State, and that the whole splendid scheme was a sort of swindling game for Denver's sole benefit. Recently a Denver man bequeathed a million dollars to a worthy public benefit, and the comment of a portion of the interior press was to the effect that he was a fool. So in Portland, Oregon, and elsewhere.

It is needless to discuss the "why." The idea is to kindly suggest that such things are hurtful, that they are boomerangs. Because they are not usually noticed by city publications makes them none the less hurtful.

When people continue saying mean things about others they get to believing those statements themselves after awhile, and that, of itself, is a bad thing for the general good, which every one is supposed to foster.

Running a Blast Furnace.

Few people who have not actually run a blast furnace realize what it is to fill the capacious maw of one of those monsters. A stack of 200 tons daily capacity, running on 50% ore, must have delivered to it each day something more than 400 tons of ore, 250 to 300 tons of coke, and over 100 tons of limestone, besides sand, coal and minor supplies—say, 900 tons of raw materials. Add the 200 tons of pig iron product shipped out and we have a daily freight movement of 1100 tons, taking no note of the disposition of the slag. The mining of the ore requires the labor of 150 to 300 men; the coal mining, coke making, quarrying of limestone and transportation, at least 300 more. The furnace itself employs about 150 or more hands. Starting up a furnace of ordinary capacity, therefore, calls immediately for the labor of nearly 1000 men; for the use of at least 1000 railway cars and many locomotives; for perhaps several steamers and vessels on the lakes; for capital, from the mines to the pig iron, of one to two millions of dollars, and last, but not least, for a high order of managing ability.—Engineering Magazine.

Belt Conveyors.

A 48-page pamphlet and catalogue bearing this title has just been issued by the Robins Conveying Belt Company, 147 Cedar street, New York, and, as it is the first illustrated and complete description of the system which has come to notice, a few extracts from it will be of interest to those engaged in the mechanical handling of material:

The construction of the belt and idlers is shown in cuts Figs. 1 and 2. The dark portions of the belt are

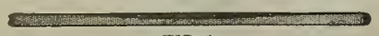


FIG. 1.

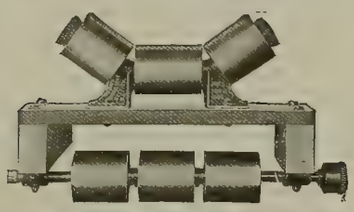


FIG. 2.

of rubber and the light of cotton duck. The heavy reinforcement of rubber in the center where the load is carried enables the belt to withstand abrasion, which would destroy an ordinary belt very quickly, and also makes the belt pliable enough to conform readily to the troughed idlers. These are lubricated by grease cups through hollow shafting, being thus rendered dust proof. These, as well as the take-ups, pillow blocks and all the other component parts of the Robins system, have been standardized and belt conveyors have been raised to the rank of finished machines, adapted to all the varying propositions in which conveying machinery is required. The illustrations here given show four of the most typical uses of belt conveyors.

Fig. 3 shows a conveyor at work carrying dredgings of rock, gravel and mud from a dredger to the river bank. The dredger is engaged in widening the Danube below Vienna, and the work required a conveyor with a capacity of 1200 tons per hour. The belt conveyor is stated by the manufacturers to be the only machine which could handle such an amount of material. The belt is reported to be still in good condition after two years of most arduous service.



FIG. 3.

Fig. 4 shows the belt conveyor used in place of a sorting table at the Sterling Iron & Zinc Co., Franklin, N. J. This is a service for which it is especially adapted. There are no teeth or links to wear or get out of pitch, nor bearings exposed to dust or grit, nor any crevices where a piece of ore can stick or jam. The belt, on account of its elasticity, will stand for several years an amount of pounding, hammering and abuse that would in a few weeks destroy a machine more rigidly constructed. For this work a wide, heavy belt is used, with idlers so shaped as to give the belt a broad, flat surface at the center, and narrow, very slightly raised sides.



FIG. 4.

Fig. 5 shows another adaption of the belt conveyor,



FIG. 5.

used to carry the ore from the crusher at a slight incline, where it obviates the necessity for using vertical elevators in crushing or milling, and, by making it possible for all the machinery to rest upon the solid ground, renders later extensions of the plant easy and inexpensive. Little power is required to run these conveyors.

Fig. 6 illustrates the Robins patent tripper in operation. By this device the belt is enabled to empty its load at fixed or movable points along its length, its position being changed either by hand or automatically. In the latter case the tripper may be made to move back and forth along the line of the belt, reversing itself at either end and distributing its load as it goes. The tripper is principally used in storing material in piles or in bins.

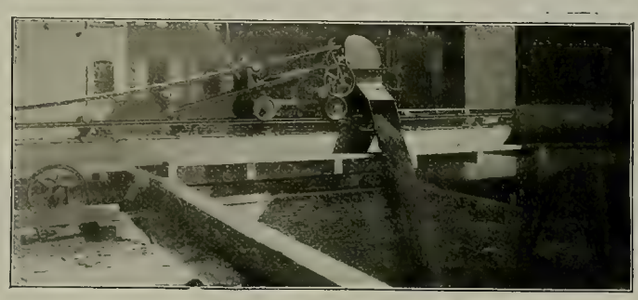


FIG. 6.

Filtration of Cyanide Solutions.

The recovery of gold from cyanide solutions is accomplished in a variety of ways. That most commonly employed is the precipitation of the gold upon zinc shavings or by the introduction of zinc powder into the gold solution. The employment of charcoal filters, while known to accomplish the desired result, is not in use except to a very limited extent. One of the new processes for the recovery of gold from cyanide is the Webb process, in which the results are obtained by arranging or building a filter with a series of cells or compartments of any size desired, filled alternately with carbon and zinc, and through these compartments the solution is caused to pass downward through the carbon and upward through the zinc. The carbon may be in the form of either coke or charcoal, and the zinc should be in a finely divided state. These compartments, when thus filled or charged, become positive and negative cells, and when flooded and connected with such a conductor as a solution of cyanide of potassium containing precious metals they generate an active electrical current and hasten the precipitation of the precious metals held in the solution, the values being deposited in or precipitated upon the carbon. To attain this object the solution is made to flow downward through the carbon in order that as much as possible of the precious metals contained shall be deposited by filtration in or upon the upper layers of the carbon, and this object is further assisted by introducing a small perforated pipe into each zinc compartment, through which at intervals a strong current of compressed air is turned. This volume of air, rising and bursting upward through the zinc, clears it of the brown powder-like deposit of precious metal precipitated upon it, forcing the deposit upward and carrying it over with the upward flow of the solution upon and into the carbon, where it is caught and held, and thus by filtration and forcing of the precipitates of the zinc upon it the upper layers of the carbon receive and soon become heavily filled with the precious metals. This richer upper portion of the carbon can be taken off from time to time for burning and smelting, and only at long intervals will a general cleanup be necessary. The air pipe in the carbon compartments is used to keep the filter free from clogging by forcing the deposits and fine particles of carbon to the top, and it is also used when cleaning up to drive the solution out of the carbon. The decomposed zinc, with smaller proportion of the precipitated values, is deposited in the bottom of the zinc compartments, from whence it is taken out and treated in the usual method where zinc alone is used.

Cyanide Poisoning.

The liability of those employed in cyanide works to poisoning by cyanide solutions or by hydrocyanic gas makes the following from the Journal of the Chemical and Metallurgical Society of South Africa of interest:

An important consideration in connection with Mr. Johnston's paper is whether peroxide of hydrogen is as good an antidote for hydrocyanic gas as for the potassium cyanide solution. The dangers of poisoning from gas are as great as from the drinking of solution. From the few experiments I have tried it seems that hydrogen peroxide (H_2O_2) is as efficacious for one as for the other. I might add my small testimony to the success of this antidote by saying that on this mine a kaffir who swallowed a fatal dose was saved by an injection of the peroxide, and was at work again in a few days.

The instability of the peroxide of hydrogen seems to mitigate its usefulness. I do not know whether it has yet been tried, but I should think that ozonic ether would prove even better than peroxide of hydrogen, for it is much more stable than the peroxide, and consequently more to be depended on.

It might be well to mention in connection with Mr. Johnston's paper that there is another danger from poisoning in the cyanide works which should not be overlooked, and that is the danger of having arsenic in the zinc, or ore, with the formation of the deadly arseniuretted hydrogen. LANE CARTER.

The above seems to be another proof of the efficacy of H_2O_2 as an antidote for cyanide poisoning. It was to be expected that H_2O_2 would prove useful in cases of poisoning by gaseous hydrocyanic acid, where any other antidote administered *per os* (*e g.*, ferrous and ferric salts and cobalt nitrate) and calculated to produce non-poisonous compounds in the stomach will be found useless. The superiority of H_2O_2 lies in the fact that it will act as an effective antidote even after the hydrocyanic gas (HCN)—whether inhaled directly or produced in the stomach from KCy—has entered the blood. It cannot be too strongly pointed out that, as a rule, KCy is rapidly decomposed by the acidity of the stomach, and the HCN thus liberated enters the blood so quickly that any antidote administered with a view to counteract the poison in the stomach itself will, in the majority of cases, prove unsuccessful. Hence the superiority of subcutaneous injection of H_2O_2, which will counteract the free hydrocyanic acid in the blood by preventing the formation of cyanide-hæmoglobine. Professor Kobert, in a letter to me, expresses the opinion "that in view of the numerous proofs, both experimentally and in practical life, brought forward for the efficacy of H_2O_2 in cyanide poisoning, he considers any fresh experiments on animals as unnecessary cruelty." The difficulty which, as Mr. Carter points out, exists in the instability of H_2O_2 will be shortly overcome, as I am informed that a local wholesale firm has ordered complete sets of apparatus for the injection of H_2O_2, containing hermetically sealed sterilized tubes with a solution of H_2O_2 ready for use, and the necessary implements for injection. J. LOEVY.

THE discovery of beach sand placers in Alaska is announced from several places. The success attending this class of mining at Cape Nome has stimulated prospecting for these deposits.

Mining Summary.

ALASKA.

The steamer Cottage City has arrived at Seattle, Wash , from Alaska with 193 passengers and $25,000 in gold. Several of her passengers were from the interior, among them being U. S. Consul McCook.

A telegram from Dawson reports mild weather in the Yukon basin. On Oct. 31st it was 30° above zero at Dawson.

A large rock fell from the mountain on the White Pass Railroad on Nov. 1st, carrying with it smaller rocks. C. Johnson and J. McLaughlin were seriously injured.

The latest "stampede" is to Cape York, in the Cape Prince of Wales district, about 100 miles north of Cape Nome. The usual "fabulously rich strike" is reported from the Siberian side, and people are reported "rushing" from Cape Nome and St. Michael in that direction.

Juneau *Record*: The Alaska-Juneau mine in Silver Bow basin has been closed down for the season of '99 after a successful season. This mine is under the management of A. Nivens and has two mills, one of thirty and the other of five stamps. This company has a payroll of $25,000 a month during the summer, which does not include the cost of transporting the concentrates four miles to Juneau for shipment to the smelter. Owing to a late summer work was not begun this year till May 1st, and the officials are now figuring on improvements and enlarging the plant for next summer's work. The ore produced is said to be the best from any of the low-grade propositions near Juneau.——Foreman Boyle of the Nowell Co.'s hydraulic mines in Silver Bow basin, reports that the water is still sufficient to operate the giants, and that his company expects to get a good head of water until November 15th. This has been one of the most successful seasons in the history of hydraulic mining in that locality, notwithstanding the fact that the season was late.

Juneau *Miner*: W. Zimmer and E. A. Klatt have located quartz claims on the east shore of Lynn canal between Dyea and Skaguay. The properties are accessible to deep water. Two men are doing development work. Assay returns give gold $3.40, silver $45.75, copper $6. The rock also carries some lead. The ledge has been traced 500 feet. Three claims have been located.

ARIZONA.

(Special Correspondence).—Geo. P. Harrington, former Supt. Crowned King mine, is pushing work vigorously on the old Tiger mill and expects soon to be pounding out gold bullion.

The old Peck Camp is again coming to the front. Copper deposits are being systematically opened up.

The Big Bug smelter, under H. B. Clifford, Mgr., is producing copper matte. D. G. Jewett is metallurgist.

Mayer, Nov. 3rd, '99.

GILA COUNTY.

The Old Dominion Co. at Globe has averted a shut down by buying a large amount of coke from the United Globe Co.

Globe *Silver Belt*: Prof. J. Douglas, who is at the head of Phelps, Dodge & Co.'s mining interests, says that the suspension of work by the United Globe Co. is temporary, made necessary by the introduction of a new furnace of 250 tons capacity and a pump of large capacity in the Hoosier shaft. These additions will consume six or eight weeks, and as a consequence operations will be suspended until the first of the year. The company has a good mine in the Gray, adjoining and connected with the Hoosier.

MOJAVE COUNTY.

Kingman *Miner*: The Midnight mine, at Chloride, owned by Keene St. Charles, has cut a large vein of shipping ore.——On the 400 level of the Tennessee mine a body of native silver ore has been struck. The old ore body is still intact.

Needles *Eye*: R. J. Dyas, who has large interests in the copper mines at Empire Flat, has sent a large barge loaded with mining supplies down the Colorado river to the mine. After discharging its cargo at the mines, the barge will be loaded with ore and towed up the river to Mellon, from which point the ore will be shipped by rail to the smelter.

PIMA COUNTY.

The discovery of molybdenite in the Santa Rita mountains is reported. The vein is 5 feet wide and contains 15% of the mineral.

YAVAPAI COUNTY.

It is reported that five shares of United Verde stock changed ownership in New York recently at $300 a share. The par value of United Verde is $10, and there are 300,000 shares. At $300 a share, the stock is worth $90,000,000. Dividends are being paid at the rate of 3% a month.

The laboratory and assay office of the Valverde Copper Co. at their new smelter at Agua Frio were destroyed by fire on the 6th inst.

There are numerous veins about the headwaters of the Hassayampa creek that contain copper sulphides with good values in gold and silver.

Journal-Miner: H. A. Kendall of Prescott is said to have recently bonded twenty-five claims owned by him in the vicinity of Jerome for $220,000.——A. J. Doran, Supt. Montgomery M. Co., which recently purchased the Accidental mine on Lynx creek, near Prescott, reports that a stamp mill will be built. Five stamps will be put in at present, but power will be provided for a larger number, and the mill will be arranged that additional stamps may be added.

Courier: Rich silver ore has been found twelve miles south of Jerome. The ore carries 400 ounces per ton silver and 35% lead. The ledge ranges from 6 inches to 2 feet in width. The property is owned by J. W. Hudgens, T. F. Peters and W. T. Hall. Mr. Hall is the manager of the McCabe mine, near the Agua Frio.

YUMA COUNTY.

It is reported that W. D. Luce will build a custom smelter in Yuma.

Natural gas has been discovered issuing from the mud in the bed of the Colorado river at Yuma.

CALIFORNIA.

Amador.

The new vertical shaft of the Mutual mine, near Sutter Creek, is 300 feet east of the ledge and down 200 feet. Stringers of quartz are being encountered. At the 500 level a station will be cut and crosscutting for the ledge begin.

The new east shaft of the Kennedy mine, near Jackson, is down near 800 feet, and sinking at the rate of 22 feet a week. This is above the average, and, with the exception of the new Utica shaft, which went down the first 1000 feet at the rate of 30 feet a week, beats the record in Amador. At the 2500 level stoping will begin.

At the South Eureka mine, near Sutter Creek, sinking continues. The shaft is down 1700 feet.

The Central Eureka is producing rich rock estimated at over $100 per ton. At the 1500 level drifting both ways on the lead is in progress. Sinking is in progress, good rock being found in both shaft and drifts.

The old village of New Chicago is again building up about the Fremont Con. mine north of Amador City.

Jackson *Dispatch*: O. M Watkins is about to open up a gravel mine near Volcano. He is also operating the Yellow Jacket, near the Defender mine in Pioneer district.——Supt. Thornton of the Shenandoah mine, near Plymouth, is preparing to sink the shaft 200 feet deeper. The north drift at the 200 level will be continued to the end line. The rock is still rich.— A shipment of bullion from the Argonaut mine, amounting to $25,000, was made on the 3rd inst.——Reports from Dr. A. L. Adams' mine, Mt. Echo district, near Ione, say he is still taking out gold in quantities.

Jackson *Ledger*: At a recent meeting of the Peerless Gold Mine Development Co , E. Ginocchio of Jackson was elected president. Lumber for the construction of buildings, etc., has been ordered. The company is looking for suitable machinery for the mine.—— The Lincoln mine, at Sutter Creek, is said to be improving. E. H. Voorheis, Supt. of the property, has been driving a crosscut west for some months, and two weeks ago he found a ledge of gold-bearing ore, which is from 10 to 12 feet wide, and will mill $10 per ton.—— The Jackson Butte M. Co. has resumed work on its mine south of Butte mountain, after a shut down of several months, under R. L. Marsh, Supt.——The Crown Point mine, at Butte City, has been rebonded to an Eastern company by the owner, T. Mello. One-half of the purchase price has been paid.——The milling of ore from the Central Eureka, near Sutter Creek, continues at the Zeila mill at Jackson.

Butte.

Oroville *Mercury*: The McLain mine, a mile from Cherokee and the same distance from Pentz, commenced operations a few weeks ago. It is known that considerable gold from the Cherokee mine escaped with the tailings. To work the tailings Mr. McLain has an elevator constructed of 11-inch pipe, similar to the Martin elevator, which, by means of a telescope joint and several ball joints, may be sunk as occasion requires. The gravel is ground-sluiced to the elevator, and is by it conveyed to the flume, which is 4 feet wide, 1½ feet deep and 160 feet long, and empties into another flume, 12 feet wide and 36 feet long, which is set at an angle to the smaller flume, to break the force of the current and to prevent the loss of gold. It requires about 400 inches of water to operate the mine, which is conveyed in half a mile of 15 inch pipe and two miles of ditch. The mine is run continuously night and day. Eight men are employed in the day and the same number at night. B. G. McLain is Supt.

Calaveras.

Vigorous prospecting is in progress in the Ford mine at San Andreas in search of a pay shoot. Large bodies of low-grade quartz have been developed and some very rich gold and telluride ore found at various portions of the mine. The company have recently bought sixty acres of land adjoining their property for $4500.

San Andreas *Prospect*: Mining operations ceased in the Stickle shaft of the Utica works this week, and the retimbering of the shaft is in progress. The old timbers, it is said, contain considerable gold from the ores which they supported, and they are being burned and the ashes panned. The air compressor to furnish the power for hoisting, and which will be run by electric power, is finished.

San Andreas *Citizen*: The Demarest G. M. Co. have bought the Murphy property, adjoining the Demarest, on which they had a bond. The winze on the 400 level is yielding rich ore on which the mill is running.——The Ellen Vannan gravel mine, six miles from San Andreas, on the Mokelumne Hill road, is the scene of great activity now. A new pipe line has been added, increasing the supply of water. Bedrock was struck and they are drifting for the east rim of the channel. They have pay on the west side and the waste from the east drift is run through the mill, four of the eight stamps being used,——The new owners of the Shirley Queen mine, on the Oxendine ranch, near Copperopolis, are working the 5-stamp mill to its fullest capacity and are preparing to put on a larger force and increase the milling capacity.——The Anderson mine, near the Martin mine, at Sheep Ranch, is to be reopened by S. Thomas and son of Oakland, W. Willoughby of Grass Valley and T. Treverow of San Francisco. There is an old shaft on the Anderson which it is proposed to sink deeper.——The new owners of the Lucas mine, on the Mokelumne river, opposite the Standard Electric Co.'s power house, have begun sinking a vertical, double-compartment shaft on top of the hill, which is calculated to strike the lead at 320 feet. They are putting in two wheels, one to run the hoist and the other the 10-stamp mill.——Gove and Child of Lodi, and Mr. Titus of Oakland, have bought the Siffre gravel mine, on the point of Stockton ridge, near Mokelumne hill.——At the Esperanza mine, near Mokelumne hill, they have received 1600 feet of new cable and are ready to start up.——The Green Mountain mine has completed a new ditch, giving them 800 inches of water and an additional pressure of 50 feet.——On the Vorlander, of which Mr. Burleson is Supt., a pump has been installed. It is operated by water and throws 3000 gallons an hour. The shaft is now down 160 feet and a contract has been let to sink an additional 100 feet at $20 a foot.

Angels *Echo*: Preparations are being made at the Welch mine, near Copperopolis, for building a mill. The vein is 40 feet in width.

Del Norte.

Crescent City *Record*: Reports from the Blue Ledge copper mines, owned by Del Norte parties, are that the vein has been tapped at a depth of 146 feet and the ore found is rich in copper. The mine is in the Siskiyous, eighteen miles from Jacksonville, Or.

El Dorado.

Work on the Stillwaggon mine at Omo will be resumed.

Several men are driving a tunnel on the Coleman mine at Omo to prospect for gravel.

The force at the Mt. Pleasant mine, Grizzly Flat, is being increased.

The Spreckels & Mulkey mine at Cedar Grove has closed down.

The Big Canyon mine at Canyon, four miles southeast of Shingle Springs, which has been idle for several months, will be started up in a few days. E. Kane, formerly Supt. Ford mine at San Andreas, will have charge. The mine is owned by Hayward & Lane.

Placerville *Democrat*: The Melton mine at Poverty Point was started up Monday under lease to a local company, of which J. Fuller is foreman.

Georgetown *Gazette*: T. M. Davis, of Greenwood, has made a strike while doing development work on his claim, north of the Argonaut mine, where he uncovered a pocket in the ledge. A single pan yielded over $300. The ledge is 3 to 4 feet wide.

Placerville *Nugget*: The Blue Gouge mine is running full blast under the management of Supt. Bind. Thirty men are employed. The ditch is nearly completed. When the grading for the mill is finished they will then put up four Huntington mills.

Georgetown *Gazette*: At the copper mine near Pilot Hill a number of men are employed putting up buildings and opening the mine. It is claimed that the ore goes 20% copper and $15 per ton gold.

Los Angeles.

The Los Angeles county courts have enjoined placer miners operating in the San Gabriel canyon, in that county. The mines in this canyon have been worked for many years and the water used for mining without complaint or hindrance, as the water after use flows back into the main channel and is used in the San Gabriel valley for irrigation. The party contesting the miners is the Electric Power Co.

Nevada.

Sutter Creek *Record*: At the Massachusetts Hill mine, near Grass Valley, they are putting in a plant to use petroleum fuel. Such a plant has been in operation for more than two years at the Maltman chlorination works, near Nevada City. Stone coal is being used at the Massachusetts Hill mine and Supt. Foote says that is cheaper than wood.

Orange.

After a trial of several months the quicksilver deposits near Santa Ana have been abandoned. A little very good ore, mostly metacinnabarite, was found, but the value was too much scattered to make mining profitable.

Placer.

(Special Correspondence).—Three-fourths of the stock of the Morning Star M. Co. has been transferred. On the 6th inst. 1803 shares of stock in that mine were bought by H. T. Power, D. W. Lubeck, J. McAninch, Mrs. I. M. Power, Mrs. D. T. Briggs and H. E. Yardley. H. T. Power was elected Pres. and Supt., vice J. H. Neff, resigned. The total number of shares in the company is 2400. The gravel channel in the Morning Star having turned in the direction of the Big Dipper mine adjoining, the Morning Star would be forced to discontinue its operations. There is still considerable gravel left in the old company's ground. The Morning Star mine has been worked for many years and employs forty men. The gravel has averaged from $7.50 to $10 per ton for the 2000 feet of channel which have been worked. The output of the Morning Star is $1000 a day.

Colfax, Nov. 8th, '99.

The Mammoth Bar mine, near Auburn, has been shut down owing to a rise in the river.

Auburn *Herald*: The Grass Ravine Co. of Ophir is running 150 tons of ore at the St. Lawrence mill, a test of fifty tons having proved satisfactory.——It is the intention of the Bellevue-Bullion Co., near Ophir, to work the two mines through the shaft of the Bullion. They have put up a 36-foot wheel at the latter, which gives them hoisting power. Sinking the Bullion shaft will be continued to 500 feet. Levels will be run and connection made between the two shafts at what is now the foot of the Bellevue shaft. The distance between the two shafts is 500 feet.

Lincoln *News-Messenger*: F. Pohl has made a strike on Bear river, near the Nevada and Placer county line. W. Taylor, Supt. Whisky Diggings mine, is interested.——At the Algol copper mine rich developments have been made recently. At the 100-foot level a 65-foot vein of copper ore was struck. Fourteen feet of the vein contains quartz bearing gold. The remainder of the vein carries copper, which varies from 3% to 40% in value. The mine is on Dry creek and is managed by Anderson Bros.— —Houchin & Dixon have begun crushing sixty-seven tons of ore from the Conrad extension, near Ophir.——The Mayflower Co., near Forest Hill, is building a new reservoir, which will give a pressure of 100 feet.——It is reported that R. Greenwood has struck some rich quartz at a point across Volcano canyon from Bath.——At the Dardanelles mine, near Forest Hill, the McDonald Co. has pumped out the slope and run through the bedrock and is breasting into the gravel.

Plumas.

Quincy *Bulletin*: W. S. Chapman has a bond on the Johnny Bull mine, near Greenville, and has fifteen men at work. Preparations are being made to erect a hoisting plant and to sink a shaft 500 feet deep.

Riverside.

The new mining camp called San Vicente is in the southwestern corner of Riverside, near the junction of the Orange, San Diego and Riverside county lines. It is here that, it is claimed, tin bearing veins have been discovered. Placer nuggets are being shown from Lucas canyon in this vicinity. A large number of claims have been located.

San Bernardino.

Needles *Eye*: L. Gray, owner of the Lum Grey properties, sixty miles southeast of Danby and twenty-three miles west of the Colorado river, has built a large barge, loaded it with a cargo of supplies and has gone down the river to the nearest point to his mines, from where they will be taken overland by wagon. He has placed in position a 3-stamp mill, which has given good returns so far. The mill was taken overland sixty miles from Danby by wagon, across the desert.

San Diego.

A Los Angeles company will bore for oil at the town of Del Mar. A large tract of land has been leased and the operations are to be carried on within the town of Del Mar, where indications of oil are found.

San Luis Obispo

San Luis Obispo *Tribune*: Paso Robles is surrounded by surface indications of oil. Near Adelaide the water of several springs has been found to be filled with hydrocarbon substances. One of these springs is on the ranch of E. Smith.

Arroyo Grande *Herald*: The Lahabra Oil Co. has shipped its drilling plant from Whittier to Arroyo Grande, to be put up in Phœnix canyon. The Puente Oil Co., through W. H. Toland, has secured leases on 25,000 acres of land on the Huasna and will commence boring in the spring. The Los Angeles Petroleum Development Co. will commence operations in December in Tar Spring canyon.

Santa Barbara.

Santa Barbara *Press*: Fifteen thousand barrels of oil were shipped from the Summerland oil fields during October. The lowest price received by any of the producers was $1 per barrel.

Shasta.

(Special Correspondence).—In the Summit mine, a copper property, near Kennett, two tunnels and a shaft aggregate 160 feet. Work continues. The property comprises eight claims.

In the Mammoth copper group a good gold prospect was found in one of the lower tunnels last week.

P. Gibney of San Francisco is having 200 feet of tunnel cut on the Oakland mine, near Muletown. The work is on the vein.

On the Brown Bear, near Shasta, 100 feet of tunnel has been contracted and work began this week.

On the Lowden & Friday property, near Kennett, comprising eight claims, work continues. The property is under bond. Last week some ore was sent to Selby's for an assay, which yielded about $5 per ton gold and silver and nearly 9% copper.

Redding, Nov. 7th, '99.

Mr. Tarbet says of the Afterthought group that has been tied up for some time by his people on a $150,000 option that they found it necessary to dismiss the proposition, as in going down with two winzes the percentage of copper was reduced, while the zinc increased. Ten thousand dollars was paid in cash for the option. Since that $8000 has been spent on development.——Steady work is progressing at De Lamar's Bully Hill group. Admittance is denied all visitors, but the report locally is that developments thus far have been satisfactory.

Redding *Searchlight*: An option on the Bennington mines, formerly the Nellie group, owned by J. Keane, near Iron mountain, comprising nine claims, has been given to San Francisco parties. It is proposed to run an 800-foot tunnel to open the ore bodies. The tunnels now in aggregate 600 feet, and the ore bodies average 2½ feet in length. The price of the property is said to be $25,000.

Sierra.

Downieville *Messenger*: F. J. Cook will begin shipping ore from the Oro Fino mine, in which he and J. Clark are interested. They have fifteen tons ready for shipment to the smelter.

Siskiyou.

Yreka *Journal*: Mr. Souther, manager for the company which will open Yreka creek with a dredger, will have seventeen carloads of machinery and lumber hauled into Yreka. ——James Ironsides, of Cherry Creek, has made a strike in his ledge on Deadwood divide, recently bonded to parties who gave up the property. Ironsides sunk a shaft 100 feet and struck a new body of ore 10 inches in width.——The Sheba M. Co. has an air compressor at the Y. R. R. depot, besides other machinery. It is reported that work will be started again.

Trinity.

(Special Correspondence).—A company, com-

posed of New York, Chicago and San Francisco people, five in all, are fitting up a hydraulic plant of considerable magnitude fifteen miles above Weaverville, on Trinity river. They are placing a 4000-foot syphon of 24-inch steel pipe and 2000 feet of hydraulic pipe. They are building a trestle across the river of heavy iron. They have bought 640 acres, known as the Bergin land, and 150 acres from a Chinese company. They have cut a three-mile ditch through bedrock, with a grade of 13 feet to the mile. The pay gravel in the 640 acres is 100 feet deep, 5000 feet long and 650 feet wide, having a 605-foot dump into the river. F. H. Hall is superintending the work. His headquarters are Weaverville.

Weaverville, Nov. 6th, '99.

Redding *Searchlight*: Since May of the present year J. S. Childs has been supervising work on the quartz property on Bully-choop. The property is being operated by thirty men. The ledge is being drifted, sinking will be commenced and work has begun on a 10-stamp mill.

Tuolumne.

R. T. Sorrenson of the Gold Bug mine, one and one-half miles northwest of Big Oak Flat, has a 4-foot ledge spotted with gold. In this claim, which has been worked extensively in a superficial way for pockets, is a dyke of diorite carrying gold in paying quantities.

A few weeks ago all the principal mines of the county were idle for lack of water. Many have resumed since the rains.

The Golden Gate mine at Sonora has commenced work again and is running with a full force. Water power is used.

A rich body of ore has been encountered in the lower workings of the Confidence mine at Confidence. This mine has produced over $5,000,000 and when owned by Ben Holliday was one of the largest producers in California.

Forty stamps were started up in the Jumper mill last week. Steam power is being used.

Within sixty days a stamp mill will be erected at the Draper mine, near Soulsbyville, the ground being already broken for it. Sinking was begun last week.

Union-Democrat: At the Hazel Dell, eight miles north of Soulsbyville, the mill starts up Dec. 1st. The 1300 feet of pipe line now being connected with the ditch taking water from Five-mile creek will give a pressure of 400 feet, and, beyond the first cost, the water is free. In the mine, since tapping the vein by means of a tunnel, drifting north and south has opened a body of good ore, 600 tons of which is on the dump. There has been 200 feet of drifting either way on a 4-foot vein. There remains 50 feet to raise to the surface with the 200-foot upraise. —— The Bonito mine, located between the Consuello and Grizzly, a mile south of Carters, owned by the J. G. Fair estate, is to be worked.——The Triumph mine, above the Grizzly, owned by A. C. Maier, is producing good ore. A tunnel is being driven on the vein which varies in size from 1½ to 4 feet. A shaft will be sunk at the mouth of the tunnel.

Sonora *Independent*: The Mt. Jefferson mine at Groveland is reported improving with development. The 10-stamp mill is being built. ——It is reported that the Mt. Zion mine, near Groveland, will commence sinking a new shaft.——The Kanaka mine is still idle. It is reported the directors have decided to sell the mine.——The Little Wonder mine, near Big Oak Flat, under the management of Milligan & McCallum, has made a strike rich in gold and sulphurets.——A rich strike was made in the King mine in Deer Flat a few days ago. The owners are Hendron & Byrne.

COLORADO.

CHAFFEE COUNTY.

Pueblo *Chieftain*: There is now going on in Turret mining camp, twelve miles north of Salida, a mining boom. A large amount of machinery has recently been taken into that camp.

CLEAR CREEK COUNTY.

The Calumet M. & M. Co. have shipped a trainload of ten cars of concentrates from the Jackson mill to Denver smelters.

The Gold Rock mine is to have a new 40 H. P. hoist. The shaft, now down 720 feet, will be sunk to 800. It is to be operated by the Springdale Co., F. Stansfield Mgr.

GILPIN COUNTY.

The Gunnell M. & M. Co., F. C. Young Mgr., has shipped its first bullion—$10,080. Seventy men are employed.

During October there were shipped from Black Hawk 296 cars of ore, aggregating 5475 tons, showing an increase of seventy-five tons over those of the corresponding month of last year.

Fifty men are employed in the Perigo, who are mostly working under lease or tribute from the Tonawanda Leasing & Mining Co., of which E. M. Messiter is Mgr. Ore is being taken out to keep twenty fast-drop stamps going at the Perigo mill, treating fifty tons per day. Other leasers working the upper workings are shipping their product to the Rollins mill, which is leased by D. C. Enearl.

Central City *Register Call*: The machinery to be placed on the Topeka mine, in Russell Gulch, is to have a capacity for working to a depth of 2000 feet, and the plant which is to replace the one recently destroyed by fire on the California will work to the 2500 level.—— The main shaft on the Cook mine, on Bobtail hill, is at a depth of 900 feet. Sinking has been stopped, but will be resumed when connections are made with the crosscut from the Gregory vein. Eighty men are employed. As soon as the new mill is completed, the force at the mine will be increased.

LAKE COUNTY.

The lease on the Ruby mine on the Adelaide park slope of Iron hill has recently been incorporated for $50,000, by W. A. Moore, J. M. Maxwell and T. Horrigan. This company has developed the property, which is on the same ore chute as the Louisville & Colorado No. 2. Large bodies of low-grade oxides and sulphides have been opened, and three eight-hour shifts are running for the Louisville ore chute.

The Penn mine on Breece hill, Leadville, produces 4000 tons of $27 gold ore monthly.

Leadville *Miner*: The Tiger mine, located on the Iowa gulch slope of Printer Boy hill, near the Continental Chief, is being reopened by T. Crocombe, general foreman of the Ibex mines, and associates. Development is progressing through the North Star tunnel, which at 450 feet will cut the ore body on its dip. The tunnel is in 400 feet and ore has been shipped from development work. A. Pasco is also interested and in charge of the work.

MINERAL COUNTY.

The unwatering of the Amethyst mine, commenced some months ago, is rapidly nearing completion. The first hole was finished last night, and the water is now running through into the Last Chance shaft and draining from there. About two weeks have been consumed in making the connection, and but one more hole is necessary to completely drain this producer.

TELLER COUNTY.

In the suit between the Jack Pot and the Doctor, at Cripple Creek, the first hearing resulted in the case being continued until Dec. 4th, '99, and meantime both parties to the suit are restrained from mining in, or extracting ore from the disputed territory. No evidence was introduced. The case was continued on the request of the Doctor attorneys for more time in which to prepare their case. If either party desires to do any work within the ground in controversy, or within the lines or possession of the other party, and the parties fail to agree upon the place or work to be done, mode of access and the persons by whom such work will be done, or upon any other terms, either party may apply to the court for leave to do such work upon forty-eight hours' notice to the other side. This order will, it is stated, in no way interfere with the operations of the Creston G. M. Co., operating the Jack Pot property.

Cripple Creek *Times*: The production of the Moon-Anchor mine is fifteen tons a day of a good grade of ore. Stoping was recently commenced in the sixth level, while extensive development work is going on north and south of the shaft in the same level. The water is lowering 8 inches a day without pumps. Two shifts are working.——Sinking has been resumed in the main shaft of the Dillon mine. It is the intention to sink the shaft to 600. The vein encountered a few weeks ago has widened to 6 feet and samples taken across it show returns of three ounces of gold to the ton.

IDAHO.

BLAINE COUNTY.

Hailey *Times*: The returns on the carload of ore shipped from Copper Basin to Salt Lake were 3 85 ounces silver, 23.55% copper, and three-tenths of an ounce of gold per ton. The dry weight was 42,500 pounds. Regular shipments will begin.

IDAHO COUNTY.

(Special Correspondence). — Moose Creek placers have closed down for winter after a satisfactory season, the first full season's run in the old channel gravel since the claim was jumped from Chinese in 1889. Operating on 30 to 50 feet of gravel, 30-inch flume, 6-inch to 12-foot grade, with 600 miners' inches of water, two giants, 4-inch and 2½-inch nozzles respectively, a trifle over 1000 cubic yards per day of gravel is broken. A shaft recently sunk on the "West Ridge" deposit of this mine shows 90 feet of gravel and no bedrock at that depth. The Idaho Co., operating American Hill placers at Elk City, operate 6-inch and 4-inch nozzles on 85 to 100 feet of gravel, using 800 miners' inches of water. The top 40 to 60 feet is stripped through 3-foot flume, 7-inch grade, the bottom elevated 23 feet by hydraulic elevator and run through 3-foot flumes, 3-inch grade. They report very satisfactory results from the season's run. Buffalo Hill, operating on 100 feet of gravel near Elk City, likewise reports a good season's run and comfortable results. This property is now principally owned by Rod Leggatt of Butte. The mine is operated through a 3-foot flume, 2-inch grade, with 700 miners' inches of water under 200-foot pressure.

The Iron Crown quartz mine at Newsome paid its first dividend in October. It is operating two Kinkead mills on 2 to 5 feet of free-milling rock, said to carry good values. An accident to its reservoir has compelled a temporary shut down.

Near the old Clearwater station, a populous placer camp in the 60's, a number of quartz prospects are attracting attention. The veins are said to be strong, carrying gold, silver, copper sulphides and galena. Some rich pieces of rock are being brought out. There is little development as yet. Several of the boys have supplies in for a winter's work, however, on their claims.

Moose Creek Placers, Newsome, Idaho, Nov. 1st, '99.

OWYHEE COUNTY.

The refinery at the De Lamar mill has been put in operation, and hereafter bullion will be again shipped instead of auro cyanides, as has been done since the leaching plant was started. The pulp taken from the presses is first dried in shallow pans in a furnace constructed for that purpose, and is then dumped into a lead-lined vat where the zinc powder is dissolved with sulphuric acid. The remaining product is melted into bars.

Silver City *Avalanche*: The transfer of the Black Jack group of mines to the Trade Dollar Con. M. & M. Co. was made last week, and Supt. Irwin of the Black Jack has turned that property over to Supt. Hutchinson, who represents the purchasing company. The deal places under one management forty-nine mining claims. The Black Jack has been a steady and profitable producer for eight years. Last spring a heavy flow of water was encountered in its lower levels, which rendered the pumping plant inadequate and the mine was closed. The acquisition of the ground will give the Trade Dollar Co. access to the Boonville and others of their claims through the Black Jack tunnel. Their tunnel being driven from Dewey will drain the lower levels. This tunnel when completed will have a length of 17,500 feet.

SHOSHONE COUNTY.

The new concentrating mill at the Sixteen-to-One mine, near Wallace, will be finished the latter part of this month.

Spokesman-Review: Clark & Sweeny, of Spokane, have a bond on seven-sixteenths of the Big Buffalo group for $87,500. Captain Woods has closed a deal at Grangeville for a bond on the controlling interest, presumably nine-sixteenths of the property. Clark & Sweeny were the first to bond this group of claims, the first locations on Buffalo Hump and the properties which caused the first stampede to that camp. The first bond was for $550,000, and the firm later concluded it was too much and threw it up.

MONTANA.

SILVER BOW COUNTY.

The dead work which the owners of the Anaconda Copper Co. are doing is interfering with the output of the mine. It is said that the former owners exhausted the ore reserves and were not particular about timbering the drifts and stopes from which the better class of ore was taken, and the present owners must retimber these portions of the mine, which prevents the taking out of ore from the richer portions of the mine while this dead work is in progress. The only available ore is from the reserve of lower grade ore. The quantity of ore being taken out is about the same as heretofore, but the net results are smaller. From an average monthly output of 11,000,000 pounds of copper, two years ago, it has fallen to 8,500,000 pounds.

Butte *Miner*: F. A. Heinze a few months ago secured a lease and bond on the Homestake mine, in Horse canyon, near Butte. He put men at work cleaning the property up. There is said to be 300 feet of water in the mine to be pumped out. When the water is under control, exploration will commence. The mine is located directly east of Butte, in a region where copper indications have been frequently struck by prospectors in small shafts and tunnels. The copper zone of Butte is recognized as being two miles long by one mile broad. Outside of that area no extensive leads have ever been found, though comparatively little work has ever been done off the main Butte hill.

Butte *Inter-Mountain*: A deal was consummated in Butte on the 1st inst. by which mining property in the southern portion of the city changed hands. The claims sold are the Red Chief and Lizzie. The former was owned by W. P. Gwinn and J. Ducie, who received $80,000 for the mineral title, including a few lots reserved for mining purposes. The Lizzie was owned by Hickey Bros., who sold the Anaconda to J. B. Haggin and M. Daly. It is south of the Moonlight. The consideration was $175,000. This also includes a few lots and the mineral right. The deal is said to be in the interest of the Amalgamated Copper Co.

NEVADA.

EUREKA COUNTY.

Eureka *Sentinel*: The Ruby Hill mines continue shipping a considerable amount of ore, taken out under the tribute system. There are twenty-five men at work at the Eureka Con. mine, fifteen at the Richmond and sixteen at the Jackson. Some of the ore is of a fair grade, but most of it is low-grade iron ore, which would not pay for extraction in the early days. The iron casing of nearly all the chambers carries more gold, in proportion to the value of the ore, than did the ore within the chambers.

ESMERALDA COUNTY.

Hawthorne *Bulletin*: Among the properties to which the Vulcan Co. has succeeded is the Parrot group of mines, five miles east from Luning. The group consists of several claims. Forty men are employed, and the company have out 5000 tons of ore. The company have a double-compartment shaft down 130 feet. ——Men are employed at Sodaville dismantling the Mt. Diablo mill and getting that place in readiness for a 75-ton smelter. The Colorado Iron Works, through its Mgr., Mr. Grant, is pushing this work.

LANDER COUNTY.

Austin *Reveille*: The Nevada Co. of Ione has purchased the Cirac group of claims, located in Union canyon, for $3000.

LYON COUNTY.

A gypsum-grinding plant is being constructed at Empire by ex-Gov. Adams of Nevada for working the deposit near Mound House.

STOREY COUNTY.

The latest telegram concerning the progress of pumping operations at the C. & C. shaft is as follows:

VIRGINIA, Nev., Nov. 9, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 115 feet and 4 inches below the 1950-foot level station. No. 2 elevator has been running continuously. JOS. R. RYAN.

The Risdon Iron Works at San Francisco, Cal., have notified the Comstock Pumping Association that the new castings for No. 1 elevator are ready for shipment to Virginia City and they expect that within a week No. 1 elevator will be ready for operation.

OREGON.

BAKER COUNTY.

At the Bonanza mine the miners struck last week upon refusal of the management to reduce the working hours on night shift from ten to nine.

Baker City *Democrat*: A strike of free gold has been made seven miles east of Baker City by Withey & Suddock, in their Golden Eagle group, located near the Flag staff and Virtue-Collateral mines. The group consists of three claims. On one claim there is a ledge 12 feet wide which assays $10.25 to $20.50 per ton, and another claim has uncovered a 15-foot lode running $12.80 to $40 per ton.

Carson *Tocsin*: A gold strike is reported from Snake river, one mile above the mouth of the Powder river on the Oregon side. The discoverer was A. Holcomb, a miner in the employ of the C. M. of O. Co. The ore is favorably located.

GRANT COUNTY.

It is reported at Susanville that the Badger M. Co., in its Badger mine, a few days ago, struck 4 feet of shipping ore.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Otto Grantz is preparing a second shipment of ore from the Hidden Fortune mine, near Terraville, to Denver, Colo. The first carload returned $79,000 and the ore now to be shipped is also very rich.

UTAH.

The October dividends paid by Utah mines amounted to $195,000, as follows: Bullion-Beck, $10,000; Daly-West, $30,000; Mammoth, $40,000; Mercur, $50,000; Petro, $5000; Sacramento, $5000; Silver King, $50,000; Swansea, $5000.

JUAB COUNTY.

Orders have been placed by the South Swansea M. Co. of Silver City for a new hoisting plant, including boilers, pump and steel cable. The boilers will have a capacity of 160 H. P. The hoisting engine will sink to a depth of 2000 feet, should such a depth be required of the plant. The management will extend the workings to a depth of 1000 feet.

SALT LAKE COUNTY.

M. Gisborn, who has run a tunnel into the old Mono mine, Dry canyon, 2300 feet, is going ahead until the ore bodies are recovered. He says the recent shipments from his camp were from the dump that was piled up with low-grade ores in the palmy days of the property, and not from new workings. The dump contains 30,000 tons of ore that is being concentrated with jigs. The tunnel is in a stratum of white limestone, impregnated with fine particles of galena, this coming in after it had passed through material that was heavily copper-stained.

TOOELE COUNTY.

High-grade ore shipments from Deep creek mines to Salt Lake are again attracting attention to that district.

The auro-cyanides shipped to Salt Lake during October were valued at $235,000.

UINTAH COUNTY.

A. D. Ferron reports 200 tons of elaterite ready for shipment from the Raven Co.'s mines in Indian canyon, and teams will haul it to the Horse Creek spur on the Rio Grande Western, a distance of thirty miles from the mines. This will be the first large shipment made by the company over its new road, and $16 per ton is saved by shipment to Horse Creek instead of to Price.

UTAH COUNTY.

M. Kelly, who has been working in the Mt. Nebo mining district, doing development work on a claim owned by Springville people, reports a 5-foot vein of high-grade ore in the claim, which goes 68% lead and $50 per ton in silver.

WASHINGTON.

FERRY COUNTY.

Spokesman-Review: The Ireland is to begin development work. It was one of the first claims located in Republic camp. The claim has been opened in several places by cuts for a distance of 400 feet. The ledge shows 15 feet of quartz on an average. The crosscuts are 6 feet deep.

Republic *Pioneer*: Work on the Mountain Lion mill, at Republic, is progressing favorably. In ten days everything will be ready for placing the stamps and cyanide tanks, and the hoist for the mine will be ready at the same time. The mine is in good condition for producing ore. There are about 4500 tons on the dump. The winze from the tunnel has reached a depth of 112 feet.

Spokesman-Review: A strike is reported in the Tom Thumb mine at Republic. The south drift at the 150 level shows 5 feet of ore which has assayed $200 per ton. It is thought that it will average $100 per ton. In the north drift is 3 feet of fair-grade ore.——Republic is to have a custom mill. It is reported that Anaconda capital is backing the enterprise.

WYOMING.

ALBANY COUNTY.

The Halleck Canyon Graphite Co. has opened a large vein of graphite in Halleck canyon, west of Laramie.

CARBON COUNTY.

Grand Encampment *Herald*: At the depth of 66 feet a new shoot was cut in the Eureka mine, near Grand Encampment. The lead is 28 inches of solid ore, 18 of it being as rich as the ore first discovered.——J. J. Mackey has located seven claims on Big creek, ten miles southeast of Grand Encampment, on the Cox lead, which is fully 40 feet in width, with ore averaging 14% copper and carrying silver and lead.

FOREIGN.

MEXICO.

Chihuahua *Enterprise*: The new 1400-foot shaft, which is the deepest in the Santo Domingo mine, Santa Eulalia district, of the Chihuahua M. Co., has 49 feet of water in it. The company has been sinking this shaft to hoist ore from side drifts and stopes. Water was struck 50 feet above the bottom. This is the first large body of water ever struck in any of the mines of this district. The regular price of water at the mines has been 12½

cents per eighteen gallons for the past year, and at times water has been very scarce in the town of Santa Eulalia. If this proves to be the water level it is a valuable strike.

BRITISH COLUMBIA.

About 700 men are employed by the mines of the Slocan, where 2500 men are usually at work. The mine managers are desirous of keeping the mines open. Some of the mines are closed altogether.

A $100,000 gold brick, the largest ever melted in a Canadian mine, is to be sent down from the Kootenai district. This year's clean up is the richest ever known in the district. The Slocan strike is still unsettled. Non-union miners being brought in has caused the strike to spread to several hitherto unaffected districts. A. W. McCune of Salt Lake will, it is said, make a test of the eight-hour law, which caused the trouble.

Spokesman-Review: J. Tichener of New York, of the British Columbia Copper Co., which owns the Mother Lode, has organized the No. 7 Mining Co., under the laws of West Virginia, to operate the No. 7 and other claims in Central camp. On the No. 7 is a 139-foot shaft, at the bottom of which are 450 feet of drifts and crosscuts. The principal values are in gold and silver. The lead on the surface has been opened by cuts for 700 feet.——A rich strike of copper-gold ore is reported from the Majestic in Central camp.——The London & B. C. Gold Fields will shortly resume work on the Norfolk, in Central camp.——The ore in the Mother Lode at a depth of 285 feet is said to be improving in value.——A. L. Watson, formerly of Rossland, has the contract to sink the working shaft of the B. C. in Summit camp an additional 100 feet.——H. N. Galer, Sec. Granby Smelter, and Eastern capitalists, have made the first payment to Rogers & Jones on the Hartford & Ranger group in Wellington camp The Canadian Pacific graders, while building the spur to Central camp, uncovered several rich ledges on the Hartford. The group will be a shipper in the spring.——W. L. Hogg of Montreal has bonded from R. Stewart the Calumet & Hecla group in Wellington camp for $50,000. The property will be developed.

Industrial Notes.

—On the Pacific coast there is a telephone to every twenty-eight inhabitants.

—Dumont, Colo., is to have an electric plant to furnish power to mines and mills.

—The Canadian Pacific Railroad will double-track its line from Vancouver to Montreal.

—Nothing but a reversal of the order closing the Philippine ports will prevent a famine in hemp.

—At Berkeley, Cal., the Sunset Telephone & Telegraph Co. are putting their wires underground.

—A large electric power plant is to be built at Flint Creek Falls, Montana, by the Montana Electric Power & Mining Co.

—The Baltimore & Ohio Railroad has strung 2000 miles of copper wire during the past year, weighing 166 pounds to the mile.

—Twenty miles of aluminum wire will be employed on the electric road now being built from Kansas City, Mo., to Leavenworth, Kan.

—Nearly $1,000,000 have been invested in gilsonite claims on the Colorado-Utah State line by Boston men, and considerable will be spent in development.

—Spokane men will put $200,000 into the building of an electric railway between Tacoma and Seattle, Wash., and expect an additional $800,000 from Eastern investors.

—A railway is to be built on the island of Hawaii from Hilo, the principal city on the eastern coast, to Makusona, with a total trackage, including branch lines, of 130 miles.

—From July 12th to Oct. 20th the White Horse, Alaska, horse railroad carried 11,000 tons of freight over its five miles of wooden length for $20 per ton. Next season the railway takes its place.

—Plans have been prepared for the construction of a railroad from Kurunegala to Kankasantural, in Ceylon. Particulars, forms and estimate of cost may be had of the Imperial Colonial agents, Downing St., London, Eng., by depositing $500.

—Near Bakersfield, Cal., the Power Development Co. will spend $100,000 replacing their present wooden flume with a tunnel through solid granite. The tunnel is 3400 feet long. It will be 7x6 feet and coated with concrete. The grade will be such that water may be carried to develop 12,000 H. P.

—The South African war has checked shipments; nearly all exports of American manufactures have been stopped until the safety of the material is assured, buyers having to stop all shipments, as the safe delivery of British goods in the Transvaal or Cape Colony will be impossible till after the cessation of hostilities.

—Aluminum is to have its first important trial as a conductor of electricity on the Chicago Northwestern elevated road. Twenty miles of 1¼-inch cables (150,000 pounds) are to be strung along the steel trestle to distribute the motive power to the trolley rails of the new road. Copper has almost doubled in price within a year; the lighter metal has dropped a shade in the scale of values.

—General Greely, Chief Signal Officer, U. S. A., says as to a Pacific cable: "In order to join closer together the United States and its Pacific colonies it is essential to span the Pacific by a submarine cable, as recommended by the President to Congress in his message of February 10th, '99. The great value of such a cable is not alone for military purposes, but more especially for the fostering of industrial interests in the new colonies and in order to facilitate commercial operations."

—Instancing the present scarcity of workmen in the Canadian West, the *American Manufacturer* notes where agents of some American contractors have been actually "stealing men." They offer higher wages and thus induce the men to go across the border. The contractors for the Ontario & Rainy River Railway report that they needed 2000 men but have only succeeded in securing 500. Wages being paid match those given in the early days of American railway construction west of the Mississippi; $2 to $3 is freely offered.

—Commerce between the United States, Hawaii and the Philippine Islands grows rapidly. The following tables show the exports to and imports from Hawaii and the Philippines in the nine months of each year since '94:

EXPORTS FROM THE UNITED STATES TO—

Nine months ending Sept. 30—	*Hawaii.*	*Philippines.*
1894	$2,431,098	357,473
1895	3,178,898	121,348
1896	2,900,807	112,148
1897	3,76 208	54,260
1898	4,579,827	84,856
1899	8 230,016	777,329

IMPORTS INTO THE UNITED STATES FROM—

Nine months ending Sept. 30—	*Hawaii.*	*Philippines.*
1894	$8,154,193	$2,307,006
1895	9,960,149	3,254,445
1896	13,602,961	4 603,823
1897	13,044,231	3,392,060
1898	14,611,285	3,164,004
1899	19,49 ¹,831	4,493,302

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING OCTOBER 31, 1899.

636,114.—TREATING ORES—Cain, Soderling & MacKnight, Bodie, Cal.
636,117.—SEPARATING BITUMEN—A. S. Cooper, S. F.
636,199.—CUE CHALKER—C. W. T. Davies, S. F.
635,757.—CAR COUPLING—C. E. C. Eddy, Tacoma, Wash.
636,136.—VACUUM TANK—L. L. Gross, Petaluma, Cal.
636,202.—ELEVATOR—C. I. Hall, S. F.
635,852.—TELEPHONE CALL APPARATUS—G. B Heath, S. F.
636,139.—FIRE ALARM SIGNAL CIRCUIT—W. R. Hewitt, S. F.
636,231.—HEEL SHAVE—E. Hoglund, Los Angeles, Cal.
635,778.—BICYCLE BRUSH—W. A. Hudelson, Jefferson, Or.
636,211.—SHOE BLACKER—T. E Lister, Los Angeles, Cal.
636,169.—DOOR OPENER AND CLOSER—J. Ohring, S. F.
636,177.—CAR SAFETY LADDER—J. H. Rapp, Fort Apache, Ariz.
635,809.—STRAW STACKER—W. W. Richardson, Pomeroy, Wash.
635,945.—THAWING EXPLOSIVES—W. J. Smith, S. F.
635,824.—LIFTING JACK—L. C. Vickrey, South Bend, Wash.
636,090.—AIR HEATER—Waterman & Morison, S. F.
636,091.—FLUID HEATER—Waterman & Morison, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Commercial Paragraphs.

THE General Electric Co. is sending three 525 kilowatt generators to Buenos Ayres, South America.

THE E. P. Allis Co. of Milwaukee, Wis., have orders for three 1500 H. P. engines for street railways in Havana, Cuba.

GEO. E. DOW of Dow steam pump fame is about to build a $50,000 five-story manufacturing establishment corner First and Natoma streets, San Francisco, the entire structure to be used in the manufacture of his pumping machinery.

THE Ratcliff Consolidated Gold Mines, Ltd., Ballarat, Inyo county, Cal., have purchased a carload of steel cable for their new double-rope tramway, 8000 feet of which is 1-inch interlocked coil rope, made by the Trenton Iron Co. of Trenton, N. J., to be used as track rope. The Vulcan Iron Works of San Francisco are building the terminals and conveying machinery, which will be shipped the 20th inst. The tramway will have a capacity of 150 tons in ten hours and will be in operation within ninety days.

Catalogues Received.

WESTINGHOUSE Railway Motors, and the Westinghouse Electric Pneumatic System for Controlling Railway and Other Motors, are the respective titles of two sumptuous pamphlets illustrating and describing such latest designed apparatus, with technical details of construction. The Westinghouse Companies, Pittsburg, Pa.

THE Jackson Drill & Mfg. Co., 1756 Larimer St., Denver, Colo., has issued a fine catalogue (No. 11) of the Jackson hand power rock drill, an illustrated description of the drill, on heavy plate paper, with full showing of the drill's construction and operation, and numerous testimonials from miners who have used and like the drill, and whose names and addresses are given. A pleased customer is always a good advertisement, and the publication of what practical men think of a device or apparatus is good business.

Recently Declared Mining Dividends.

Swansea, Utah, $5000; Nov. 10.
Mammoth, Utah, $40,000; Nov. 4.
Daly-West, Utah, $30,000; payable Nov. 20.
Bonanza M. Co., Washington, $2500; payable Nov. 20.

Personal.

C. H. LINDLEY has returned from Wardner, Idaho, to San Francisco.

F. WHITLOW is the new Supt. Lightner mine, Calaveras county, Cal.

G. G. GATES of Jackson, Cal., is in San Francisco on mining business.

T. R LOMBARD of San Diego, Cal., will develop the Cedros island gold mines.

ROSS E. BROWNE has returned to San Francisco from a professional trip to Nephi, Utah.

PROF. W. L. WATTS left San Francisco for the Los Angeles, Cal., oil field on the 9th inst.

ISIDOR DAVIDOV goes as Supt. Santa Barbara placers, Zaragossa, Antioquia, Colombia, S. A.

HUBERT VISCHER has returned to San Francisco, having completed the government work on the Yuba river, Cal.

A. P. BRAYTON SR, Pres. Pelton Water Wheel Co., San Francisco, is home from an extended European tour.

JOHN HOWELL, formerly of the Broken Hill, is inspecting the properties of the Great Australian Quicksilver Co., N. S. W.

C. W. MERRILL, who has been erecting cyanide plants in Montana and South Dakota, returns to Alameda, Cal., this week.

E. A. WILTSEE is en route from San Francisco to London. The proposed visit of John Hays Hammond is indefinitely deferred.

JOS. SELLWOOD has been appointed Gen. Supt. American M. Co., the Lake Superior department of the American Steel & Wire Co.

W. H. RANDS has been appointed government geologist Queensland, Australia, Mining Department, at an annual salary of $4000.

M. L. REQUA of San Francisco, who returned from a recent visit to Arizona on the 3rd inst., has returned to Kingman, Arizona.

COL. GEO. STONE, contractor for the coast railroad gap between Elwood and Surf, Cal., says the road will not be finished before November, 1900.

J. H. CURLE has visited 225 gold mines in the Transvaal, Australia and New Zealand, etc., and is coming to the United States to increase the list.

E. F. GROPELLO, till recently in charge of the cyanide plant at the Taylor mine, El Dorado county, Cal., left San Francisco on the 10th for Turin, Italy.

O. O. HOWARD JR., Pres. Ratcliff Consolidated Gold Mines, Ltd., and the Mt. Shasta Gold Mines, Ltd., has returned to San Francisco from New York.

J. L. FLOOD, one of the owners of the Allison Ranch mine, near Grass Valley, Cal., in company with W. R. Eckert and J. E. Walsh has made an inspection of the mine.

COL. S. H. LUCAS, who recently sold his gold mine in Calaveras county, Cal., to Mr. Posey of Colorado, has taken his residence at San Diego, Cal., for the winter season.

ED KANE has resigned the superintendency of the Ford mine, Calaveras county, Cal., and takes charge of the Hayward & Lane mine, Shingle Springs, El Dorado county, Cal.

JAS. TAYLOR, who has been in receipt of a yearly salary of $5500 as government metallurgist, New South Wales, has resigned to take charge of a mining property of his own.

F. R. MORE, Gen. Mgr. St. Anthony M. Co. of California, is in San Francisco from Omenica, B. C., and reports a prosperous season. His operations are near the Arctic circle, 700 miles north of Ashcroft, B. C.

C. MINOT WELD of Boston, Pres. Melones M. Co., has left Boston for a visit to the mine. Mr. Eustis, a mining engineer, will accompany him for the purpose, it is understood, of making an expert examination.

PAUL K. BRAWD, consulting engineer Russian Electric Co., St. Petersburg, expects to make another visit to the United States, to arrange for the Russian representation of several American machinery concerns.

F. E. WARE, Vice-Pres. Mt. Shasta Gold Mines, Ltd., and Pres. Bertha G. M. Co. of Sonora, Mexico, has gone from San Francisco to Mexico on an inspection of the new mill which is about completed at the mines.

H. F. ELBON, Pres. Arctic Hot Blast M. Co., is back from Cape Nome. He says there will be considerable litigation there in 1900. During the season water was 25 cents per bucket, beef $1.25 per pound, wood $50 per cord and coal $60 per ton.

ROBT. B. STANTON, the mining engineer who took the perilous boat ride through the Grand Canyon of the Colorado in '89, is in San Francisco from Pennsylvania. He says there are no insuperable engineering difficulties in building a railroad through that superb extent of scenery.

S. B. EVERETT, American consul at Batavia, Java, says that attempts are being made to deceive the public by reports of valuable gold mines in the islands of the Dutch colony, Celebes, Borneo and elsewhere, and that the most of the reports and prospectuses are combinations of swindling, greed and plunder.

K. TAKEDA, chief engineer Kosaka copper mines, Ri Kuchu, Japan, who has been looking at California copper methods, goes to Europe. The Kosaka is the largest copper mine in Japan, employing 3000 men, who each earn 30 cents per day. The silver is retained for Japanese coinage, and the copper exported.

F. A. CORNELL of San Francisco has returned from an extended sojourn in the placer gold mines of the Dolores river, southwestern Colorado, where the Western Electric Co. of Chicago has built a dam twelve miles above the placer deposits, transmitting power to dynamos which pump water up 100 feet into reservoirs to furnish necessary pressure to work the giants.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FLUID HEATING APPARATUS.—E. R. Waterman and R. R. Morison of San Francisco, Cal. E. R Waterman having assigned his interest to P. S Regnart of same place. No. 636,091. Dated Oct. 31, 1899. The object of this invention is to provide an apparatus which is especially designed for heating liquids for various uses. It comprises an exterior containing vessel having rigid therewith an interior double-walled chamber segmental in cross-section, said chamber having its double walls closed at the top and open at the bottom, and at one side an open communication with the exterior vessel. An electrical heater is preferably employed, and the form of the chamber is such that a free circulation between the inner and outer portions is provided so that the liquid may be further rapidly heated.

VACUUM TANK AND WATER LIFTER.—L. L. Gross, Petaluma, Cal. No. 636,136. Dated Oct. 31, 1899. This invention is designed to provide a water-lifting apparatus which can be utilized for the purpose of filling tanks with water or other liquid or semi-liquid which can be drawn into the tank by vacuum. It consists of a tank having inlet and outlet openings, a source of supply for gas-producing material, a measuring chamber intermediate between the source of supply and the vacuum tank, and this is adapted to discharge the gas-producing material into the tank. A valve stem extends therethrough having valves fixed to it with such relation to each other that when one valve is closed the other is opened, the lower valve being normally closed by a spring, and there is a lever by which the upper valve may be closed and the lower one opened. Means are provided for producing an explosion of the gas within the tank and the subsequent contraction produces a vacuum which will draw up the liquid into the tank.

DOOR OPENING AND CLOSING DEVICE.—J. Ohring, San Francisco, Cal. No. 636,169. Dated Oct. 31, 1899. The object of this invention is to provide a device for readily opening and closing doors which are distant from the operator or inconvenient to be reached, such as street doors opening upon stairways leading to flats or rooms at some distance from the door. It consists of a latch-actuating lever, a rod extending upwardly therefrom, a weighted lever and connections between the outer end of the lever and the door whereby the raising of the lever will pull the door open and the dropping of it allows the door to be closed by the gravitation of the weight. A cord is operatively connected with the weighted or an equivalent lever and passes over guide pulleys by which it is led to the operating point and the latch-actuating rod is so connected that the first pull upon the cord disengages the latch and the further movement acts to pull the door open. When released the mechanism is such that the door closes automatically.

AIR HEATER.—E. R. Waterman and R. R. Morison of San Francisco, Cal. E. R. Waterman having assigned his interest to P. S. Regnart of same place. No. 636,090. Dated Oct. 31, 1899. This invention relates to an apparatus which is designed particularly for heating air, its object being to provide a convenient heater in conjunction with a nozzle through which a current of warm air may be directed into the cavity or upon the part where it is desired to use it and to so temper the heat of this air current as to prevent its unduly distressing the patient. It comprises an outer casing having a removable handle portion fitted to the rear end, an air-conducting pipe interior to the casing, a heater surrounding the pipe, a nozzle inserted in place through the rear end of the casing with an enlarged base flange to seat against the interior of the front end of the casing, and a connection through which air is delivered to the heating pipe. An electrical heater surrounds the air pipe, and a suitable insulating material prevents the escape of the electrical current. A non-heat conducting jacket surrounds the device.

FIRE ALARM SIGNAL CIRCUITS.—Wm. R. Hewitt, San Francisco, Cal. No. 636,139. Dated Oct. 31, 1899. This invention relates to such signal systems as have two independent series in each engine house operated alternately from a central fire alarm office. When a fire alarm is received at the central office it is first repeated over one of the lines called the "main tapper line," and then sent over the other called the "main gong line." Such an alarm would indicate the number of the station at which the fire department is due; but as all the companies do not respond to every alarm, but only to such as are within their own districts, it is desirable to relieve such companies from getting up at night when the call is not in their district. The device also prevents a failure of signals in case the watchman fails to properly manipulate the switches of the local circuit. The local circuit contains gongs, releasing devices, branch circuits having different closing contacts, and a switch in the local circuit is so arranged as not to be normally closed to the different closing contacts alternately, or to the said closing contacts simultaneously, and it is also so arranged as not to be opened at any position to all the closing contacts simultaneously. In conjunction with this is a "main tapper circuit," a branch circuit including one set of the closing contacts, a relay in the local circuit of the main tapper circuit adapted to close the branch circuit. A second branch circuit includes another set of closing contacts and a main gong circuit and relay which is adapted to close the second branch circuit.

Propeller Pump on the American River, Cal.

(Continued from Page 541.)

As the water recedes the bottom is excavated, until the whole length of from 10 to 15 feet is extended, when, in a few minutes, it may be removed and another section of casing put on from the bottom by flange joint connection and shafting with screws and guides added from the head of the pump; the whole operation taking but a few minutes time, when the pump may be speeded up to lower the water coming in during the slight delay.

The principle of the pump is that the water is lifted by screws, and the guides are arranged to deliver the water from one screw to another after it has been thrown the economic distance of which the screws are capable—about five feet. The work and the pressure are equally divided among the several screws, the weight being supported from the head by roller or ball bearings. The speed of this pump is the same for all depths for a particular amount of water. An increase of speed increases the capacity of the pump, and, by a lowering of speed, the capacity of one of these No. 10's, the size here shown, may be reduced from 2600 gallons per minute, to accomodate the inflow, however small. This wide range of capacity is a very important feature and is a requirement that is met in many mines, and a pumping plant for mines should be capable of handling more water than the estimated maximum flowing into the shaft, so that any increase of inflow may be handled without resorting to bailing.

The water at Missouri Bar carried considerable quantities of fine sharp sand and some gravel, but this pump handled the work without any repair being made during the season. The parts are simple and interchangable, no valves are used in the pump, and there are no exposed bearings; any needed repairs can be made quickly and at small expense.

L. G. Harrison, general agent for the Pacific coast, 31 Main street, San Francisco, Cal., has one of these Wood's propeller pumps in practical operation at his establishment. His exhibit is an interesting one and he will be pleased to explain anything connected therewith to anyone interested in handling water. These pumps are not dependent upon suction, for any time the water recedes more shafting and runners may be added from the top or bottom. No priming is required, it being only necessary that the bottom runner or screw be in the water when starting, and the admission of air does not cause a loss of the water. They take up but small space in a shaft, or in wells without pit being dug to water lever, and may be operated on an incline or vertically.

This pump is the invention of P. K. Wood, of Los Angeles, Cal., who is the manufacturer.

American Steel & Wire Co.'s California State Fair Exhibit.

(Continued from Page 541.)

phone. When we fly great kites for scientific purposes we often use wire for a string, and we could not explore the depths of the sea without wire sounding lines. We fence our fields with wire and nail our houses with wire nails. This last use for wire is comparatively new, but it is probably now the largest one that exists. The wire nail was invented abroad. Twenty years or so ago the only places where it was seen in this country were in foreign packing boxes, in accordions and cigar boxes. These nails were all made of iron, with thin, flat heads, which were usually very ragged about the edges. The nails or heads in general use then were of square sections cut from strips of iron. To-day the cut nail has almost disappeared from general use and has been replaced by the wire nail. To drive a nail, when the tapered cut nail was the only one to be had, was an art which it was said a woman could never acquire, but any one can drive a wire nail. The way in which the wire nail has displaced the cut nail is shown in these figures: In 1866, out of a total production of 8,760,000 kegs, only 600,000 kegs, or 6.9% were made of wire. In 1896 the total production was 6,335,730 kegs, and of these, 4,719,800 kegs were wire nails, or 73.5%. Each keg weighs 100 pounds, so that of the 2,000,000,000 pounds of wire made, this industry alone consumed 633,573,000 pounds, or about one-third. Another third is used for making barbed or plain fence wires, the other third going into the innumerable manufacturers of the country, from the material which forms the hook that enables the fisherman to take his prey, to the bicycle spoke or the vibrating cords of the piano or mandolin. Without wire we could not card our wool or cotton to prepare it for shipping, nor make a loom to weave it into cloth. To-day even the largest cannons are built of wire, and England has already got a number of big guns in service made of this material, which have proved themselves far superior in many ways to those made of more solid sections. No dynamos, motors or other electrical instruments of any kind could be made without wire. The strongest of all the wires made is that for pianos and other musical instruments. This is of fine steel, and tempered, and it is calculated to be able to resist a strain of 424,000 pounds to the square inch of section.

The wire cloth makers, who make all kinds of fabrics, from mosquito netting to fence cloth with meshes six or eight inches square, use enormous quantities of wire, and another great quantity is used in making the spiral springs which are used in all kinds of upholstered furniture.

The general manner of making wire is first to roll the rods down to a convenient size for handling, and then, after tapering an end, to pass the rods through tapered holes in a plate, which grow successively smaller and smaller. The wire is drawn through these holes by means of tongs, which grip the tapered ends, and then it is wound on reels. The drawing hardens the material, and it has to be annealed at frequent intervals by heating. In drawing very fine wires of gold or silver or other precious metals, the draw holes are often drilled through diamonds or rubies, and the making of these plates is a special industry.

There are more than 1000 sizes of wire made, ranging in measurement from the minimum of one-thousandth of an inch in diameter.

This great output of a million tons of wire in the United States is practically all manufactured by the various mills of the American Steel & Wire Co. This company comprises some forty-two mills, located in the most advantageous manufacturing districts of the United States, and the American Steel & Wire Co. say that their product is vastly greater than that of any other company in the world. They lead all other wire manufacturing concerns in the world as regards the volume of their output and variety and extent of their manufactures, which comprise wire of every description, and everything made from wire—barbed wire, plain wires of every description, field fencing, poultry netting, wire ropes and cables for logging and mining, street railways, tramways, ropeways, etc., copper and insulated wires for electric light and power companies, electric street railways, telephone and telegraph companies.

In addition to the wire products proper produced by this company, they also manufacture a great many specialties, such as the Schoenberger horseshoes, Shoenberger boiler plates and sheet steel, Cleveland cold-rolled shafting, chain of every description, double pointed tacks; in fact, their line is so extensive that it is one of the greatest manufacturing institutions in the world. Their trade compasses every part of the United States, as well as North and South America, and they are making extensive shipments to all foreign countries, China, Japan, Australia, Java, Turkey, England and the Continent, as well as to St. Petersburg and Vladivostock, Russia.

The American Steel & Wire Company maintain an important manufacturing industry on the Pacific coast, their factory here being known as the Pacific Works, covering over two and one-half acres of ground located between Bay, Powell, Mason and North Point streets, in San Francisco. Their general sales offices are at Nos. 8 and 10 Pine street, San Francisco, and their branch sales agencies are located at No. 201 North Los Angeles street, Los Angeles, Cal.; 231 to 235 Pine street, Portland, Oregon; 108 West Washington street, Dexter Horton Bank Building, Seattle, Washington; and at Spokane Falls, Washington; Butte, Montana; and Salt Lake City, Utah. This company is one of the most enterprising and progressive business institutions on the Pacific coast, and are doing a great deal to assist in the development of the local manufacturing interests, as their products are largely manufactured and supplied from the Pacific Works, in San Francisco. The enterprise and facilities of this great company were well illustrated by the magnificent display of their varied products which is shown on the first page of this issue. This display was the most complete and extensive of manufactured products ever made at the State Fair at Sacramento, and was the center of attraction to the many thousand visitors to this year's State Fair. The display was thought so highly of that it received the grand gold medal for the most complete and artistic display, and in addition was also awarded five other gold medals and awards of merit for individual lines.

The policy of this company is broad-guage and progressive, their treatment of their patrons fair and reasonable, and they will be glad to have anyone interested in the subject of wire or wire products call upon them at any of their sales agencies, where they will be furnished full information regarding wire products, and accorded all courtesies possible in supplying their requirements.

In addition to their display at the State Fair in Sacramento, this company also made extensive displays of their products at the Mechanics' Fair in San Francisco, where they also received the first award of merit; at the Humboldt County Fair in Eureka, Cal.; at the State Fair in Salem, Oregon; at the Portland, Oregon, Exposition, and the Spokane Falls Exposition, at all of which places their exhibits were the center of attraction, and received much commendation from the visitors for their completeness and excellence, as well as the many interesting features in the displays.

Mameva Mining & Milling Co.'s Property.

The property of the Mameva Mining & Milling Co. of Pittsburg, Pa., embraces five claims, located in the Mameva mining district, Inyo county, Cal., bounded as follows: "Commencing at Twelve-mile spring, in Inyo county, Cal., and running northeast to the State line of Nevada, thence northerly along the State line to Stewart's Holes, thence westerly to the Armagosa, thence southerly to line opposite Twelve-mile spring, thence southeasterly to Twelve-mile spring."

H. Wisener Hammond, the secretary of the company, says: "We have been operating only a few months, with a force of from four to seven men, and an idea of the conditions existing at present can be had from the following description by our superintendent, Mr. Baxter, under date of Sept. 16th:"

"The Lookout mine is a carbonate mine, with an iron gangue, and the ore assays as high as 71% lead, $4 gold, 21 ounces silver and 12% copper. The formation is dolomite, lying on quartzite and slate, making the quartzite the foot wall and the lime the hanging; in reality, a contact. The ore occurs in caves, with an iron casing, crops for over 50 feet in width, and in all appearance is like the Richmond mine, in Eureka, Nev., which declared dividends to the amount of $9,000,000. There is a tunnel in about 50 feet, with a crosscut 6 feet, showing ore both in the face of the drift and crosscut.

"South of, and adjoining the Lookout mine, is the Copper mine, lying right in the contact, between the lime and the quartzite, a small streak of which assays 214 ounces silver and 25% copper, and the ore crops to surface in different places for about 30 feet. There has been very little work done on this as yet, it being a continuation of the Lookout mine. Adjoining the Copper mine, on the east side, is the Chief, from which assays have been had running 6% copper, 5 ounces silver and $2 gold. This mine is situated wholly in the quartzite, and the croppings are fully 40 feet wide. South of the Copper and Chief mines is the Little Mamie mine. This mine we are working at present and are ready to ship ore. The ore is a carbonate and assays from 47 ounces silver, to 110 ounces silver, 6% copper with 61% lead. The vein can be traced the whole length of the location, and there is a tunnel in about 100 feet, with a crosscut 23 feet, and the ore is showing in the face of the drift. We are sinking on the ore, which is a very soft carbonate; and the ore is mixed with crystals, in the shape of a V, specimens of which can be seen at the office of the Mameva Mining & Milling Co., 1006-7 Park Bldg., Pittsburg, Pa. In all my experience in mining, which covers a period of twenty-five years, I have never seen anything like it—that is, to appear all in one shape, none of them being octagon, all flat—and they can be shoveled out with ore. East of the Little Mamie mine is the Contact mine, which is a gold mine with quartzite foot wall and lime hanging. There is no silver in this rock, and it carries $5 in gold, and cuts clear through the formation and can be traced the whole length of the location. The croppings are exactly like the famous Keystone mine, which assayed as high as $80,000 per ton in gold."



Tunnel in Little Mamie Mine, June 24th, '99, Mameva Mining District, Inyo Co., Cal.

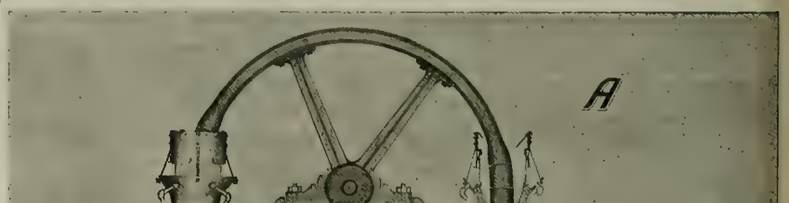
Mr. Wisener continues; "While we will within the next sixty days ship a few cars of ore, it is our intention to continue development work, with a view of placing the property in the very highest physical condition possible before we ship extensively or erect a smelter. The crystals referred to in Mr Baxter's report have been assayed by the Pittsburg Testing Laboratory, showing no silver, copper nor gold, but 74.4% lead; being termed cerussite—carbonate of lead ore.

"A new assay from the Little Mamie, subsequent to Mr. Baxter's letter of Sept. 16th, shows .11 ounce gold, or 2.27 gold, $66 silver, 54% lead, 20% copper and 5% to 10% zinc. The lowest assay in copper in any of the ore from the Little Mamie mine (which mine has been more extensively worked than the others), shows 6.2% copper—which is considered very good, in view of the large amount of ore we are exposing in this particular mine. This is sulphide ore—wet. We have a fair tonnage of ore from the Lookout mine; this is principally a lead ore—wet—and is desired by a neighboring smelter for fluxing."

Under date of Nov. 10 the company wires that the net proceeds of a recent shipment to El Paso, Texas, of fifteen tons, unassorted, were $533.68.

The Ideal Stamp Mill.

Herewith is presented two illustrations of a stamp mill recently patented by A. C. Pratt, 1 Crocker Bldg., San Francisco, Cal. That marked A shows pitman connection for any power, and also gives outside view of one mortar and section of the other. The one marked B shows it with cylinder for direct application of steam.





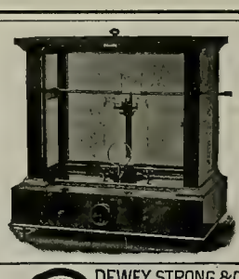
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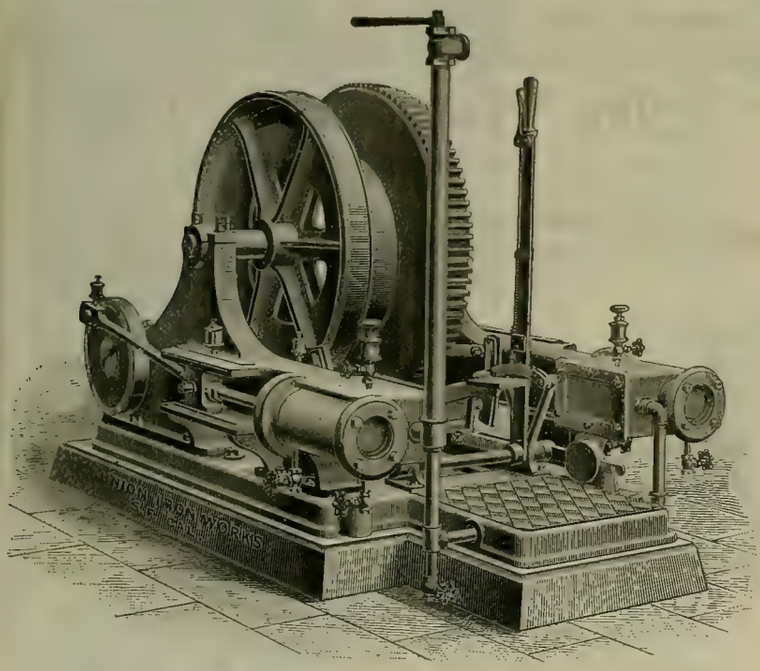
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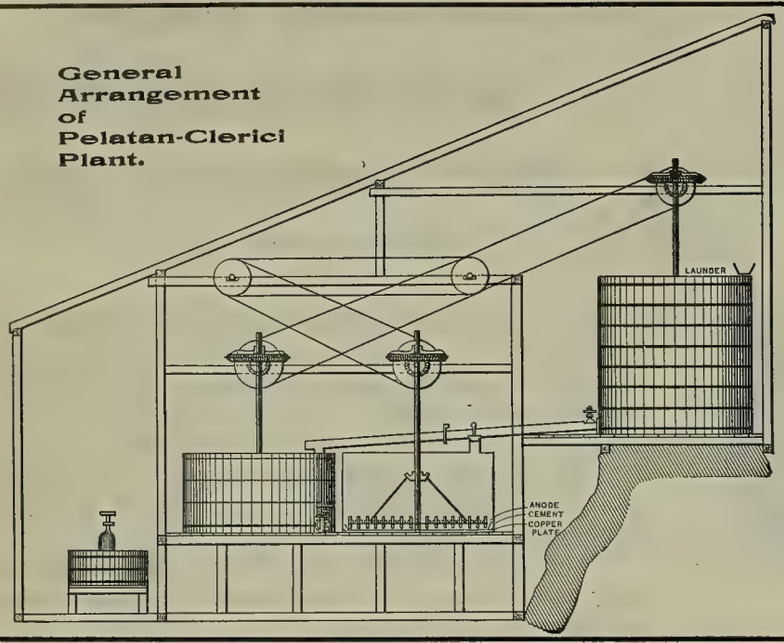
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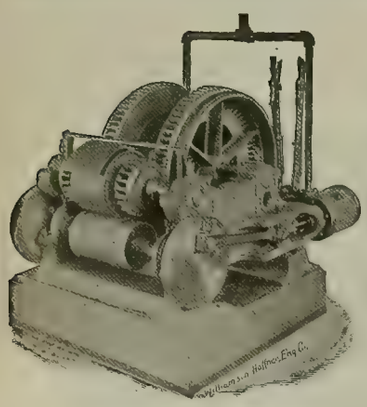
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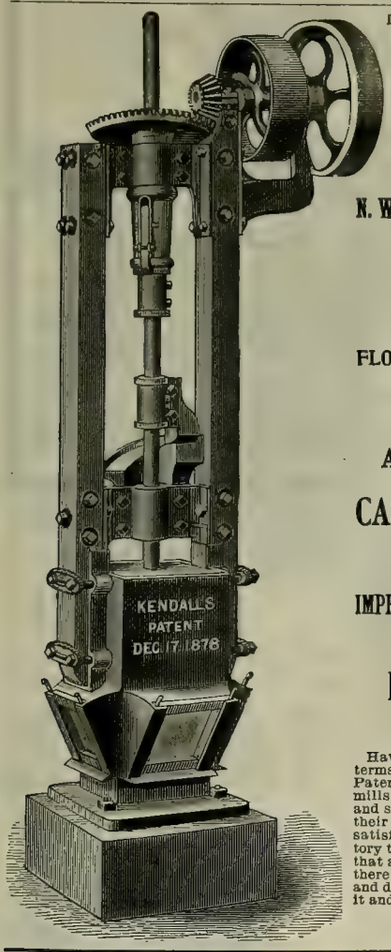
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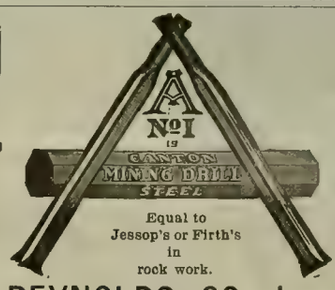
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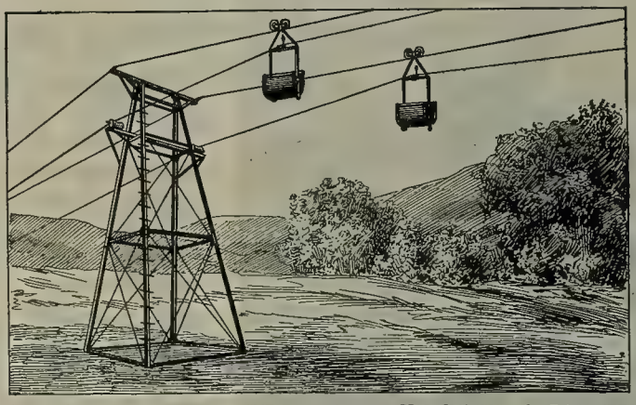
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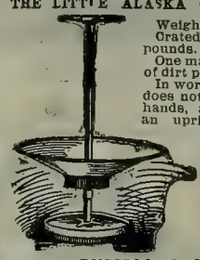
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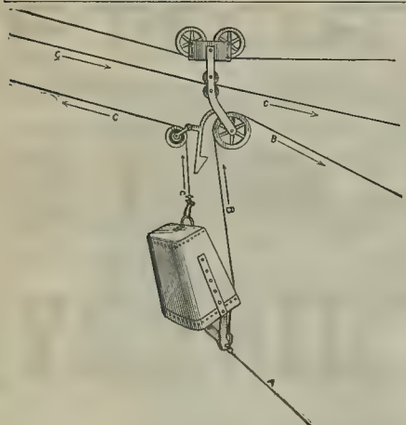
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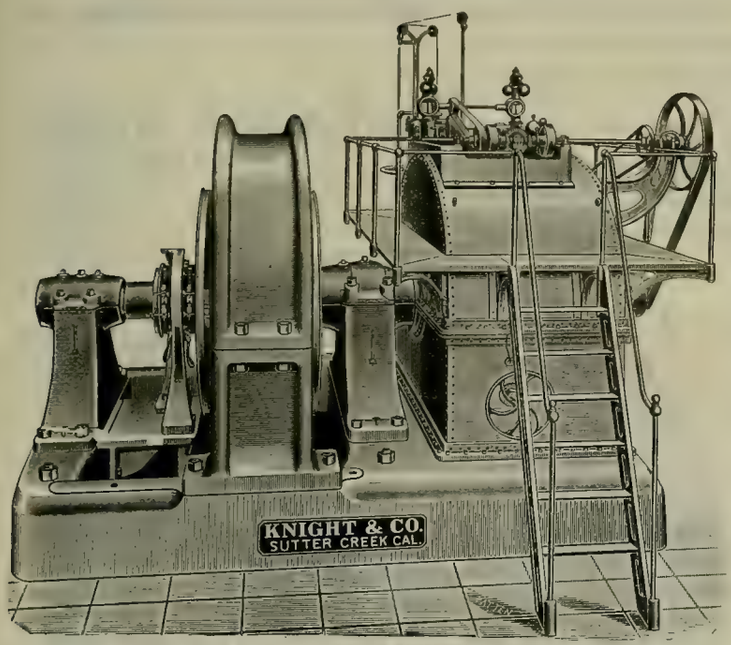
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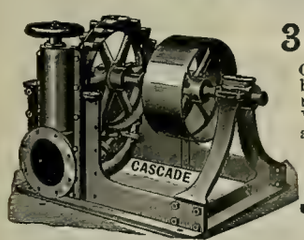
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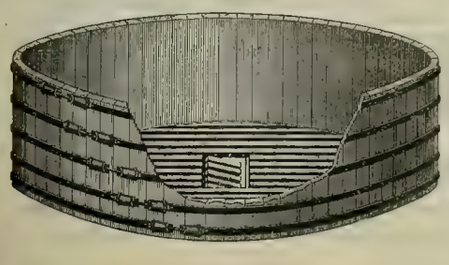
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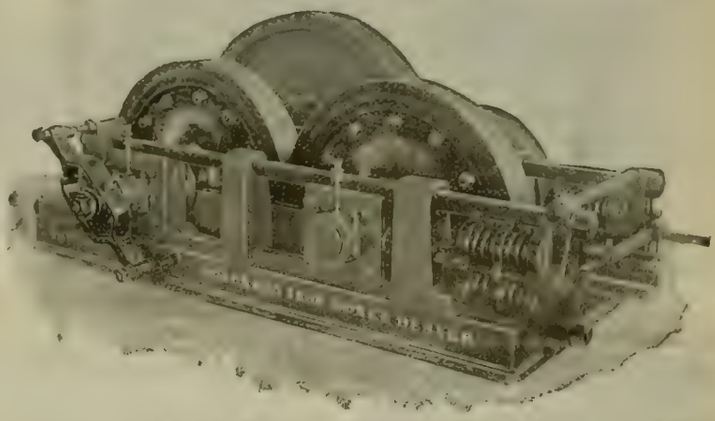
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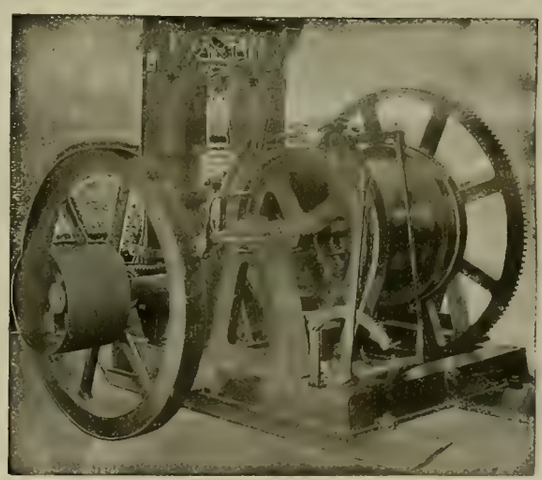
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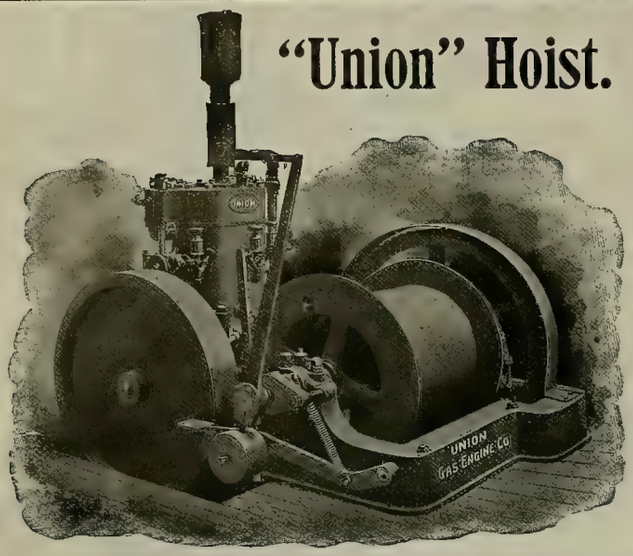
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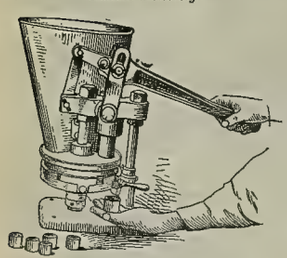
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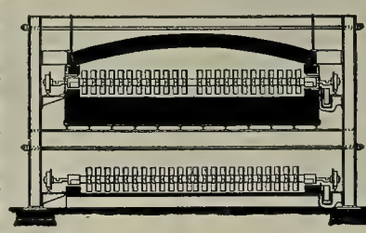
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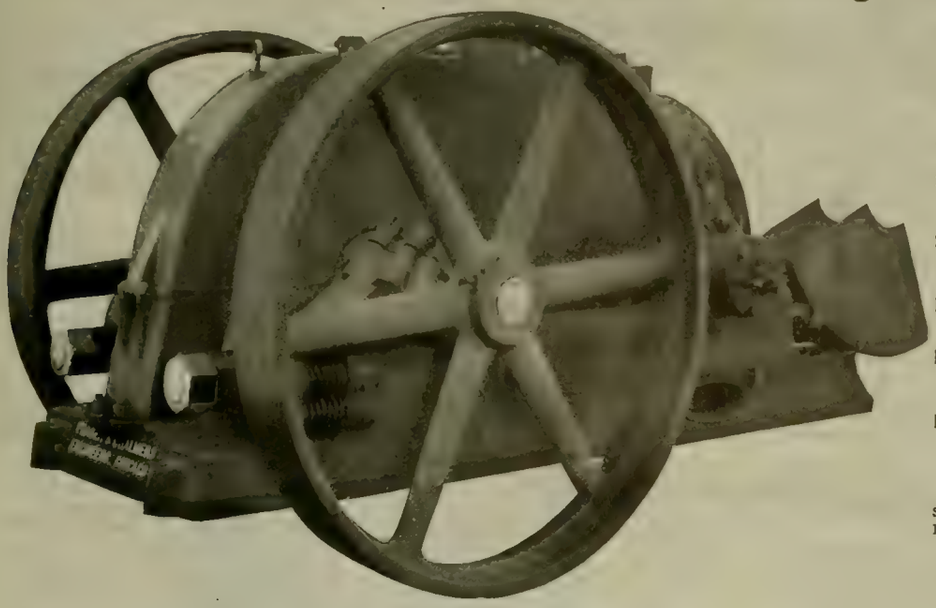
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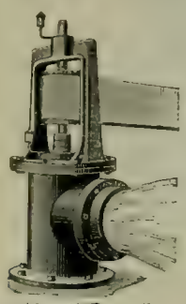
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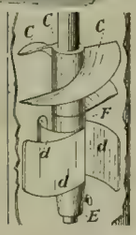
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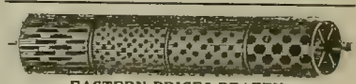
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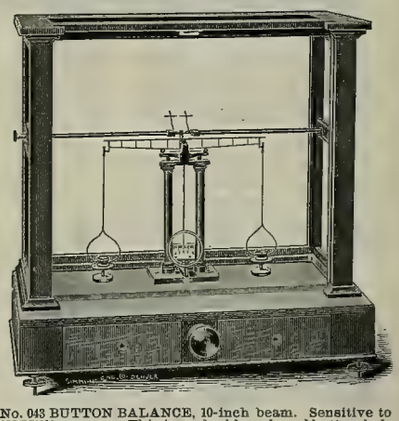
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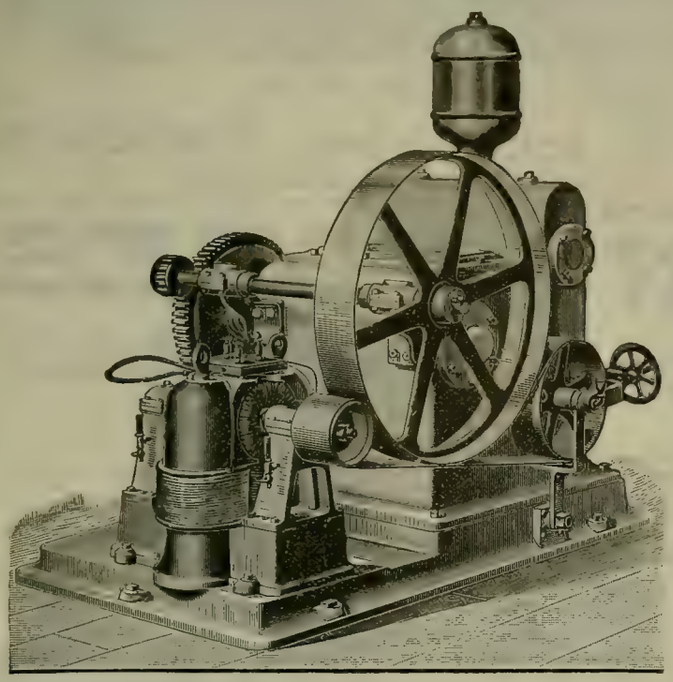
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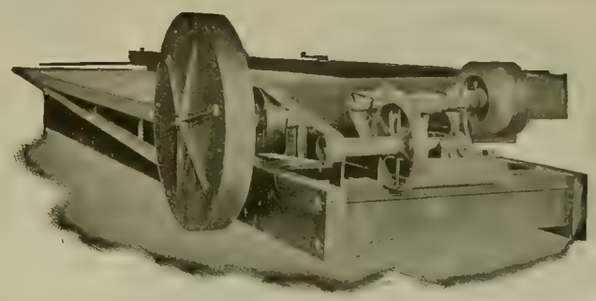
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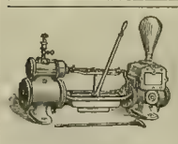
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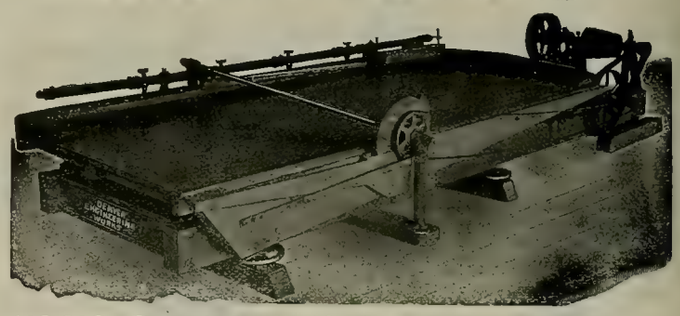
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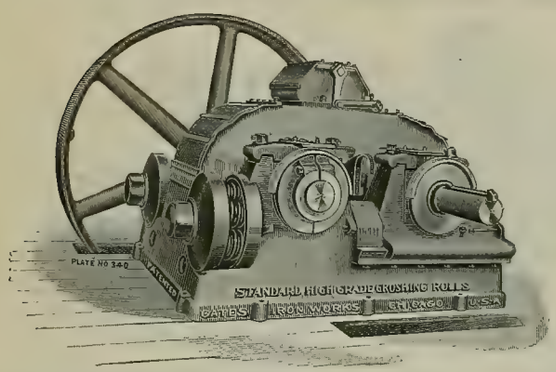


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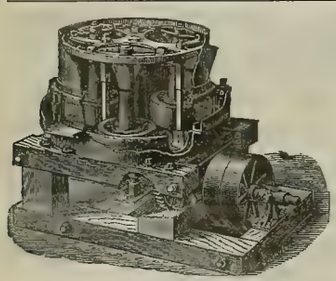
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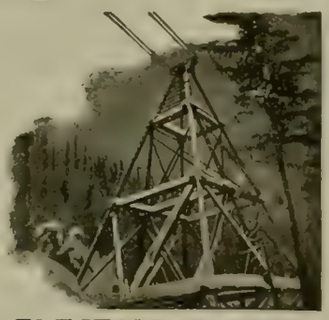
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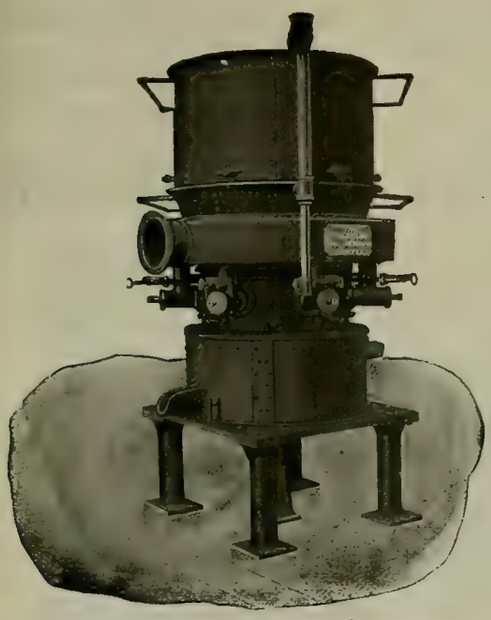


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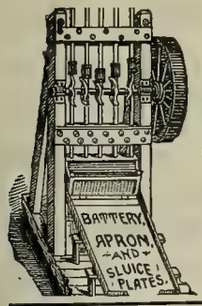
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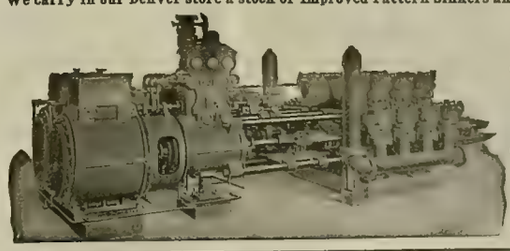
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A. MIDDLEBROOK, Manager.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with Law.

We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. 50 Cents a Copy.
MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco, Cal.

Dewey, Strong & Co., Patent Agents,

330 Market Street, San Francisco, Cal.

Market Reports.

SAN FRANCISCO, Nov. 9, 1899.

SILVER.—London, 26 15-16d; New York, 58¼; San Francisco, 58⅜@58¼; Mexican Dollars, 47½@48½; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.60 bid, $4.65 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake dull at $17; brokers' price, $17@17.50. Local—Mill copper plates, 23¾c.

An effort is being made to brace up the market for copper in America in sympathy with the firmer London tone, and Lake at 17c is not so much in evidence as a few days ago. London is buying heavily, and the continent is also reported to have made purchases lately, but the home trade is still waiting. The Calumet & Hecla has taken large orders which run into December at 18½c. The impression seems to be that copper will not go below 17c and may again go to 18c, or above it.

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Dull and easy, $29.75 bid and $30 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $50; export, $45@45.50; carload lots, special rates.

It is reported that the floating supply of quicksilver has now become practically exhausted, and another advance in prices is expected. The earnings of quicksilver properties are increasing in proportion to the advances in the metal. The opening of new mines and the rehabilitation of old ones have not as yet made any impression on the market.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

PLATINUM.—London, 66s per ounce; New York, $17.75; San Francisco, $17.25.

ZINC.—Dull and easy; $4.70 bid, $4.80 asked.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66° B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¼c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8½c; 6s, 12 oz., 7½c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 8, 1899.

9:30 A. M. SESSION.

100 Chollar	21c	600 Mexican	16c
300	20c	100	17c
100 Con. Cal. & Va.	$1 30	500 Potosi	26c
500 Justice	03c	200 Sierra Nevada	34c

2:30 P. M. SESSION.

100 Belcher	33c	200 Mexican	16c
100 Best & Belcher	38c	100	15c
100 Con. Cal. & Va.	$1 35	50 Ophir	49c
50 Confidence	67c	50	51c
350 Gould & Curry	24c	200 Potosi	28c
550 Hale & Norc's	40c	200 Sierra Nevada	38c
100 Justice	03c	100 Yellow Jacket	23c

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

FOR SALE.

Gold Properties in Various Stages of Development.

Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..

FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

AIR COMPRESSORS, Catalogues.

Rock Drills, Coal Cutters, Lift Pump, Pohle and Stone Channelers.

The INGERSOLL-SERGEANT Drill Co., Havemeyer Building, NEW YORK.

San Francisco Agents, PARKE & LACY CO., 203 Fremont Street.

FOR SALE.

"Placer Property, which has been thoroughly explored and which shows it to be a paying property."

Address E. N. BREITUNG, Marquette, Mich., U. S. A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

CALIFORNIA STUMP PULLER.



The Most Powerful Made!

Send for Illustrated Catalogue.

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FRED C. MILES,

CISCO, PLACER CO., CAL.

Copper, croppings 50 ft. and over. Good percentage at surface. Gravel and gold mines.

Trade Mark. Trade Mark.

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Jena Normal Glass,

THE BEST LABORATORY WARE MADE.

Everything necessary for the Assayer and Chemist will be furnished of best quality at *reasonable prices.*

UNEXCELLED BALANCES, WEIGHTS AND PLATINUM.

EIMER & AMEND,

205-211 Third Ave., NEW YORK.

WANTED — For Eastern syndicate, developed and paying gold mine; no limit as to price. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

FOR SALE.

A "Best" 14-Horse Power Crude Oil Gas Engine, as good as new. Inquire at Room No. 69, Nevada Block, San Francisco, Cal.

TO ASSAYERS.

A fine set of assay scales with pulp balances, all in good order, will be sold for $125.00, if applied for soon. The outfit consists of one Troemner's No. 5 balance, of latest pattern, with aluminium beam and agate bearings, original cost $175.00; also, one Becker's pulp balance, No. 18, with 8-inch beam and weights, costing $26.00. Both said balances mounted in glass case with sliding doors. Further particulars by addressing Box 4, San Andreas, Cal.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited. H. B RUNKLE, Mining Broker, El Paso, Texas.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.



REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO. AKRON, OHIO.

Largest Manufacturers of Oil Filters in the World.

Send for Catalogue 38.

Mining, Mill, Driving Lamps —AND— Locomotive Headlights.



SIZES ON HAND:

24-inch,
20 "
17 "
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10 "
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Boesch Lamp Co.,

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585 MISSION STREET, : : : : : SAN FRANCISCO.

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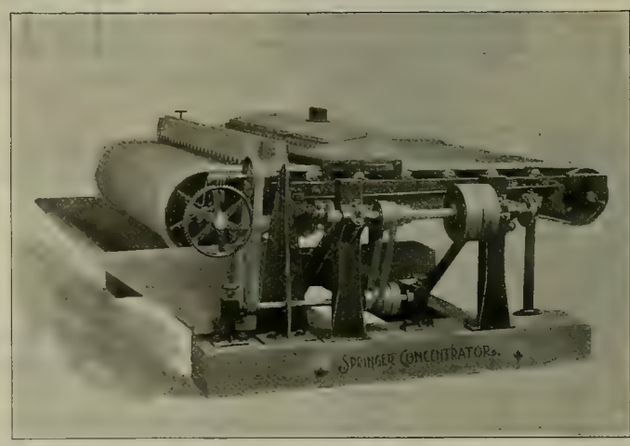
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LEADVILLE, COLO.

SPECIAL ATTENTION TO MAIL ORDERS.

$1000.00 that there is no Belt Machine that will do more, cleaner, or better work than---

THE SPRINGER CONCENTRATOR.



The best 6-foot rubber belt machine in the market. You will see at a glance that this Concentrator embraces all of the best qualities of other good concentrators, besides many adjustments and improvements which none of the others contain. This machine is shorter than any other concentrator. See report of Supt. Lowring of Utica mine in "Mining and Scientific Press" of Jan'y 14, 1899, wherein he cut three 12-foot Frue vanners down to 8 feet in length and got a saving of 8 cents more per ton from the 8-foot than from the 12-foot machine after a thorough test of a run of thirty-five days. This is the strongest, simplest, most durable, less wear and tear, and takes less power to run than any other. It has only one-half as many pieces in its construction as in some concentrators. All belts are tightened by sliding boxes, and the shaking frame can be raised or lowered and leveled while running at full speed. Weight only 1500 pounds, thus a saving of one-half in transportation. This Concentrator is now running from Alaska to Mexico, and giving the best of results. All mining men should see thir Concentrator before purchasing any other. Price for 6-foot rubber belt machine, f. o. b., $400. Address all correspondence to AMOS C. SPRINGER, 976 Pine Street, San Francisco, Cal.

FIRTH'S DRILL STEEL, 16 cents per pound.

The best drill steel on the market. Has no equal for hard rock drilling. Miners cannot afford to use an inferior steel when FIRTH'S can be bought at the above price.

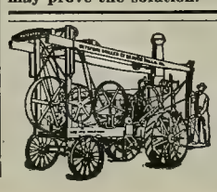
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Fremont and Howard Sts., SAN FRANCISCO, CAL.

Are You Confronted With a Difficult Ore-Separating Problem?

THE WETHERILL MAGNETIC SEPARATING PROCESS

may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y



For Testing Placer Ground.

Sinks and drives 6, 8 or 10-inch pipe through boulders; takes all the loose material out, including gold, as the hole is sunk. Does the work at a very small cost. Drills water and oil wells and mineral test wells through any kind of rock to 1500 feet. Several sizes. Unexcelled for lead and zinc testing.

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Thousands of engineers can testify to their efficiency. We want your endorsement also. Buy a Lubricator from your jobber. We guarantee it to give perfect service or money refunded. Jobbers on Pacific coast sell them.

The Wm. Powell Co.,
Cincinnati, Ohio.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

DELINQUENT SALE NOTICE.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 20) levied on the 16th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
G. A. Hinckelbein Trustee.....	9	1.000	$50 00
G. A. Hinckelbein, Trustee.....	10	1.000	50 00
G. A. Hinckelbein, Trustee.....	11	1.000	50 00
G. A. Hinckelbein, Trustee.....	32	200	10 00
P. A. Wagner, Trustee.....	90	980	49 00
P. A. Wagner, Trustee.....	91	1.000	50 00
P. A. Wagner, Trustee.....	92	1.000	50 00
P. A. Wagner, Trustee.....	93	1.000	50 00

And in accordance with law, and an order from the Board of Directors, made on the 16th day of September, 1899, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 217 Sacramento St., San Francisco, California, on WEDNESDAY, the 15th day of November, 1899, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

CHARLES BOVONE, Secretary.

Office—217 Sacramento St., San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY.— Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 13th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Jno. L. Bradbury, Trustee	75	100	$200 00
S. L. Harris, Trustee.....	45	50	100 00

And in accordance with law, and an order from the Board of Directors, made on the 13th day of September, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 28th day of November, 1899, at the hour of 1 o'clock P. M of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

Established 1852. Incorporated 1895.

John Taylor & Co.,

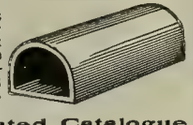
63 First Street, San Francisco, Cal.
Manufacturers and Importers of

Assayers' Material,



FURNACES, SCALES, BALANCES, WEIGHTS, ETC.
ALSO, MINE AND MILL SUPPLIES, CHEMICALS AND CHEMICAL APPARATUS.

Agents for Baker & Adamson's Chemically Pure Acids. A full stock always on hand. Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.



New Illustrated Catalogue on Application.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Henry H. Meyer et als., in the French Claim, at Alabama Hill, near Downieville, Sierra Co., to deposit tailings in a ravine below the mine; from R. J. Sinnott and F. M. Spencer, in the Hopkins Creek Tailing Claim, in Goodwin Township, Plumas Co., to deposit tailings in Hopkins Creek; and from James C. West, in the Eagle Gulch Mine, in Butte Co., near Strawberry Valley, to deposit tailings in a worked-out pit, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on October 30, 1899, at 1:30 P. M.

Assessment Notices.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of October, 1899, an assessment (No. 9) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of November, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 21st day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

OSCEOLA CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Amador County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of October, 1899, an assessment (No. 8) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 307 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of November, 1899, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 6th day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

HOLLAND SMITH, Secretary.

Office—307 Montgomery street, San Francisco, California.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of November, 1899, an assessment (No. 117) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on THURSDAY, the 7th day of December, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of December, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of November, 1899, an assessment (No. 4) of Ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of December, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 3d day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary

Office—213 Jackson St., San Francisco, California.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE, County Clerk.
[SEAL] By E. M. THOMPSON, Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 2. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

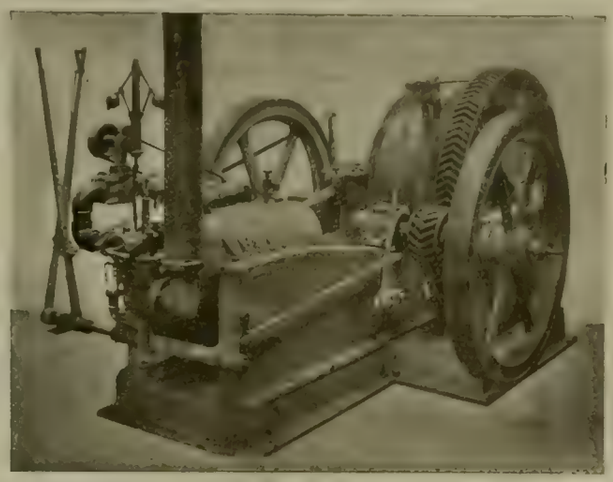
Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE, County Clerk.
[SEAL] By E. M. THOMPSON, Deputy Clerk.

Skeleton Mining Report.

NEEDED BY EVERY MINING MAN.
FIFTY CENTS POSTPAID.
Mining and Scientific Press, 330 Market St., S. F.

HERCULES HOISTS Are Sold the World Over..



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.

HERCULES GAS ENGINE WORKS,.....305 MARKET STREET, SAN FRANCISCO, CAL.

NO POSSIBLE DOUBT

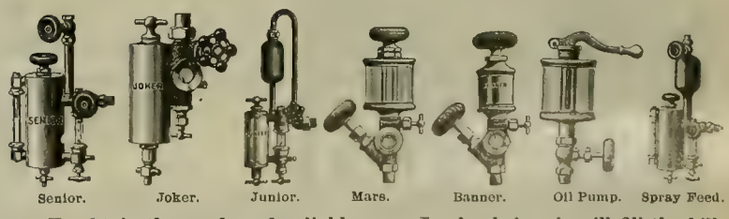


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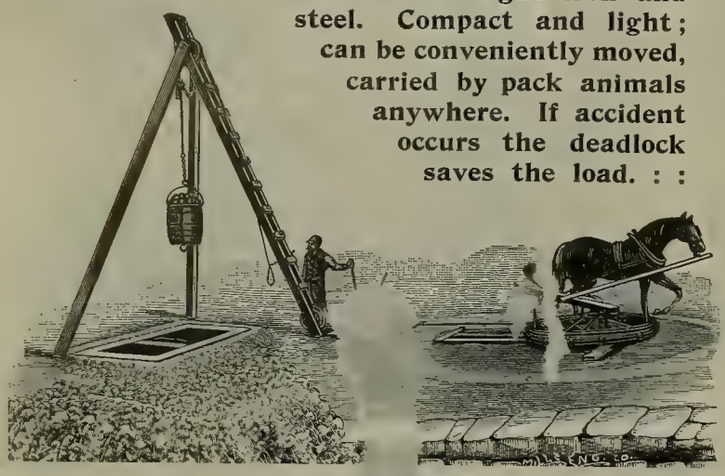
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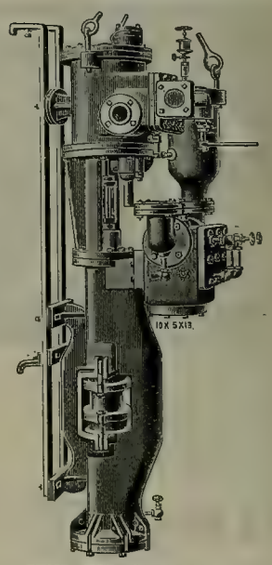
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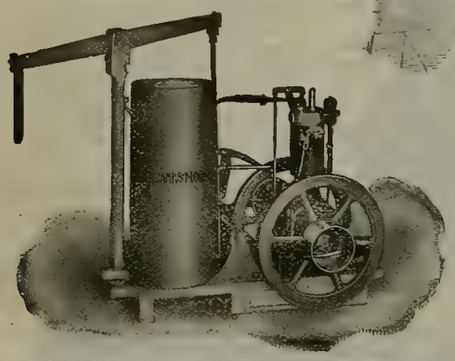
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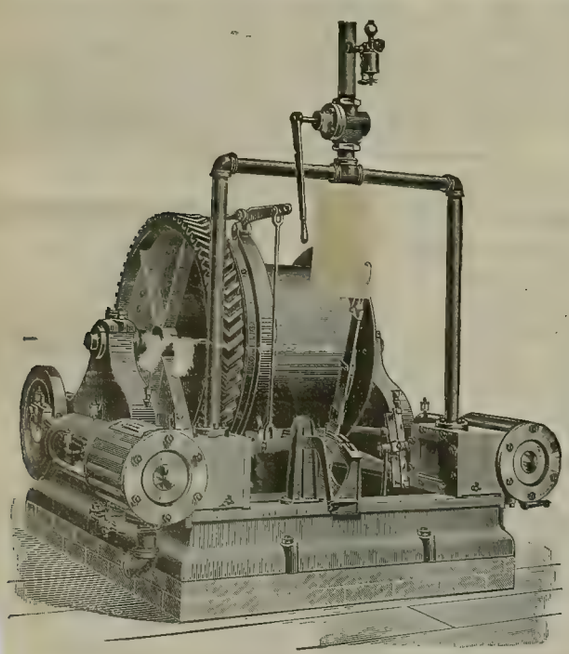
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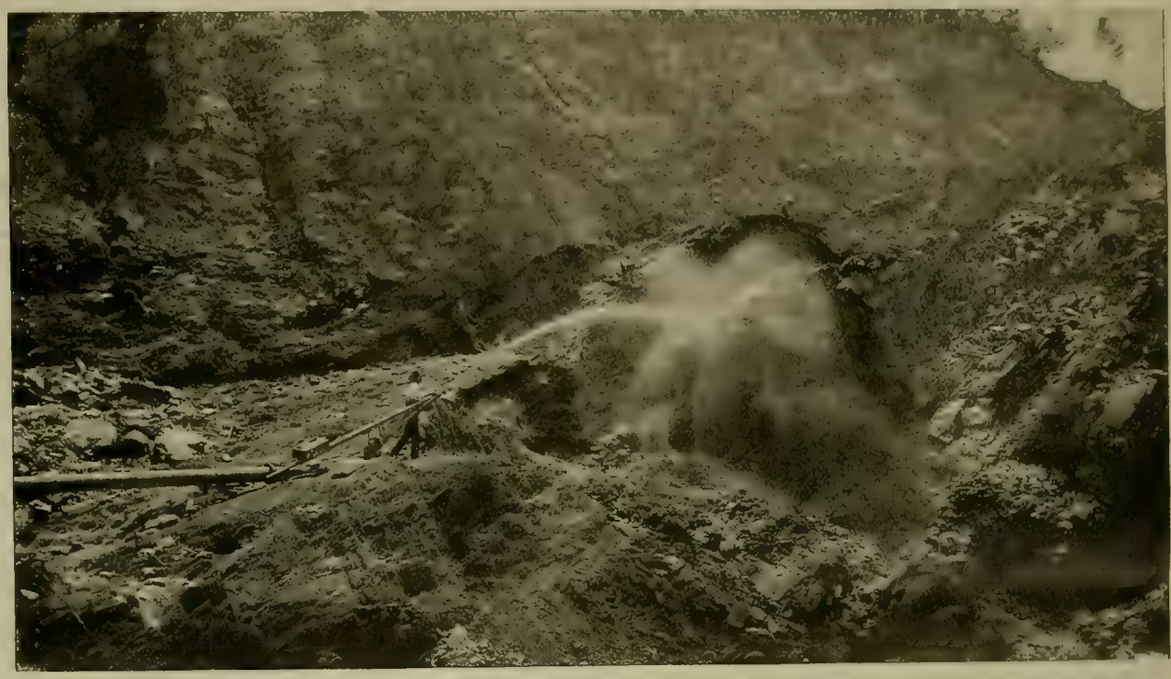
MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

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Gold Deposits in Georgia.

The Appalachian gold belt enters Georgia from the Carolinas and runs southwest to the State line. The greater part of the gold found occurs in the Dahlonega and Hall county belts. Both placer and vein mining are carried on in White county. In Lumpkin county is the richest part of the belt, and mining operations have been carried on since the opening of the first mine in 1829. The individual auriferous belts are generally made up of several veins or ore bodies, running more or less parallel with each other and conforming in dip and strike to the country rock, varying in thickness from a fraction of an inch to several feet. The so-called stratified deposits are of common occurrence, and are noted for great thickness. They are well represented at the Crown Mountain and Jumbo mines in the Dahlonega district. A typical example is at the Banner mine, Carroll county, where the ore body is of uniform size, formed of numerous layers of quartz separated by thin layers of schist, both the quartz and the schist being gold-bearing. The deposit there is 75 feet thick.



"HYDRAULIC" MINING IN THE DECOMPOSED AURIFEROUS SLATES, WITH THEIR VEIN CONTENTS, AT THE SINGLETON MINE, DAHLONEGA, GA.

Georgia gold ores are usually of low grade, free milling and sulphurets. The sulphuret ores are chiefly met below the water level and are mainly made up of white quartz, carrying auriferous pyrites.

Modern mining machinery is in use at many places in the State. In the Dahlonega district the greater part of the ore is obtained from saprolites, a term used to designate the decomposed ore bodies in place. The hydraulic giant is used in mining these ore bodies, which are the superficial oxidized portion of the "stratified deposits" or ore shoots. It is a cheap method. The ore is carried away from the giant by the rushing waters, caught up in the flume or sluice boxes, and conducted to the stamp mill. Deep mining is carried on only at the Creighton mine, the Royal, near Tallapoosa, and a few other mines. The chlorination process is used in the treatment of the low-grade sulphurets in these mines. There are a number of good properties in the State, near the Southern Railway, which are being developed.

The accompanying illustration at first view looks like an old-fashioned California giant at work in the Sierra foothills, but a closer inspection will show differences. One of the most interesting things about it is the fact that its use, as represented, is unique. It is not "hydraulic mining" as known in California, as the Georgia process is simply a cheap way of getting out the ore for reduction, a sort of combination of hydraulic and quartz mining not general on the Pacific coast.



TRACTION ENGINE AND LOAD IN THE SIERRA NEVADAS, CALIFORNIA.

Hauling Lumber with Traction Engines.

The powerful engine herewith portrayed, with its long train of heavily loaded wagons, is one of five outfits of this kind built by The Best Manufacturing Co. of San Leandro, Cal., for Towle Bros. Co. lumbering firm of Towles, Placer Co., Cal., who have had four of them in successful use for over seven years, hauling logs to their mills and lumber to the railroad station, taking the place of animal power, which they formerly used. These outfits are particularly adapted to haul freight of all kinds from out-of-the-way places. In many regions logging camps, saw mills and mines are situated from ten to forty miles, and sometimes much greater distance, from a railway,

(Continued on Page 574.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—"Hydraulic" Mining in the Decomposed Auriferous Slates, with Their Vein Contents, at the Singleton Mine, Dahlonega, Ga.; Traction Engine and Load in the Sierra Nevadas, Cal., 569. A Railroad to the Klondike—White Pass & Yukon Route; Looking up the East Fork of the Skaguay River—White Pass & Yukon Route, 572. On the Way from Skaguay, Alaska, to Lake Bennett, B. C.—White Pass & Yukon Route; Crossing the Divide—White Pass & Yukon Route, 573. Latest Mining and Metallurgical Patents, 575. Head of San Joaquin and Kings River Canal, Cal.; Brush Dam, Head San Joaquin and Kings River Canal, Cal.; Upstream View of Steamboat Chute, Cal.; Downstream View of Steamboat Chute, Cal., 576. Mining Scenes in Alamo, Lower California, 577. Side Elevation, Wildman Head Frame; General View of Wildman Mine, Sutter Creek, Amador County, Cal., 578. Guides Fitted with Blocks; Front Elevation, Wildman Head Frame; Arrangement of Timbers, Wildman Shaft, 579. The Late Lyman C. Page, 583.

EDITORIAL.—Gold Deposits in Georgia; Hauling Lumber with Traction Engines, 569. Cheap Deception; Stock Gambling vs. Mining; High Prices of Tin and Quicksilver; Miscellaneous, 570.

MINING SUMMARY.—581-582-583.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 598.

MISCELLANEOUS.—Concentrates, 571. A Railroad to the Klondike; The Wentworth Cyanide Plant, Lucknow, N. S. W., 572. An Indicator for Hoisting Speed, 573. Mining Operations at Telluride, Colo.; Copper Tubes and Sheets Direct from Solutions, 574. Latest Mining and Metallurgical Patents; New Method of Detecting Gold; Cordially Appreciated, 575. Headwater Workings of a California Irrigation System; A New Alloy, 576. Alamo Mining Camp, Lower California; Cheap Mining and Milling, 577. The Emerson Shaft of the Wildman Mine, Sutter Creek, Cal., 578. The Vanderbilt Mining District, San Bernardino Co., Cal., 579. Motive Power at the Mines. Official Statistics of the World's Gold Production, 580. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Recently Declared Mining Dividends; Commercial Paragraphs; The Late Lyman C. Parke, 583.

It is stated in Eastern financial journals that large producers of copper in the Lake Superior region have purposely allowed the price of copper to decline to 17 cents for the purpose of discouraging small operations and mines producing on a very small margin of profit, in order that the price may be maintained at present prices.

Tutuila island of the Samoan group in the south Pacific, which by international agreement has fallen to the lot of the United States, is said to possess in Pago-Pago bay the best harbor in the south Pacific ocean, Pearl harbor in the Hawaiian group being considered next best. Tutuila island has an area of but fifty-four square miles and a population of 4000, and is not particularly valuable from a commercial standpoint; but, with the valuable harbor, it becomes of great value to the United States in consideration of increasing trans-Pacific trade.

A great many of the mines of the Witwatersrand, South Africa, are closed down, the richest being worked by the Boer Government with such skilled labor as they can command. The operation of these mines, mills and auxiliary plants had been reduced to a science. Careful attention had been given to every detail and the best managers and most skilled metallurgists and mining engineers employed. If, under the existing circumstances, the new managers can work those mines at a profit, it will be a matter of surprise to mining men.

In the Rossland, B. C., district the I. X. L. mine, with so-called free milling ore and a 10-stamp mill, presumably suited to the treatment of the ore, is shipping its ore to the smelters, it being stated that the cost of milling and the attendant loss of values are greater than the cost of treatment at the smelter. It would appear from this statement that either the ore is not free milling or that the mill work is not as efficient as it might be. Where an ore is free milling it can be treated in such a mill at a cost much below that of smelting silicious ore anywhere. Much of the rich gold ore of Cripple Creek district of Colorado goes to smelters, but the telluride ores of that district are not, strictly speaking, free milling.

Stock Gambling vs. Mining.

A depreciation in the price of copper may have the effect of checking the demand for copper mines and prospects and turn the attention of investors to gold mines once more, for since the copper boom promising gold properties have been largely overlooked. Those seeking investment in mines should always consider carefully not only the present but the future prospect. Copper is never stationary in price for any great length of time, but gold is always worth $20.6718 for each ounce of the pure metal. A few months ago 15 cents per pound was considered a high price for copper, but it went above it, and the rush for copper mines, copper prospects and copper stocks indicated the public confidence that the high price would last for all time, or at any rate until a fortune could be made. Now the price is falling and copper stocks are falling with it, and those who bought in at or near top figures are losing their money and condemning mining as an investment. There is little use in warning those who make these ventures, for if they did not gamble in high-priced copper stocks they would risk their money in other enterprises equally uncertain, but their loud complaint at the loss of their money in mines deters others who would otherwise invest on a rational business-like basis from making any investment at all, and legitimate mining gets a setback. For many years mining suffered from the effect of speculation and ill-advised investment and a period of depression followed, during which the industry secured a firm foothold, depending upon merit alone, and has come to be looked upon as a legitimate business offering greater profits for investment than any other industry, but an era of wild speculation in which many lose fortunes is almost certain to have a reactionary effect and for the good of the mining industry at large it is better to see copper settle slowly downward to a reasonable price than see it advance to 20 cents. Competitive metals will cause it naturally to seek its proper level in the commercial world. The investment of money in a bona fide mining operation, the management of which is in the hands of competent and experienced men, is as safe an investment as one can make in any business offering a possible large return for capital invested, but the investment of money in the high-priced stocks of mines in the management of which the investor has not only no voice but little knowledge of existing conditions is quite another thing.

The high price of tin and quicksilver is stimulating prospecting for the ores of those metals, with the result that numerous discoveries of cinnabar have been made, and deposits of low-grade ore, long known, are being opened; but prospectors, generally being less familiar with tin ores, have not met with great success in finding tin deposits. In the Black Hills of South Dakota are many tin-bearing veins, and although a large amount of money has been spent in the development and equipment of these vein mines, thus far a commercial success has not resulted. In the streams adjacent to the tin mines, both in the Harney Peak region and in the Nigger Hill district, on the Wyoming line, there are large quantities of tin stone, which can be recovered by sluicing operations. In each of these districts gold also occurs, particularly in the creeks of the Nigger Hill country, and in working these in the early days of mining in the Black Hills, the black sand which constantly and abundantly accumulated in the sluice boxes was the bane of the miners, who dumped it out into the gulch again. This black sand is largely made up of wolframite, columbite and other rare iron ores, with a considerable amount of cassiterite. It seems strange that placer miners of those districts do not take proper steps to recover these valuable minerals from the gulches by the simple and inexpensive method of sluicing, and then subjecting the minerals thus obtained to a more careful separation for the market.

The success achieved by the Home Mining Co. of Leadville, Colo., in reopening the flooded idle mines of the lower portion of that district, when outside capital feared to invest, has stimulated others to emulate their example, and the organization of a second home company is now talked of in Leadville. Those who reside at the mines should know their true worth better than others, and there are many places where home mining companies, organized to develop new mines or open old ones, would give greater confidence in the mines to others residing outside the district. These local companies not only show the confidence which those residing at the mines have in them, but are also an index of the progressiveness and energetic character of the camp.

Cheap Deception.

Among other foolish practises which of late have become particularly noticeable is the reporting of the sale of mining property in the prospective stage of development at large figures. A copper prospect previously unknown and unheard of is this week announced sold for $700,000; another, a gold prospect, for $300,000. Frequently these "sales" pass the million dollar mark. There can be but one object in making these false statements, and that is to give to the property an apparent value which it does not possess, and is as bad as representing it to have large and valuable ore bodies which do not exist. These so-called sales are in most instances merely contracts to sell or buy, not binding on either side, and the actual price is usually one-tenth, one-twentieth or even one-hundredth of the price stated to the public. In most cases it is the intention of the promoter to organize a corporation and to put the property in at the price stated, generously not increasing it. The investor in such stock must necessarily buy on an inflated valuation and his chance of ever getting even, to say nothing of making anything from his investment, is very small. Since the war tax has required stamps to be affixed to these documents some have even resorted to this cheap method of deception, putting a greater number of stamps on the instrument than the transaction actually demands, carrying the impression that a large sum of money was paid for the property. These small frauds may serve their purpose in some cases, but a careful, discriminating public will in most cases understand the situation and not be deceived into believing either all they hear or see.

Some time ago was stated herein at some length that this paper does not sell space in its reading columns; that whatever is printed in these columns is printed free, no matter whom it may benefit or advertise; that the criterion by which it is judged is its interest to our readers, and that if it meets this standard it will be given space in our reading columns for nothing, and that if it does not, it will not be inserted at any price. It appears that the London *Mining Journal* is run on the same broad-gauge plan. It received a "puff" of a gold mining company with instructions to publish it as news at a stipulated price. The *Journal* somewhat indignantly published the proffer, and the notice itself, greatly to the distress of the West Rand Central Gold Mining Company, whose plans were thus exposed. The company's promoter writes the *Journal*, saying that such publication of its pecuniary proffer was "a great breach of confidence." The *Journal* answers, taking the correct and unanswerable stand that its first duty is to its readers and the public. The Mining and Scientific Press congratulates its English contemporary on its courage and public spirit in refusing to sell its reading columns, and is constrained to further say that such action is in honorable contrast to some mining and financial journals who betray whatever public confidence may be reposed in them by asking and taking so much per line for what would not otherwise appear, and what is ofttimes fraudulent and deceptive.

The only way to view advertising is as a business proposition, a cash investment for publicity and profit. The buyer of advertising space should know just what he is getting, how many copies of the paper are printed, where they go, the kind of people they go to. Knowing that, if he deems the medium of value to him he would do well to advertise in it; otherwise, not. Business is simply the systematic supplying of wants, that's all. If a business man has a good article it is business to create a demand for it by proper announcement in the journal most likely to reach those to whom he looks for business.

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THE number of this issue printed is 8856 copies.

ASTRONOMERS say that the earth receives only the one two-billionth part of the heat of the sun.

UP to this date more than 3000 miles of new railway have been built in 1899 in the United States.

THE silver production of the world in 1898 was 165,295,572 ounces; it was 164,073,172 ounces in 1897 and 157,061,370 ounces in 1896.

IN '93 J. H. Hammond was paid $20,000 per year in South Africa by Barnato Bros., Mr. Conners, $12,000 per year; Mr. Clements, $6000.

THE average density of the earth is 5.505, water =1. This would make the total weight of the planet 5,690 trillions of tons (of 1000 kilo).

HOUGHTON COUNTY, MICHIGAN, in which are the largest copper mines in the Lake Superior region, gives employment to more than 13,000 men.

ANCIENT river channels, such as are found in California capped with lava, are subject to location under the laws governing the location of placers.

A LACK of knowledge of the lines bounding the mill site or claim lines is the misfortune of the claim owner, who is supposed to know where his lines are.

SOUTH AFRICAN gold bullion produced by the cyanide process varies widely in value, from .675 to .995 fine; an average would, probably, be about .825 fine.

OF the eighteen explosives in the "permitted list," seven have nitro-glycerine as their base; the other eleven have ammonium nitrate. Cordite contains 5% of vaseline.

DIAMOND DRILLS have recently been advantageously employed in making connection between drainage tunnels and flooded shafts sunk from the surface at Creede, Colorado.

AN assayer in the State of Nevada is required by law to place a written description pasted on or stamped upon every bar of bullion or amalgam melted, retorted, assayed or refined by him.

IN shaft measurement and mine surveying generally an iron plummet is liable under certain circumstances to cause error which may in all cases be obviated by the use of a brass plummet.

"ENCLOSED find three dollars for a renewal of my subscription to the best mining paper published" is the way a mining engineer of world-wide fame expresses his opinion under date of the 5th inst.

WHERE it can be shown that work done in a tunnel is for the benefit or development of adjoining claims constituting a group, work so performed may be made to apply as assessment on the adjoining claims.

A SIPHON tube 4 inches diameter, length of line 1760 feet, greatest altitude of siphon 15 feet above intake, and 52 feet above discharge orifice, will give an average discharge of 490 gallons water per hour.

IRON as used commercially is never "pure." It is a mixture of other elements and iron. Pure iron can be produced chemically. Piano wire is probably the purest form of iron in use—99.7% pure, 0.3% carbon.

AUSTRALIA produces more gold now than at any time in her history. Of this a large proportion comes from the desert of Western Australia, where all the water is salt and life is largely one of constant hardship.

SAND floats on water because of capillary attraction, the surface tension of the water enabling it to form a depression somewhat larger than the particle, resulting the same as if the specific gravity of the dust particle had been decreased.

THE non-use of a water right is not an abandonment, though long continuance of such non-use argues an intention to abandon. Abandonment is a question of intention, and whatever clearly shows that intent is fair evidence either way.

THE output of the mines of the Witwatersrand for the month of September was 411,962 ounces, making a total for 1899 to Oct. 1 of 3,913,840 ounces, which is more than two and a half times as great as the output for the same months during 1896.

ANY photographic flashlight powder containing potassium chlorate or perchlorate is dangerous. Great caution is requisite in the preparation and use of ordinary flashlight powders, and none but an experienced person should attempt to mix or use them.

THOMAS EDISON JR. is now credited with declaring that successful telephoning across the Atlantic will soon be an accomplished fact. Thos. Edison Sr. says that such an "accomplished fact" will require for its accomplishment a stronger force than electricity.

THE softer the iron the better for field magnets of dynamos, or of motors, or cores of armatures. A motor's armature is more likely to burn out when going slow than when at high speed. The resistance of an armature wound with 1500 feet of No. 26 wire is about 16 ohms.

WORK done on a patented claim for the benefit or development of adjoining claims (unpatented) may apply as assessment or such adjoining claims: one hundred dollars worth of work on improvements being made on the patented claim for each unpatented claim in the group.

THE idea that a mineral vein must be a "true fissure," having "well-defined walls," with "gouge seams," and lie "between walls of different character," is disappearing, and anything that contains pay is considered to be the vein, whether the walls are in evidence or not.

PROBABLY "the cheapest hydraulic mining ever reported" was that at the North Bloomfield, Nevada Co., Cal., some years ago, where, according to the superintendent's statement, the entire cost averaged 2 cents per cubic yard of material removed—about 1 cent per ton.

ANSWERING F., Ouray, Col.: magnetic iron ore containing 75% iron would be a rarity; 72% is about the limit of the best. It is suggested that samples be submitted to steel and iron companies of Colorado and the East. It is possible that transportation charges would absorb what would be profit in a property more favorably situated.

GOLD occurs in gypsum at Lake Austin, Murchison, West Australia, where, in a conglomerate of metamorphosed rocks, diorite and quartz, cemented by gypsum and oxide of iron, has been found free gold from a color up to pieces of 28 dwts. The deposit appears to be lacustrine.

CRYOLITE is a fluoride of aluminum and sodium, contains from 8% to 14% aluminum, is found in gneiss in Utah, Colorado and Greenland, where it occurs in huge bedded deposits, mined in masses from an open cut, and run direct into the holds of vessels for shipment to the Atlantic States and Europe.

ANY difference in voltage between a dynamo with electro field magnets and the same with permanent field magnets is due to higher intensity of magnetic field. In the electro-magnet higher intensity is produced, which can be compensated for by using larger permanent magnets, so that the voltage can be brought up to any desired point.

A GERMAN scientist at Berlin has announced the discovery of a new planet in the solar system, which is revolving about the sun in an elliptical orbit between the earth and Mars, its period of revolution being 645 days. This is presumed to be a new planet whose appearance is accounted for by some disturbing influence of some large planet.

THE name of no successful gold-smelting electrical process occurs to the writer. Numerous laboratory experiments have been pronounced successful, and in several cases the idea has so far advanced commercially as to occasion successful sale of stock in such proposed enterprise. There are, however, several eminently successful electrical gold-refining processes of proved commercial value.

THE flame of an ordinary candle or lamp is extinguished by a mixture containing 16 5% oxygen and 83.5% extinctive gases. A flame of coal gas requires for its extinction a mixture containing 11.3% oxygen and 88.7% extinctive gases. Air expired from the lungs is of the same composition as that which extinguishes the flame of an ordinary candle or lamp. Air may be breathed until its oxygen is reduced to 10%.

THE Santa Ana, Cal., electrical transmission plant carries 33,000 volts eighty-one miles. The Michigan proposition is to exceed this, the intent being to transmit 40,000 volts ninety miles—from a dam with a 23-foot head to Jackson. The generator connected direct to the turbine shafting is a three-phase alternating current dynamo; its voltage on full load is 2300; its rated capacity in amperes on each phase is 377; its rated H. P. is 2700. It weighs fifty tons and rests upon a concrete foundation.

FIRES originating near steam or hot air pipes have been attributed to the partial charring of the wood or fibrous dust by the heat and its absorption of oxygen from the air. Oily waste and rags used for cleaning machinery are the most fruitful sources of spontaneous combustion, and journal drippings with accumulations of dust are a source of danger. Sawdust packed in barrels or boxes when wet may cause a fire. As in other cases, intelligent attention and constant watchfulness are necessary.

BEYOND the violet end of the solar spectrum there is a whole gamut of invisible rays which only reveal themselves by their effect in promoting chemical action; and, similarly, beyond the other end of the visible scale, the deep red, there is a gamut of invisible or dark rays which are only perceptible by their heating effect. Regarding the former the photographic plate has developed some new facts, and the bolometer has similarly indicated absorption lines in the great invisible spectrum that lies beyond the red.

NEARLY every establishment furnishing mining machinery has one or more trusted, experienced men, practical mining engineers, who know what is needed in special cases or general requirements, and who can see that anything needed, large or small, from a stamp shoe to a complete plant, is properly furnished. Such men can install any required machinery and their advice and aid are of value, and in all cases where a mine needs machinery of any kind those in charge of the mine would do well to have a talk with such a man.

WHEN an ore deposit occurs in a massive rock like granite, porphyry of any kind, felsite, andesite, etc., and there is found an extensive crushing of the country rock along and including the vein, crosscuts are of utmost importance, for the best defined wall often proves to be merely a plane of fracture within the mineralized zone, beyond which pay ore may be again found; and because a crosscut in one portion of the mine is without result, should not deter the management from making others elsewhere. Crosscutting should be carried on systematically in view of this condition.

PETROLEUM may be rendered uninflammable: to 250 gallons of petroleum add 550 pounds of common salt; heat the mixture to 100° C., when may be collected about sixty gallons of volatile and very inflammable hydrocarbon—benzine. The remaining petroleum is not inflammable below 100° C., and its illuminating power is increased. Were the 190 gallons of residue added to 375 gallons of crude petroleum, the mixture heated for one hour to 100° C., then cooled to 40° C., the first resultant sixty gallons benzine added, the whole again heated to 82° C., the fuel thus obtained would not be inflammable below 75° C.

IT is kindly suggested to many of our exchanges that occasional credit for matter reprinted from this paper would be appreciated. It is not infrequent to notice nearly the whole of this page reproduced without a single line of credit, and while of course it is gratifying to have technical matter that is prepared at considerable cost and research so evidently appreciated as to be copied wholesale, yet probably our appreciative Eastern and Canadian friends who so universally appropriate items to their own columns will agree with us in the suggestion that it would look better to at least occasionally credit the original source.

WHERE an assay of an ore gives gold .57 oz. and silver 1.03 oz. it is not likely that the same ratio of gold to silver would be found in bullion resulting from the treatment of such ore, as the probability is the gold would be relatively higher than the silver. In the event, however, of such a saving the fineness is found by simple proportion. The fineness of silver or gold contents of bullion is always written in thousandths, which expresses so many parts of silver or gold in 1000 which the bullion contains. .57+1.03 oz. =1.60 oz. Thus as 1.60 : .57 : : 1000 : 356.25= the gold fineness; 1000—356.25=643.75 the silver fineness. Ordinarily the fractional fineness is omitted.

UNDER no conditions should blasting powder be placed on hot steam pipes, or steam boilers, or on or in a hot stove, or any hot metal. Nor should it be exposed to radiated or reflected heat from a fire of any kind. It should be kept away from the blacksmith's forge or shop, and should not be roasted, toasted or baked in any way. (Sometimes a "Concentrate" occasions a smile from some old, experienced miner, but he should remember that thousands are yearly beginning, and a pointer that is unnecessary to him is of as much value to many as it was to him when he first began. If he will remember the number of good men that he has seen hurt by monkeying with powder he will be glad to note a word of caution that may save some fellow-miner's life.)

THOUGH a wet season, the usual November stories of singular gold finds are late. The Douglas Co., Oregon goose with a $5 nugget in its crop, the Klickitat, Wash., salmon with a similar amount in its stomach and the Rossland, British Columbia, fir tree whose ashes assayed $17.43 "to the ton" are as voiceless in '99 as the lost desert mines beyond Mojave, Cal., or the "white gold worth $31.75 per ounce," once so prevalently reported from Yuma, Arizona. The only recent noticeable effort in this regard is from Redding, Cal., where last week a hotel cook found a "magnificent pearl" in the gizzard of a chicken he was dissecting. The former chroniclers of strange mineral manifestations in bird and beast seem to be now more lucratively engaged in writing oil prospectuses.

IN the case of a man with an assayer's certificate of the assay value of his ore, concentrates and tailings, and wanting to know how many tons had been put into one, a general rule may be deduced, viz.: From the assay value per ton of ore and of headings, respectively, subtract the assay value per ton of tailings: divide the lesser remainder by the greater: the quotient represents the "number of tons put into one." Ore containing free gold amalgamated in batteries or on plates should have the sample for ore assay taken from the pulp delivered to the concentrators. The assay value of the original ore may then be known by dividing the value of the amalgam by the number of tons crushed, and adding the result to that found by the assay of the pulp going to the concentrators, probably securing as accurate a result as sampling from the rock breaker.

THE controlling factor in the successful operation of a quarry is the market price of the stone, rather than its intrinsic value. Builders and contractors may not be familiar with qualities of stone that made it suitable for their purpose. Poor economy sometimes occasions the use of inferior material in an attempt to cheapen the cost. The actual cost of stone dressed ready for use depends upon the ease of quarrying in blocks of the form required, the facility with which the stone can be dressed, and the cost of transportation. The price of the stone will be further determined by its beauty, susceptibility of fine finish, and its established reputation. Whether the stone shall be sold in the rough, or dressed, depends upon which brings its owner the largest profit. A large part of the actual cost value of a stone is the labor put on it; a good part of its sale value is its reputation.

IN the event of a mining company or corporation neglecting or failing to perform the assessment work on unpatented mining claims, the locations revert to the Government, again becoming a part of the public domain, and are subject to relocation by any person whether a stockholder or not. If, however, the stockholder should have held a fiduciary position—as president, secretary or manager of the company or any other position which would have given him knowledge of the company's affairs of a confidential nature—the court may hold that he has relocated the property as trustee and for the benefit of all stockholders. All depends upon the prior relation which the stockholder may have had with the company in an official way. This is in answer to four different questions—E. G. T., Bisbee, Arizona; L. L. Y., Butte, Montana; J. P., San Francisco, Cal., and O. F. M., Colorado Springs, Colo.

IN the case of McShane vs. Kenkle, (44 Pacific Reporter, 979), Supreme Court of Montana, the court held that: "Under the laws of the United States (Sec. 2320), providing that no location of a mining claim shall be made until the discovery of a vein or lode within the limits of the claim located, it is the finding of mineral in the rock therein that constitutes the discovery, and it is not necessary that the vein or lode should contain mineral of such a nature that a practical miner, if he encountered it, would feel justified in following it up with the reasonable expectation of finding paying mineral. Nor is it required, under the statute, that the paying mineral necessary to justify the location of the claim should be found at the time and place of discovery; but it is sufficient if the development of the vein showed that paying mineral exists within the limits of the location. It never was intended that the locator of a mining claim should determine all the facts before he would be entitled to a valid location."

CONCERNING the disposition and ownership of tailings, "Lindley on Mines" says, Sec. 426: "To suffer tailings to flow where they list, without obstructions to confine them, is equivalent to their abandonment. If they lodge on the lands of another they are considered an accretion, and belong to him. If they accumulate on vacant and unappropriated public land, it has been the custom in the mining regions of the West to recognize the right of the first comer to appropriate them by proceedings analogous to the location of placer claims. As was said by the Supreme Court of Nevada: 'Although not a mining claim within the strict meaning of the expression as generally used in this country, a tailings claim is so closely analogous to it that the propriety of subjecting the acquisition and maintenance of the possession of it to the rules governing the acquisition of the right to a strictly mining claim at once suggests itself.' The Land Department has recognized this possessory right and permitted entries to be made of lands containing beds of tailings, under the laws applicable to placers. There are no adjudicated cases in the reports of department decisions which have come under our observation; but we have knowledge of several instances where patents for this class of claims have been issued under the mining laws."

A Railroad to the Klondike.

When the big "rush" to the Klondike took place two years ago the attendant horrors of the Chilcoot pass and the extraordinary cost of transportation made it manifest that the kind of men who made railroads before wagon roads in other mining regions would not long wait upon the difficulties in getting toward the new El Dorado, but would throw them aside. Accordingly a wire rope tramway was built, and that in turn superseded by a railway, now in daily operation between Skaguay and Bennett, a distance of forty-one miles. The engravings on this and the opposite page illustrate the general appearance of the country through which passes the White Pass & Yukon route, though the scenes herewith presented could be duplicated in California, Colorado, Utah, or Montana. Under date of October 10th the traffic manager writes: "We have now a large number of men constructing the road from Bennett to White Horse, a distance of 110 miles from Skaguay, and we have every reason to believe we will be operating trains over the second division by June 10th, 1900. Upon the completion of our tracks to Lower White Horse by June 10th, and after the opening of navigation of the rivers, the schedule time from Puget Sound and British Columbia ports to Dawson will no doubt be about eight days."



A RAILROAD TO THE KLONDIKE—WHITE PASS & YUKON ROUTE.

The Wentworth Cyanide Plant, Lucknow, N. S. W.

The plant recently built at the Lucknow mines is a slimes plant, and is the result of a series of experiments in agitation methods conducted by Henry Watson, the cyanide manager. After trying compressed air, revolving barrels, and other methods, Mr. Watson came to the conclusion that arms revolving on a central spindle, with bafflers fixed on to the inside of the tank, was the most perfect method of agitation. Without the bafflers the agitation would not be so complete, as the motion would be centrifugal, but with the bafflers the swirl of pump is thrown back from the sides of the tank and an intimate mixture of all the particles is effected. It was thought the slimes would settle in the tank sufficiently fast to dispense with artificial means of filtering, and this is the case when the tanks are filled with the pumped-up mixture of slimes and water, the rate of settling then being 1 foot per hour, but after a six hours agitation with cyanide the time is so long that filter presses will have to be used. The slimes are deposited in a bed so coherent and plastic as to resemble putty and are absolutely impervious to water. They consist of calcite with kaolin, and kaolin forms the finest portion of it, being so fine that when mixed with water and filtered through Swedish filtering paper the filtrate is milky. The slimes are broken up by being thrown into a revolving trommel, with water fed in. The trommel is set in a large wooden tank, and when the sludge is sufficiently thick it is pumped up by a centrifugal pump to the launder communicating with the tanks. In the tanks it is allowed to settle, and the supernatant water is syphoned off to a pipe whence



LOOKING UP THE EAST FORK OF THE SKAGUAY RIVER—WHITE PASS & YUKON ROUTE.



ON THE WAY FROM SKAGUAY, ALASKA, TO LAKE BENNETT, B. C.—WHITE PASS & YUKON ROUTE.



CROSSING THE DIVIDE—WHITE PASS & YUKON ROUTE.

it runs back to the trommel tank; then the agitating tank is filled again, and the process continued until the tank is filled with fairly thick sludge. A sample is taken by running a 1-inch iron pipe into the mass, closing the top end of the pipe with a screw cap and withdrawing. The sample is assayed for total solids, water and gold contents, and from this the amount of cyanide necessary is calculated. It will be seen that more calculation is necessary with wet slimes than with dry, as with dry slimes the cyanide solutions can be run on without calculation, but with wet slimes the amount of water present must be taken into consideration. The gearing for the tanks is the ordinary cog-gearing with clutch and lever motion, as used in precipitation tanks in the Russell process for silver ores. The cyanide liquors are syphoned off to a pipe which communicates with the filter tank, this filter tank being composed of a wire sieve bearing a layer of sand and a filter cloth. The filter cloth is loose and is kept in position by a wooden frame, but it can easily be removed when choked, and cleansed by washing. The filtration is helped by a steam ejector, and the filtered solutions are pumped by this ejector to the collecting vats. From the collecting vats the solutions pass to the charcoal filters, of which there are 24. These filters are of sheet iron. It is calculated that the charcoal in these boxes is sufficient for 490 tons of liquors. From the boxes the liquors pass to a sump tank, whence they are pumped up to the weak solution tank. The measurement of the tanks are: Strong solution tank, 12 feet 6 inches by 6 feet; weak solution tank, 12 feet 6 inches by 6 feet; five agitation tanks, 12 feet 6 inches diameter by 7 feet deep; one sump tank, 12 feet 6 inches diameter by 6 feet deep. Collecting tanks—there are two of 5 feet by 4 feet by 4 feet; these are only temporary, pending the installation of a 12 feet 6 inches diameter by 6 feet. The agitation tanks take about 21 tons of water and slimes. The extraction of the gold is 90%. The average value of the slimes is 8 dwt., but the contents vary from 4 dwt. to 1 oz. The total quantity of tailings is 200,000 tons, which, at 8 dwt. per ton, would give 80,000 oz. of bullion, at £3 10s. per oz., or a total of £280,000. —Melbourne Mining Standard.

An Indicator for Hoisting Speed.

An ingenious machine is employed for measuring the velocity of a hoisting engine recently inserted at the Skalley Shaft No. 2 of the Dudweiler Colliery near Saarbrucken. It consists of a small fan 23½ inches in diameter, connected by a rubber tube with a vacuum gauge and an indicator and recording cylinder. The fan is driven by a belt from the shaft of the depth indicator. The fluctuations in the rate of winding are recorded by vertical lines drawn on the paper surrounding the cylinder, while the actual velocity at any given moment is shown by the pointer and scale. When men are being conveyed, the maximum velocity being 5m., the depression line is ½-inch long, and the fan makes 260 revolutions, correspondingly higher values being obtained during the winding of the buckets.

Mining Operations at Telluride, Colorado.

Special Staff Correspondence.

The new Smuggler-Union mill is nearing completion and will doubtless be in operation by the first of next year. The size is 100x285 feet on the ground, located on a slope of the hill, with elevator tower and storage rooms extending above the level of the tramway floor. The foundation stone work is of the heaviest character, the twelve battery motors, four tons weight each, resting upon seven-ton blocks of iron and the latter set in masses of concrete. The battery posts are 20x26 inches. The 400 H. P. condensing, tandem, compound engine which is being set in masonry of stone and concrete, is direct connected with the main battery shaft which runs the length of the mill. Each of the twelve batteries of five stamps is run by an independent subordinate shaft which connects by pulleys with the master shaft. By this arrangement any one of the twelve batteries may be detached from the main shaft without interfering with the operations of the others. The stamps are 1050-lbs. weight, of the Alaska Treadwell type, and will drop 110 to the minute. Below the batteries of sixty stamps will be the usual sets of amalgamating plates, the material from the latter passing over twenty-four bumping tables, each provided with sizing screens. The coarse product from the bumpers will pass to Wilfley tables set upon intermediate platforms, then reground in Chilian mills, the product from the latter passing to the thirty-two Triumph vanners, ranged symmetrically on the vanner floor below. The ore is first crushed at the mine and delivered by the tramway to the series of hoppers on the top floor of the mill, and passing from the hoppers over grizzlies, the coarse material being fed through six Dodge crushers, reducing it to ¾-inch size. Thus nothing coarser than ¾-inch is fed to the stamps, enabling them to work more rapidly. Four 125 H. P. boilers will furnish the steam power.

The old 50-stamp Smuggler-Union mill will continue to be operated. The crushed material from the stamps passes over plates, bumping tables and two sets of vanners, the coarse from the whole mill being ground by Huntington mills. The concentrates from the bumpers carry from 3 to 4 oz. gold, 6% lead, 60 oz. silver, 23% iron, 20% silica to the ton of concentrates. From one set of vanners the product carries .6 oz. to .7 oz. gold, 35 oz. silver; from another set it carries about 20 oz. silver and 1 oz. to 1¼ oz. gold. The old mill is now crushing about 175 tons of ore per day. The stamps are 850 lbs. weight and drop about 105 to the minute. It is expected that the combined capacity of the two mills will reach 450 tons of ore per day.

The workings of the Smuggler-Union mine are entered through the Bullion tunnel at a point about 1500 feet higher than the elevation of the mills, a wire rope tramway connecting the mine with the mills. The Bullion tunnel is at an altitude of 10,800 feet, is in a distance of 2300 feet along the strike of the vein. From the surface a shaft sinks vertically 1250 feet to the tunnel, landing near the breast, with stations at the second, third, fifth, seventh and ninth levels, the last named being the tunnel level. The distance between levels is 250 feet. The hoisting plant is on the third level, 280 feet vertically from the surface. The stopes above the seventh and fifth levels extend along the vein over a mile, following it from the southern end of the Smuggler grounds northward into the Sheridan and Mendota grounds, which belong to the Smuggler-Union Co. The drifts on the seventh and ninth levels are to be driven 2000 feet farther northward, which will take them to the limit of the company's grounds under the summit of the range. The shaft referred to starts on the vein at the surface, but where it strikes the tunnel level, 1250 feet below, the vein is 200 feet to the west, thus showing the dip of the latter westward. The ore above the fifth level is pretty well worked out, excepting at the northern end of the grounds. The present output comes from the stopes of the seventh and ninth levels. The vein maintains a tolerably straight course, a marked regularity in width, standing between trachyte walls, as was observed in following the stope above the seventh a distance of over a mile. The quartz, constituting the vein, is unusually hard and the method pursued is to strip the vein along the hanging wall, then breaking down the ore to the foot wall by hand drills and blasting material. Every 50 feet along the stopes is a "mill hole," or ore chute, cribbed by 2-foot timbers with ends facing the chute, which leads to the level. The ores are a quartz, carring free gold, iron pyrites bearing gold, silver, lead and zinc. At a point 700 feet below the Bullion tunnel is the Pennsylvania tunnel, taking the same general course, which is now in 1400 feet. This will be pushed farther and connected with the upper workings, giving a depth on the vein of about 1800 feet. All work in the stopes is done by contract at a certain price per fathom, measurements being taken in length and height on the vein, the width not being considered. Drifting is done by the foot. A. L. Collins is the general manager; C. W. Becker, mine superintendent; S. F. Elliott, superintendent of old mill. The construction of the new mill has been under the planning and superintendence of C. W. Van Law.

The Tom Boy upper levels, in Savage basin, are at an altitude of nearly 12,000 feet; the entire tonnage, however, comes through the lower tunnel which crosscuts the vein about 2000 feet from the entrance, this tunnel being the 600-foot level from the vein apex. At a point in the tunnel a vertical shaft is being sunk in the hanging wall, which has about reached the 800 level. A crosscut from the shaft through the vein has been made at the 700 level. The vein dips about 60 degrees. Development work to the extent of about one and a quarter miles has been done this year, making an aggregate of about three miles of work in the mine. The vein is opened through five main levels. The timbering of the mine is very thorough and extensive, the stull system being used. The mill is just below the tunnel entrance. It is equipped with crushers, rolls, grinders, amalgamating plates and vanners, the material passing over the plates through 30-mesh screens. The plates are cut into sections by traverse riffles, by which the black sand, mixed with gold particles and quicksilver, are caught. At intervals the material from these riffles is taken out, ground in a clean-up pan, with additional quicksilver, and separated from the black sand. By this method, also, the iron is intercepted, largely, and kept from going to the vanners. The vanner product is a very clean concentrate, containing not more than 6% of silica. The lead product comes from special streaks in the vein. The mill is treating about 180 tons of ore per day. Since last year power for the compressor plant has been changed from steam to electricity. A pumping plant on the opposite side of the range, operated by electric motor, delivers water from a lake to the mill through a pipe line. J. Herron is manager of the property.

The Hector Mining Co., operates the Cimaron mine and mill and persons similarly interested are driving the Ophir tunnel under Montana basin, which lies between Savage and Marshal. This tunnel is in over a mile and is driving toward the Virginius grounds on the Ouray side, and is an enterprise at the head of which is A. E. Reynolds. A tramway is being put up from the Ophir tunnel entrance to the Cimmaron mill and an addition to the latter is being built.

A. E. Hampson is operating a canvas tailing plant, near Pandora, through which he runs the tailings from the Smuggler mill. He ships about eight cars a month of slime concentrates, which are at least 100 mesh, the values obtained therefrom, Mr. Hampson states, being about $50 per ton in gold, silver and lead.

The Liberty Bell G. M. Co. is milling about 100 tons per day at their 40-stamp mill, and an addition is being erected for putting in forty more stamps. It is stated that about 75% of the saving is made on the plates and the balance in concentrates. The material from the plates passes through hydraulic sizers, separating the fine from the coarse, the former passing to one set and the latter to another set of concentrators, there being eleven double-decked tables in the mill. The ores from the Liberty Bell are a white, blue and brown quartz, bearing free gold and gold values in iron pyrites. The ore is crushed at the mine, then delivered at the mill by tramway.

WASCOTT.

Telluride, Colo., Nov. 3d, '99.

Hauling Lumber with Traction Engines.

(*Continued from Page 569.*)

and the cost of transportation by oxen or mule teams is so very expensive that the millman or miner had but little left from his season's work after deducting cost of hauling to and from the railway. This problem has been successfully solved by the application of steam power to traction engines designed for the work to be done, affording a method of transportation that has large capacity, is economical to run, and can be operated as a rule wherever animal power has been used, each outfit requiring but one engineer and one fireman to run it, doing the work of many animal teams and reducing the cost of transportation of freight 50% less than it was by animal power.

These machines are operated successfully where it is practicable to use mule or ox teams, ascending and descending steep grades over the mountain roads, or on the plains, hauling their immense loads of forty and fifty tons over grades from 8% to 15%, traveling at a speed of three miles per hour.

The engine illustrated on the first page of this issue is rated actual 50 H. P.; has double cylinders which are firmly attached to a steel bed frame independent of the boiler. The drive or carrying wheels are 8 feet in diameter, tires 24x¾ inches; lead wheel 5 feet in diameter; tire 15x¾ inches, and is furnished with steel gearing throughout. The whole machine except the cab is substantially built of steel and the best of iron, to stand the heavy work for which it is designed.

The wagons are also constructed of good material and have a carrying capacity each of 4000 to 5000 feet of lumber. This particular train has a load of 24,000 feet lumber, board measure.

Copper Tubes and Sheets Direct from Solutions.

Copper is now largely deposited from solutions. There are forty refineries which dissolve and deposit all their copper, and it is estimated that over one-third of the total copper output of the world is refined in this way. This signifies the transport of the copper, atom by atom, across the vats by the electric current; one cubic inch of copper contains roughly sixty thousand billion atoms. This is a great expansion of what was merely a laboratory method of purifying. The great success of this method of refining is due largely to the value of the so-called impurities of raw copper. Nearly all copper ores contain silver and gold; and where raw copper obtained from these ores is refined, the silver and gold are found as an insoluble anode sludge upon the bottom of the vats. From this sludge these metals can be obtained as bullion by a simple and inexpensive chemical treatment. The value of the bullion recovered in one year by this means at the Anaconda, Montana, refinery was $3,500,000; and if one assumes the average raw copper is only one-half as rich in precious metals as the Butte ores of Montana, the value of these impurities, separated every year, would amount to $8,000,000.

The method of refining adopted by different companies is practically the same, though they differ in the arrangement of the vats and in the distribution of the electric current. The raw copper is cast into plates of convenient size and suspended in a solution of copper sulphate, with thin sheets of pure copper on each side of it. When the current is passed through the solution the raw copper dissolves, but is deposited again on the thin sheets of pure copper, while the impurities sink and form the anode sludge or remain in the solution. The deposited copper is usually of coarsely crystalline structure and is smelted to obtain the ingots in commercial form. Further operations are necessary before this pure electrolytic copper can be obtained in the form of plates, tubes or wire, and it was therefore natural that attempts should have been made to obtain deposits of copper which should be dense and even in composition and also possess the form of the article or product wanted.

The difficulties to be met and overcome in obtaining such deposits were, however, greater than imagined, and it is only within the last two years that sheets and tubes of electrolytic copper on a commercial scale have been produced directly from the solution. There are now two processes, both patented, which produce these results.

The older of these processes—the Elmore—aims to produce seamless tubes of pure copper by the deposition of the metal upon a revolving mandrel of suitable diameter, this mandrel acting as the thin sheet of pure copper in the vat above described. The earlier patents describe a method of obtaining a smooth deposit by the application of pressure from traveling agate burnishers; but this method was found to produce a foliation of the deposit, and much time and money has been spent in overcoming this defect. A satisfactory tube has been made by using a modification of the original process.

The second is that known as the Dumoulin process, from M. Dumoulin's laboratory in Paris. The process obtains smooth and dense copper by the application of a thin insulating coating to the inequalities that form on the surface of the metallic deposit. As before, the copper is deposited upon a revolving mandrel, but only one-half of this is immersed in the solution. The insulating material is applied by impregnators which have a movement along the length of the surface of the deposit, and coat all projecting parts with a thin film of animal matter. The film hinders further deposition until the surrounding depressions have been raised to the common level. The insulating film is being removed continuously by the oxidizing action of the air and of the solution, and thus deposition of copper can occur again on any part, as soon as it has ceased to be coated by the animal matter out of the impregnator.

Revolving mandrels, 12 feet long by 16 inches in diameter, are used in the electrolytic vats. When the deposit of copper has attained a thickness of one-sixteenth of an inch the copper tubes are removed and are cut lengthwise. In this manner copper sheets are obtained of satisfactory quality.

The sheets are applicable to all ordinary purposes and are sold at the same price as ordinary sheet copper. The Electrical Copper Co. of London states its intention to show that this process may be used for the manufacture of boiler tubes and other hollow articles.

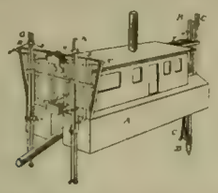
That these two processes can turn out satisfactory products is regarded beyond doubt, and their future success is to depend solely upon the economic factor in their operation. It may be pointed out here that in both cases the value of the impurities found in the slimes may materially affect the results, and, as in the older electrolytic copper refining industry, success will largely depend upon obtaining raw copper which is known to be rich in its contents of silver and gold.

Latest Mining and Metallurgical Patents.

Patents Issued Nov. 7, 1899.

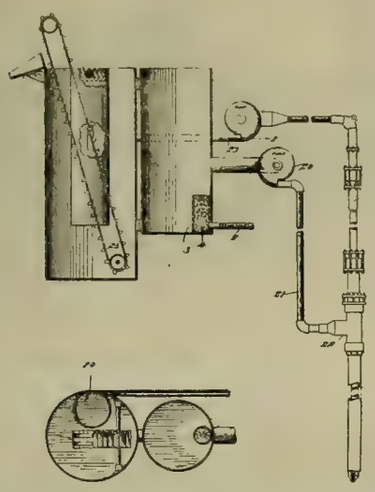
Specially Reported for the MINING AND SCIENTIFIC PRESS.

HYDRAULIC DREDGER.—No. 635,798; B. H. Muehle, Detroit, Mich.



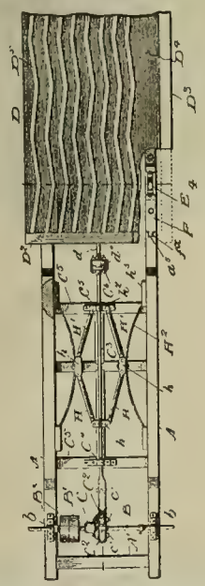
A dredger hull provided with a pivotal spud at one end, and one or more spuds or poles sliding up or down within hinged and oscillating sleeves at opposite end of hull, which also carries an excavating device, these parts being so arranged that the hull and excavating device may be moved laterally about the pivotal spud.

APPARATUS FOR RAISING BITUMINOUS SAND FROM WELLS AND SEPARATING BITUMEN FROM ITS IMPURITIES.—No. 636,117; A. S. Cooper, San Francisco, Cal.



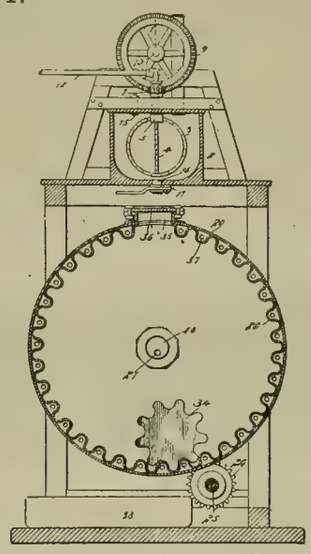
In an apparatus for raising bituminized sand from wells and separating the bitumen from the impurities, a hot water tank, a separating cylinder open at its bottom, a pump having pipe connection with cylinder, a pipe leading from pump to a tube designed to extend into the well, a jacket surrounding tube, another pump having connection with the water tank and also having communication with the space between the jacket and the tube, and an injector at the lower end of the jacket and tube, and means for discharging a heating medium into the tank, a sand receiving tank, an elevator in sand receiving tank, a hydraulic pipe having connection with the pump, a jacket surrounding the lower portion of pipe, a pump having connections for forcing water from the water tank into the jacket and an injector at the lower end of the jacket and pipe.

ORE CONCENTRATING MACHINE.—No. 636,679; J. H. Michelsen, Butte, Mont.



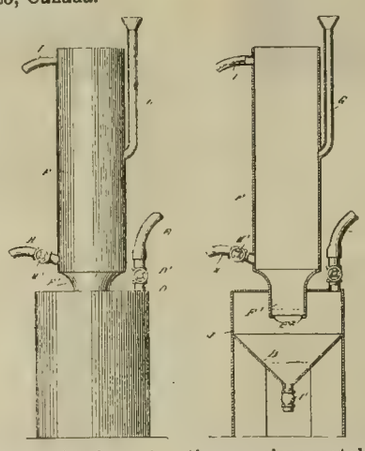
In an ore concentrator, the combination with a vibrating table, roller bearings for supporting the same; means for raising rollers under one side of table; of a pitman provided with a vertically adjustable connection to table and also provided with a pair of toggle levers upon each side, levers being pressed inward by curved springs, one end of toggle levers being connected to the pitman and the other upon the frame of the machine; and an eccentric connected to pitman provided with means for varying the movement of pitman. An ore concentrator, consisting of a vibratory table adapted to be tilted toward one side, a pitman adjustably connected thereto and provided with bearings, toggle levers interposed between pitman and a portion of the frame of the machine provided with springs tending to retain the toggle levers extended, springs being provided with bearing blocks upon frame; of a driving shaft having rigidly mounted thereon a flanged collar, and a circular slotted disk adjustably secured to collar, the disk being surrounded by an eccentric strap, strap being connected to one end of pitman. The combination with a vibratory table adapted to be tilted to one side, and a pitman provided with means for adjusting the throw of table and means for taking up lost motion; of a connection between table and pitman composed of a flanged slotted collar rigidly secured to the end of pitman provided with a dovetailed groove of uniform width, extending transversely across collar, and a similar slotted collar rigidly mounted upon a portion of table, but provided with a dovetailed tongue of uniform width extending transversely of collar adapted to slide in the grooved portion upon the other collar, and slots upon both coinciding, both passing through the slots to secure the collars together.

AMALGAMATOR.—No. 636,666; J. M. Holmes, Glens Falls, N. Y.



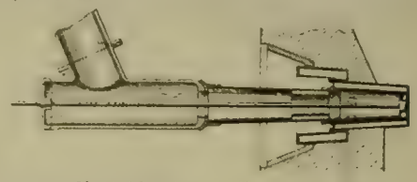
An amalgamator, comprising a pulverizing drum, consisting of an inner and an outer sheet-metal shell, the inner shell being corrugated, double heads closing each end of the cylinder, the spaces in the heads being in communication through the peripheral passages formed by the corrugations of the inner shell, the space in one of the heads being adapted to receive a heating medium entering through a port in one of the trunnions of the drum, the space in the other head being adapted to discharge the heating medium through a port in the other trunnion of the drum, and a longitudinally corrugated mulling cylinder arranged within the inner shell and adapted to be rotated by the corrugations of inner shell.

APPARATUS FOR EXTRACTING PRECIOUS METALS FROM ROCK, SAND, ETC.—No. 636,675; J. F. Latimer, Toronto, Canada.



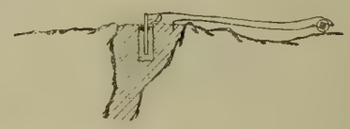
An apparatus for extracting precious metals from rock, sand, and the like, comprising an upright receptacle having an open contracted bottom or throat, an overflow outlet near the top, a valved pulp outlet near the bottom, a material inlet between the two outlets, a ring set in the contracted bottom or throat to reduce the size thereof, and a receiver through the top of which extends the contracted lower end of the receptacle, receiver having a valved liquid inlet at its top and a valved concentrates outlet at the bottom.

APPARATUS FOR REGULATING DISCHARGE AREA OF FURNACE TWYERS.—No. 636,239; P. Benni, Ostrowiec, Russia.



In an adjustable twyer the combination of a tapered nozzle or inlet, a hollow annulus of size to fit and partially close the nozzle or inlet, and combined adjusting and cooling pipes movable longitudinally of nozzle or inlet, and secured to the annulus, and guides through which pipes pass.

ELECTRO METALLURGICAL PROCESS OF EXTRACTING NATIVE COPPER.—No. 636,321; T. Craney, Bay City, Mich.



A process for mining native copper where it occurs in isolated masses or boulders, which consists in forming a cavity in mass or boulder, suspending a copper rod within cavity and in electrolytically depositing the copper from the mass or boulder upon the copper rod, by constituting the copper rod, the cathode and the mass or boulder, the anode of an electrolytic cell and the containing vessel for the electrolyte. The herein described process of mining masses or boulders of native copper, which consists in applying the electro-metallurgical process of extracting the copper directly to the mass of copper in situ.

PROCESS OF EXTRACTING PRECIOUS METALS FROM ORES.—No. 636,288; H. de Raasloff, New York, N. Y.

The improvement in the process of separating precious metals from their ores, consisting in mixing with the ore a solution of a base and a solvent for precious metals, which solvent is capable of being separated from the base by oxygen and adding liquid air to the ore and solution, the solvent being capable of being separated from base by oxygen, evaporating nitrogen from liquid air, and adding the oxygen which remains to the mixed ore and solution.

New Method of Detecting Gold.

A new method of detecting the presence of a small quantity of gold has been recently discovered by Dr. Ohler. By this method the presence of quantities as low as 77 centigrammes per ton may be established. The operation is as follows: A quantity of finely powdered ore, say 120 grammes, is introduced into a flask. To this an equal volume of tincture of iodine is added, and the mixture well agitated. It is then left for an hour, agitating from time to time, and is finally allowed to stand. When the solution has separated, a band of filter paper is saturated with this, and the paper allowed to dry. This operation is repeated five or six times in succession, in order to completely saturate the paper. It is afterward calcined, and it will be observed that the ash, when gold is present, offers a purple color. This color should disappear quickly if the ash is moistened with bromine water. The test may be modified in the following manner: A quantity of the powder, 120 grammes, is covered with bromine water, and after agitating during the course of an hour, the solution is filtered. Upon adding protochloride of tin to the solution, it takes a purple color, in the presence of gold, giving the reaction known as "Purple of Cassius." In the case of sulphides the ore should be previously roasted, and when the mineral contains a considerable proportion of carbonate of lime, it should be calcined in the presence of ammonium carbonate.—Scientific American.

Cordially Appreciated.

The MINING AND SCIENTIFIC PRESS of San Francisco is the best mining paper printed.—Telluride, Colo., Journal, Nov. 4.

The MINING AND SCIENTIFIC PRESS of San Francisco is the oldest and best publication devoted to the mining industry on the coast.—Globe, Ariz., Silver Belt, Nov. 9.

Headwater Workings of a California Irrigation System.

This paper has had considerable to say about the conservation of water, the necessity for storage in California and other States, that the mining, electrical and other industries might be served and protected.

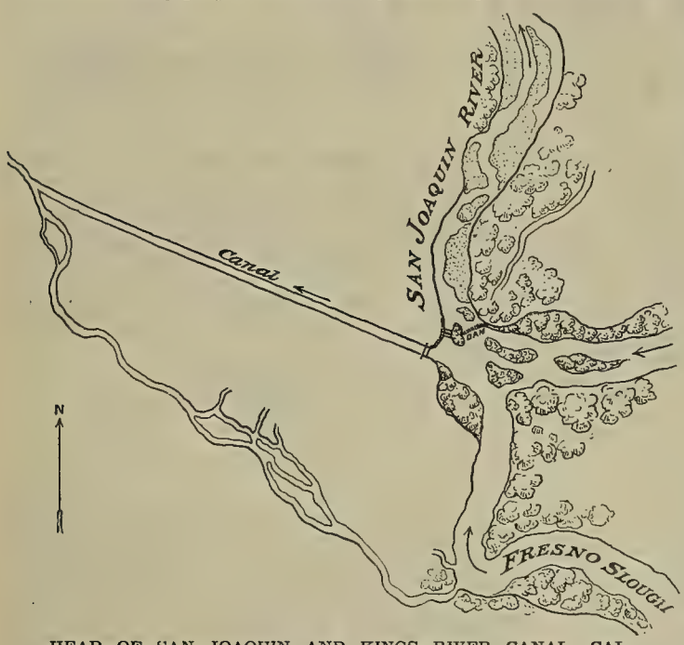
The present meeting in San Francisco of the Society for the Preservation of Water, which has that desideratum in view, makes timely some reference to a typical California irrigating system.

There are many people who talk very earnestly and well about the benefits of conservation of water who have little idea of the way in which the water that is producing wealth is taken out from the streams which bring it down from the melting snows and heavy rains of the mountains. Possibly some of our California readers who are using this water to excellent advantage have a very indefinite idea of where it immediately comes from and by what headworks it is turned aside from its natural course to the sea to render them service. All these details of methods seem to be commanding increased attention in these later days, because the great arid interior is awakening to the opportunities opened by irrigation and is desirous to know how California gets her irrigation water. For this reason the Government experts are giving increased attention to California and the systems of the San Joaquin valley are carefully described and illustrated in late Government publications.

An instance of this is found in the Water Supply Papers of the U. S. Geological Survey, in which the local descriptions are by C. E. Grunsky, a California irrigation engineer. From this source is taken an exposition of the works of the San Joaquin and Kings River canal, one of the oldest in the valley, distributing water over a considerable area.

The first engraving shows the canal starting in a westerly direction from the San Joaquin river, below the discharge of the waters of Fresno slough. Below the opening of the canal an island is seen in the San Joaquin which was taken by the engineers as a vantage point in their work. The engraving also shows the steamboat chute filling the space from the bank to the west side of the island. The second engraving shows a sketch of the same island with the end of this chute on the right, and on the left, reaching away to the farther bank, the brush dam which backs up the water so it will flow freely into the canal. The two lower engravings give up and down stream views of the steamboat chute already mentioned.

The canal is fifty feet wide — about the same as the width of the steamboat chute which is near it. This chute is obviously a way to raise the water as high as necessary without putting in an obstruction, which would stop navigation. It has a a falling dam, which holds back the water except when its lowering is required by the occasional passage of river craft. The views show that the works required much piling and planking, and are therefore a constant item of expense, as is also the 350 feet of brush dam which has to be repaired or replaced each spring after the winter floods have done their worst with it. Besides the piling and sheathing, much brush and sacked sand have to be used to protect the natural banks from cutting. Still the enterprise has proved profitable to Miller & Lux, who are practically the sole owners of the system, and they have had in some years as much as 38,000 acres under irrigation from this source. They have developed colony enterprises upon it, and the recent considerable development of that area has shown what irrigation can do for that arid region by the prosperity which prevailed there during the recent years of drouth.



HEAD OF SAN JOAQUIN AND KINGS RIVER CANAL, CAL.



BRUSH DAM, HEAD SAN JOAQUIN AND KINGS RIVER CANAL, CAL



UPSTREAM VIEW OF STEAMBOAT CHUTE, CAL.



DOWNSTREAM VIEW OF STEAMBOAT CHUTE, CAL.

A New Alloy.

Magnalium, says the *Electrical Review*, London, is the name of a new alloy of aluminum and magnesium, discovered by Dr. L. Mach, which is said to possess valuable properties. The addition of magnesium in quantity not exceeding thirty, and not less than ten, parts by weight to one hundred parts by weight of aluminum, imparts to the latter metal properties which, in the pure condition, it does not possess, without raising its specific gravity (2.64), on the contrary, slightly lowering it, since the specific gravity of magnesium (1.74) is even less than that of aluminum. The addition of magnesium produces an alloy which is harder, and is easier and cleaner to work than pure aluminum. Turning produces a surface as bright as a mirror, and shining like silver, the metal coming off in long spiral turnings. The alloy files clean and regular; without tearing, or choking the file, as aluminum does. Deep and sharp screw threads can be cut on it, and very clean holes can be bored out. The color of the metal resembles silver more than aluminum, and it takes a high polish. The hardness and strength of the alloy are considerable; the hardness can be varied by varying the proportions of aluminum. An addition of heavy metals is not only unnecessary, but is positively injurious, since this deteriorates its working properties and increases its specific gravity. Previous attempts to make useful alloys of aluminum and magnesium are said to have failed, owing to the aluminum not being pure. This point is of great importance, and aluminum made by an electrolytic process must be used.

THE Ontario Government has granted a concession of 1200 acres of corundum lands in Hastings and Renfrew counties to a syndicate headed by J. N. Shenstone, of the Massey-Harris Mfg. Co. The concession is in the form of a lease for a term of ten years, renewable. The syndicate is bound to expend at least $100,000 during three years in developing the lands and erecting a plant for the crushing of corundum and manufacture of abrasive goods and other articles. Twenty-five thousand dollars are to be laid out on a plant. An unusual feature is the retention by the Government of the right to fix the maximum price at which corundum may be sold in the Dominion.—Canadian Mining Review.

THAT was a remarkable demonstration of what a mogul can do, that occurred on the New York Central the other day, when engine No. 948, one of the new moguls, hauled out train No. 11, the Southwestern Limited, made up of two mail cars, five passenger coaches and nine Wagner cars, sixteen cars in all. The total weight of the train was 1,832,000 pounds, or 916 tons, and the length of the train, including the engine, was 1212 feet, or nearly a quarter of a mile. This engine made the running time of the train between New York and Albany, 143 miles, in three hours and fifteen minutes.

SOME large and rich mines afford excellent illustrations of how things should not be done. Indeed, if they were not rich probably they would soon close down as monuments of unfortunate investments. A rich mine will pay with any kind of management.

Alamo Mining Camp, Lower California.

Written for the MINING AND SCIENTIFIC PRESS by J. D. LOWRY.

Lying in the southwestern corner of a mountain-fringed plateau or table land, seventy-five miles to the southeast from Ensenada, Lower California, is the town of Alamo, with its adjacent mines and mills, 4500 feet above sea level.

Here, in the year '89 a discovery of gold was made, and a rush to the region followed from all parts of the United States and Mexico, and even from Europe, but the larger part were from California. To those first on the ground the region offered a rich field both for placer and quartz mining.

In the case of the placers, of which there were and are still considerable deposits in Alamo, they were of such richness in the early days of the camp that gold could often be picked up on the surface in good sized nuggets in the vicinity of what is now the town, but like the San Roque placer diggings, over which there was some excitement during the past spring and summer, it soon played out. Then, owing to a scarcity of water, placering was abandoned by white men, but Chinamen kept the field, and are still there in considerable numbers working these deposits, notwithstanding that every bit of water used is carried a considerable distance to the diggings in buckets, etc., and it is safe to assume that they are making more than a living out of them.

The ledges, too, were of extraordinary richness at the surface, the ore running anywhere from $10 to $5000 in gold to the ton. Shafts were sunk, mills erected, and Alamo in a short time became a busy and booming mining camp. At the present time the ore rarely reaches the $100 mark per ton, and averages but a small fraction of that amount.

The boom had a comparatively short existence, as at the end of a year and a half from the time it started it suddenly subsided, and great numbers left the camp, some of them tearing down the buildings they had erected, and, as a consequence, Alamo is now suffering from the want of decent accommodations in the way of houses and rooms for those living there.

The formation of the region is very irregular. No regular or permanent ledge has been found up to the present time, although a depth of 350 feet has been reached in the Montezuma mine. Violent dynamic forces have been at work, and as a result the whole formation appears as a mass of faulted ledges cut by intrusive porphyritic and other dykes. Gash veins are also of frequent occurrence, rendering mining an uncertain proposition in Alamo.

The quartz is found principally in walls of granite and slates, although schists, sandstone, hornblende rock, etc., are also found. A reddish cast predominates, owing to the great prevalence of iron oxide. The ore is principally free milling, but considerable sulphurets, chiefly iron pyrites, are found associated with the gold. Galena is also of frequent occurrence.

At the present time there are six mills and one cyanide plant in working condition in Alamo, but it is rarely that they are all in operation at the same time.

Of the above-mentioned plants, four are 5-stamp mills, viz.: the Aurora, 1000-lb. stamps, owned and operated by the Aurora M. & M. Co.; the Montezuma, 1000-lb. stamps, owned and operated by Los Angeles parties; the St. David, 1100 lb. stamps, leased and operated by the International M. & M. Co., and a private prospecting plant owned and operated by parties living in Alamo.

Of the other two mills, one is a rotary mill, owned and operated by a Frenchman living in Alamo, and the other is a Bryan, owned and operated by the Texas M. & M. Co., of Kansas City, Mo., in which Senator Cockerell of that State is interested.

With the exception of the last named mine, the Texas, which uses a Dodge rock breaker, each of the above mills is supplied with a Gates ore crusher.

The cyanide plant, owned by Wiggins, Albright & Neal, of California, is erected on the ruins of the Princessa mill, which burned some years ago, and they are now working the tailings of this mine. They also expect to work the tailings of the other mines in the camp, and have already secured the option on the tailings of the St. David mine. In the early days of Alamo the Princessa was one of the richest mines in the camp, and little attention was paid to saving anything but the coarser gold; consequently, considerable fine gold passed over the tables into the tailings.

The cyanide people erected their plant in July last, but while not yet complete, they have been working the last month, and from all accounts with good results. The plant consists of three tailings or pulp vats of forty-one tons capacity each, two solution tanks, two precipitating boxes, two regenerating or solution strengthening tanks, and one alkaline wash tank. The tailings vats and solution tanks are connected by pipes in such a way that two or all three of the former can be worked at the same time.

Zinc shavings are used as the precipitating medium. The solution has a strength of about 0.5% cyanide. Up to the present time caustic soda has been used as a neutralizer, but after recent experiments with lime they have concluded that it will serve the purpose equally well, and thus enable them to do away with the costly importation of the former. At the time of the visit of the writer to the plant no means other than the shovel for either filling or emptying the pulp vats were employed, but appliances for both of these purposes will be installed. All pumping of solutions was done by hand, a very slow and laborious process, but it was stated that a steam pump was to be put in.



Viznaga Mine.
St. David Mine.
Aurora Mine.

MINING SCENES IN ALAMO, LOWER CALIFORNIA.

From a climatic and scenic standpoint the location of Alamo is ideal. The plateau on which it stands is sixteen miles long and two to three miles wide, walled in on every side by mountains. The plateau offers good facilities for farming and grazing, and there are a number of farms and ranches scattered over its eastern end.

The population, numbering from 400 to 500, is mostly composed of Mexicans, although there are a number of Americans and Europeans, and a number of Chinamen. Board costs $8 (Mexican) per week, and sleeping accomodations from $1 to $3 (Mex.) per week. Clothing and other necessaries of life are high, as nearly everything sold in the place comes from the United States, and pays not only a high duty but a heavy freight charge as well.

Fuel (wood) is cheap, it being $7 (Mex.) per cord. Labor is also cheap, wages ranging from $2 (Mex.) per day for muckers and ordinary laborers to $3.50 (Mex.) per day for miners.

San Francisco, Cal., Nov. 2nd, '99.

Cheap Mining and Milling.

In the issue of the 4th inst. appeared a paragraph to the effect that the Spanish mine near Washington, Nevada county, Cal., had been closed down and would not be started up again. The company had been working the mine by means of an open cut for many years and made a profit on ore that went 95 cents per ton. The cut had got so deep that the property could not be worked in that way any longer, and it would not pay to work through a shaft.

In response to a request for some accurate data the following is reproduced, having been originally prepared from the superintendent's report. The figures show what was probably the cheapest milling of ore ever accomplished in the world, and while the circumstances were exceptional, the results show what may be accomplished under similar conditions.

At the mine at the time this data was prepared the vein averaged 90 feet; the hanging wall was slate, soft, shaly and not well defined. The true vein was on the foot wall and consisted of solid quartz, 4 feet thick, and did not pay for working. The pay was found on the hanging wall side, which contained many veinlets and streaks of ferruginous quartz carrying gold. Where no quartz was to be found, there was no pay. The slate on this (the west) side was talcose.

The main tunnel was in 1200 feet. The vertical distance from the surface to the end of the main tunnel was 350 feet. One of the methods of extracting ore there was as follows: There was an excavation from the tunnel to the surface which acquired the form of an open cut with sloping sides, too steep for a man to stand on; a man with a churn drill was lowered by a rope; he drilled a hole which, when deep enough, was charged with about five pounds of powder and fired, causing a large quantity of the soft slate to slide to the bottom, whence it was taken out through the tunnel. The mine employed a foreman, two white men and eight Chinese, who extracted about 4000 tons of ore a month—enough to keep the mill at work. The wages paid were: white men, $3 per day; foreman, $3.50; Chinese, $1.50.

The ore obtained came out of the tunnel by gravity, the empty cars being hauled back by mules. The ore was passed through a Blake rock breaker and then ground in a Huntington roller mill, of which there were three of 5 feet diameter and one of 4 feet. The mills, which made fifty-eight revolutions per minute, were fed by Hendy automatic ore feeders.

The following record of one month's run of the mine may be taken to indicate the low cost of working the ore, and to show, also, how a very low grade of ore may be profitably treated when the conditions are all favorable:

MINE—COST OF PRODUCTION.

(Run: 28 days' work produced 3443 tons of ore).

	Labor.	*Supplies.*	*Total.*
Extracting ore	$703 50	$113 41	$816 9
Delivering ore to mill	160 20	17 95	178 15
Dead work	105 20	10 93	116 13
General expense	78 35	1 95	80 30
Total	$1,047 25	$144 24	$1,191 49
Cost per ton	.304c	.042c	.346c

MILL—COST OF REDUCTION.

(Run: 24¼ days reduced 3443 tons of ore).

	Labor.	*Supplies.*	*Total.*
Mill expenses	$227 32	$194 33	$421 65
Water for power	.....	161 70	161 70
Handling ore	154 50	5 35	159 85
General expense	78 40	1 95	80 35
Total	$460 22	$363 33	$823 55
Cost per ton	.133c	.106c	.239c

Bullion produced	$3,138 55
Total expenses	2,015 04
Profit	$1,123 51

It will be seen from this that the ore only yielded a trifle over 91 cents per tor, yet a profit of 32.6 cents per ton resulted. The percentage of profit was 35.8 of the total. In the previous month 2796 tons of ore were worked, which yielded $1.16 per ton. The profit was 56 cents per ton, or about 48% of the total. The profit that month on a yield of $3268.49 was $1572 91. The cost of mining was 37½ cents and of milling 23 cents per ton.

THE increasing application of concentration to low-grade ores is resulting in a largely increased output of both precious and base metals.

The Emerson Shaft of the Wildman Mine, Sutter Creek, Cal.

Written for the MINING AND SCIENTIFIC PRESS by JOHN ROSS JR.

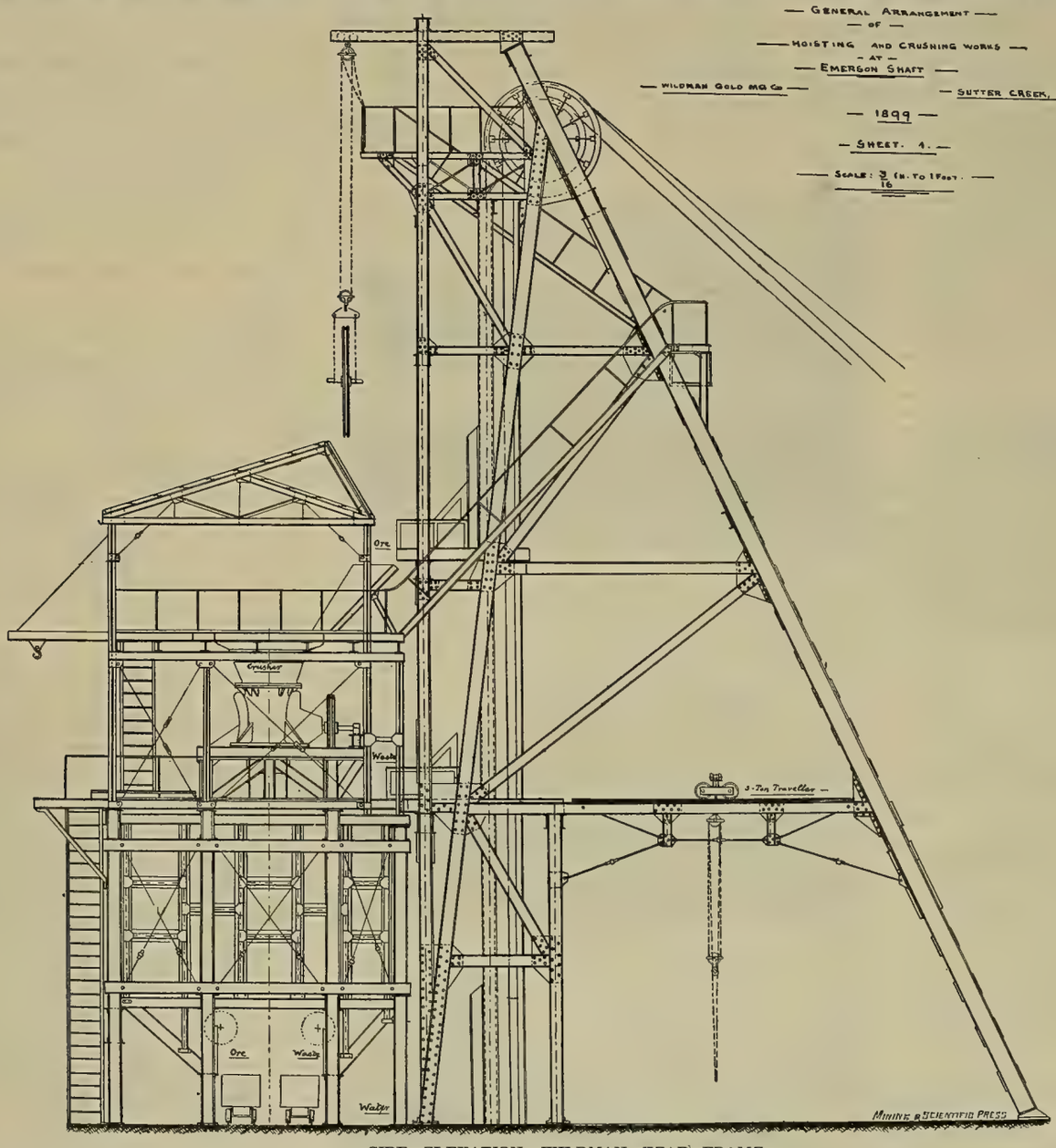
The Wildman and Mahoney mines are among the oldest in the California gold belt. The properties, originally worked separately, have been consolidated under a single management, and have been extensively developed and exploited during the past four years. The diamond drill has been effectively employed in prospecting beyond the limits of the mine workings, the result of which was so satisfactory that it was determined to sink a new vertical shaft in the hanging wall country, which would render the extensive operation of the mine at great depth easy of accomplishment, it being impossible to carry on deep mining economically through the original shafts, sunk on the veins.

The new or Emerson shaft, as it is called (named after the president of the company), is vertical, and is being sunk nearly 1000 feet east of the present Wildman inclined shaft. It is calculated that it will cut the Wildman vein at a depth of between 2300 and 2400 feet. It is difficult to give the exact depth, as through this section the lode flattens more or less in depth. It is now down over 700 feet, and making at the rate of 2 feet per day. The ground passed through is mostly diabase, with some very hard grey slate (altered diabase), an occasional seam of black slate and stringers of barren quartz.

A seam of asbestos 4 inches thick has also been passed through.

The excavation outside of timbers is 8x20 feet and is made across the stratification of the country—that is, the length of the shaft is east and west. Timbers used are all selected spruce, 12x14 inches, framed in the usual Comstock style, with the following exceptions:

First—The wall plates are placed with the 12-inch side vertical, and the dividers with the 14-inch side vertical. A dap is cut ½ inch deep out of the wall



SIDE ELEVATION, WILDMAN HEAD FRAME.



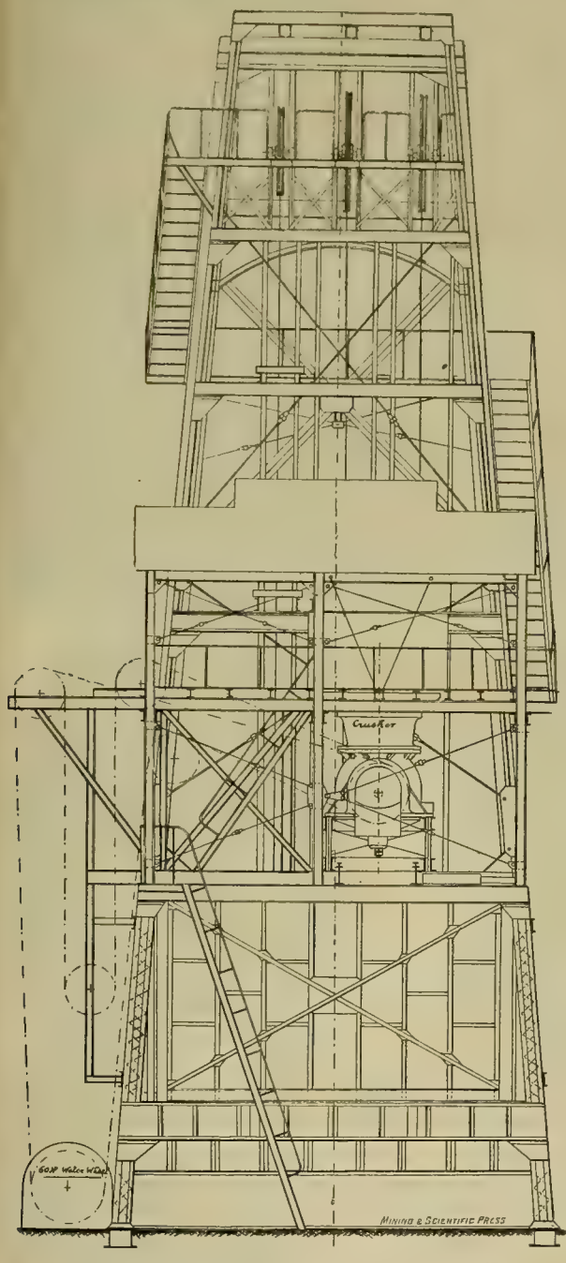
GENERAL VIEW OF WILDMAN MINE, SUTTER CREEK, AMADOR COUNTY, CAL.

plate, top and bottom, for the center posts, which leaves 1½-inch footing and heading for the posts, as the 14-inch side, or end of the divider, comes against wall plate and posts, thus giving more strength to the wall plate and a better footing for the posts than would be the case if the divider was of the same width as the wall plate.

Second—As seen in sketch of divider, a 2-inch piece of filling is inserted behind each guide, which gives 4 inches to work on (in keeping guides true) in case of a squeeze in the shaft.

The sketch of section of shaft shows a small "service cage" in the pump compartment for the use of foreman and pumpman. It is to be run open on two sides, to facilitate the handling of long lengths of pipe. All of the pipes are set on the side of the shaft opposite this cage.

The ladders are each 15 feet long, inclined over each other, there being a landing at the end of each ladder.



FRONT ELEVATION, WILDMAN HEAD FRAME.

The shaft sets are 4 feet apart, or 5 feet from center to center of wall plates. The skip compartments are 4½x4½ feet and the pump and ladder compartment 4½x5 feet.

The wall plates and ends of dividers are framed so that the dividers are driven up, into place, instead of down, which will prevent their being knocked out by blasts.

It is the intention to use skips that will carry three tons of ore at a load, making total weight of load (including cable and skip), starting at a depth of about 2500 feet, of about six tons.

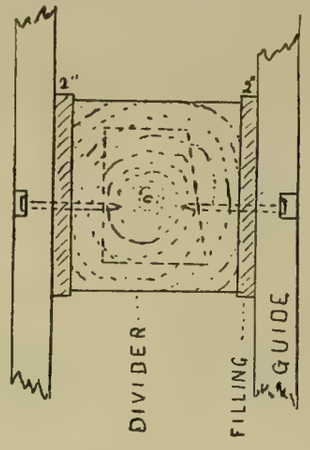
Foundation of stone and cement for permanent gallows frame or head gear has been built from bedrock to the level of the collar of the shaft. The temporary head gear now in use is so built that the permanent structure can be erected over it without interfering with the work.

The head frame for this shaft was designed by A. E. Chodzko of San Francisco, Cal., and is to be built entirely of steel. In this arrangement the switches for the different dumps—for water, waste and ore—will be operated either by compressed air or electricity, and will be under the control of the engineer.

The rock breaker will be set in a steel frame, which is in front of but entirely independent of the main head frame. The crusher will be run by rope transmission from a 60 H. P. wheel.

Travelers have been provided for the rapid and safe handling of skips when changing from water to ore skips, or vice versa. The skips are automatic and require no attendance, the arrangement being such that ore, water or waste may be dumped where desired, the engineer having complete control. Over each sheave is a runway with travelers arranged for handling the sheaves by means of chain blocks, which dispenses with the temporary rigging up of gin poles, such as are commonly employed for the purpose.

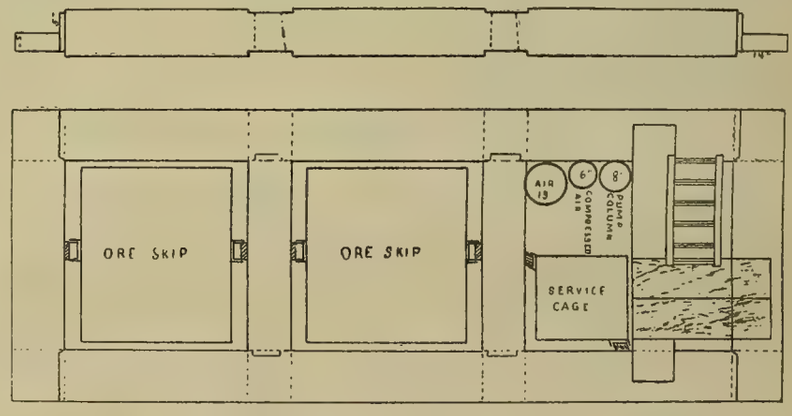
This structure throughout has been designed with care and is calculated to meet all the modern requirements of deep mining. This is the first large steel head frame to be built in California. The engravings give a front and side elevation of the structure,



GUIDES FITTED WITH BLOCKS.

in which the details are clearly shown. The resultant strains fall just in front of the main compression members, and the design throughout is one calculated to afford great strength and rigidity with a minimum of material.

THAT there have been failures in mining as well as in other branches of business cannot be denied, and the causes generally are not hard to find. As is the case in most other pursuits, failures can generally be traced to lack of capital and experience. Some say mining is a gamble, and it is in the sense that most other callings are a gamble. The farmer ventures with his crop of wheat, not knowing whether he is going to have eight bushels of wheat to the acre or thirty at $1 until the harvest is over. The real estate man buys town and farm property, pays taxes on it for years and often sells below cost, and a careful estimate of the mercantile line shows that not more than 10% of those who enter it succeed. If there are more failures in mining than in farming, it can be explained on the ground that the larger the profit when a success is made, the larger is the number who make the venture regardless of means and experience. Mining, like other industrial pursuits, requires capital and experience. When a company engages in it, it is not necessary that all the members thereof should possess both, if only both are united in the management, although it is more satisfactory all around if it is the case.



ARRANGEMENT OF TIMBERS, WILDMAN SHAFT.

The Vanderbilt Mining District, San Bernardino County, Cal.

Written for the MINING AND SCIENTIFIC PRESS.

In the extreme eastern portion of San Bernardino county, Cal., about seven miles from the Nevada State line, is the Vanderbilt mining district, which at one time attracted widespread attention, but from which comparatively little is heard lately. Still, there are valuable mines in Vanderbilt, and they are being worked, but in a quiet way, and, consequently, are little heard of.

The district is in the low hills which lie at the northeastern end of the New York mountains, the latter being properly a continuation of the Providence range. These hills are rounded by erosion, with here and there a rugged outcrop of a ledge of some harder rock formation. Surrounding the low hills on the east, southeast and south are high abrupt bluffs of volcanic rock—the remnant of a great flow which at one time must have covered hundreds of square miles of this region. These rocks consist of rhyolite tuff, rhyolite and andesite, lying in thick layers, apparently comformable, and forming a series of terraces 1000 feet in height. Thus far no mineral deposits have been found in these rocks, though identical with the rhyolites, liparites and tuffas at Calico, 150 miles to the westward.

Underlying these volcanic rocks is a crystalline formation, the geological age of which is not known, but which probably belongs to the Palæozoic. The geological structure is simple, consisting of an alternating series of gneissoid and schistose, granitic and hornblende rocks, intruded by large, irregular masses of coarsely crystalline rock (pegmatite), containing an abundance of rose-colored orthoclase and little mica. The absence of mica in all of these rocks is a noteworthy circumstance.

Intrusive dykes of a variety of rocks occur in the district, all of granitic type, ranging from felsite to aplite (a crystalline, granular admixture of quartz and feldspar). These dykes are not abundant, but are found accompanying all of the principal mineral veins, though also occurring where no veins are found.

The strike of the rocks over twenty square miles of this region is uniformly north and south, the dip being variable though usually nearly vertical. The eastern portion of the area is more gneissoid and massive, and is more largely made up of hornblende rocks than the section in which the veins occur, and to the westward are found heavy beds of limestone conforming to the strike and dip of the schists. Beyond them is found a broad area of syenitic granite. In these western granites are large dykes of rhyolite and vitrophyre, though, as far as observed, none of them have any connection with mineral veins. Ferruginous quartz veins are found in the granites, which contain some gold, but they are uniformly low grade. Still farther to the westward, very large quartz veins are found which are stained with copper carbonate. In the New York mountains, southwest of this district, copper and silver ores are found at and near the contact of limestone and granite, and considerable development has been done on them, but they are now idle. In the limestone near Manvel, three miles from Vanderbilt, is found a quantity of crysocolla in irregular bunches.

In this interesting district is a peculiar vein system, which to the casual observer is complex and puzzling; but, upon platting the several veins, their relations become apparent. There are two main systems, which are 1000 feet apart and nearly parallel. The direction of strike is about N. 55° to 60° W., though this varies somewhat. On the west is the Boomerang system, which comprises one main fissure several thousand feet in length, and striking in the direction indicated, with branches forking out from the main crevice at a low angle on either side of it. In each case these spurs or branches

strike out to the southeastward, there being no branches diverging to the northward. They all contain high-grade ore.

The eastern system is in some respects like the Boomerang system, but with important differences. The main fissure in the latter system is that of the Gold Bronze-Gold Bar vein. The St. George, or Gold Bar, fissure is found on a low ridge near its northern end, and from that point strikes south 63° E. for a distance of 1200 feet, where it sends out a diverging branch, which, sweeping around in a curve, forms the Gold Bronze fissure, the main portion of which strikes nearly east and west. The Gold Bar fissure continues southerly from this point of divergence, but assumes a curving strike and sends out a second and then a third branch, each of which, together with the main or foot wall fissure, has a corresponding curved strike, including between the several veins segments of country rock, having the form of concavo-convex lenses. To the southward of these curving veins is another vein, having no apparent direct connection with the main fissures, but conforming to it in the curving strike, and it may properly be included in the same system. Each of these fissures are also ore-bearing.

Nearly opposite the southeastern end of these two systems of veins, a third system is found, striking nearly at right angles to those described, and forming a connecting link, as it were, between them. This vein has a strike approximately northeast and southwest, and, like those previously described, is the principal vein of a system of fissures, which, also like the others, branch out from the principal vein. These several veins diverge from a point near the southeasterly end of the Boomerang vein.

The whole vein system of the district forms a most interesting study of the dynamic forces which result in the fracturing of rock masses and the formation of mineral veins in which are concentrated large quantities of the sulphides of the base metals, together with gold and silver.

The compressive stress which resulted in a disruption of these rocks has created planes of weakness, into which have been intruded eruptive magmas in the form of dykes. These do not occur in all of the fissures, or, if so, all do not appear at the surface, though possibly they may be found in depth. The principal and most valuable veins, however, are accompanied by dykes of ashy gray colored rock, too much decayed to make its normal condition easily determinable, but which is probably felsite. The character of the mineral veins indicates that the fissures have been the planes of extensive movement, resulting in a crushing of the dyke rocks and the original schists, which they intersect as well. Subsequently the deposition of ore has taken place, though the movement of the rock masses has continued long after the formation of the veins had been completed, as evidenced by the striated surfaces on the walls, the formation of heavy gouge seams and the fracturing of the solid vein materials.

The Gold Bar crevice is well defined and continues for a long distance. It has heavy gouges and clay masses within the limits of the fissured zone, which in places is more than 20 feet wide. The dyke rock is much decomposed and the entire zone shows evidence of extensive movement and crushing force. The ore shoots are lenticular in shape, usually thickest in the center of the mass, thinning toward the outer edges. These shoots have a peculiarity noticed in many veins elsewhere—that of "splicing" or overlapping at the ends. This condition is observable both longitudinally and in depth.

Where these splices occur the walls are usually decomposed, softened and reduced to the condition of a tough clay, which parts from the hanging wall in great slabs, forming dangerous ground to mine, if not properly supported. At these places the clay is often found to contain imbedded angular fragments of quartz and small bunches of sulphide ore. The ore shoots are of good size—12 inches to several feet in width. The minerals are sulphide of iron, lead, zinc and copper. Gold and silver form the principal values, the gold largely predominating. The gangue is quartz.

In a general way this description of the Gold Bar vein will also apply to the Gold Bronze vein and to most of the others in the district which are accompanied by dyke rocks, with the exception of the main fissure of the Boomerang mine. In the Gold Bar and Gold Bronze system the ore shoots form for the most part at the contact of the dyke rock with the schists, but in the Boomerang the ore occurs in a series of lenticular bodies within a dyke of light gray rock. The dyke has a width of 1 to 15 feet, which is fractured by a system of nearly parallel fissures, between which the dyke material has been shattered and pulverized, and in these shattered portions of the dyke the ore shoots have formed, the sulphide minerals and quartz filling interstitial spaces and to some extent also replacing the pulverized dyke material. Ore deposition appears to have resulted in direct proportion to the fissuring and pulverizing of the dyke rock prior to the infiltration of the mineral solutions.

With the narrowing and final discontinuance of the dyke going southeastward, the strength and value of the ore shoot diminish, until at the farthest extent of development nothing remains but a small vein lying at the side of the dyke, where it is but a foot in width. A short distance farther southeast the dyke appears to have disappeared entirely, and in its place is found a vein of barren white quartz, which continues hundreds of feet in the same general direction.

In all of the veins mentioned a good grade of ore has been found, some of it running several hundred dollars per ton. In a number of the smaller veins which are offshoots from the main fissures high grade shipping ores have been mined, and these were extensively worked in the early days of the camp, from 1892 to 1894. The principal mines have passed into the hands of A. G. Campbell of Salt Lake, who has worked first the Boomerang and more recently the Gold Bar-Gold Bronze veins extensively and profitably. W. H. S.

Motive Power at the Mines.

Written for the MINING AND SCIENTIFIC PRESS by A. E. CHODZKO.

The recent fire that destroyed a part of the generating plant at Blue Lakes City, Calaveras county, Cal., thus depriving several neighboring towns and mines of their quota of electric current, affords a timely opportunity for calling attention to the most desirable methods in the production of motive power at a mine, a question to which its success, and often its existence, is intimately connected.

The sudden putting out of the electric lights in a town or in a mine will, in most cases, prove to be a decided if not a serious annoyance; yet, unless in some exceptional cases, such an accident will not, by far, create as grave a situation as would the suspension of hoisting or pumping power in a deep shaft.

The latter has been experienced, to a greater or less degree, by a number of mines along the mother lode during the last two or three dry seasons, and that the lesson has not passed unnoticed by some, at least, of the mine owners of California is evidenced in some recent hoisting installations, where a steam engine has been coupled by a disconnective device to the driving shaft of a hydraulic hoist. A broader view of the situation has even materialized into the organization of a committee of prominent citizens, and a definite programme has already been outlined, tending towards a systematic impounding of waters in the high Sierras for use in dry seasons.

This is an undertaking of considerable magnitude, and which, momentous and extensive as it is, will entail a large amount of preparatory work, followed by legislative action. Its good effects are not, therefore, to be expected in the immediate future.

No intention is here entertained to discuss the requisites of the economical production of motive power. A number of factors of various natures must be considered and combined to arrive, in each particular case, at the solution of this problem. But while no iron rule can be set in the premises, two points at least are pretty generally considered at the present day, as established by experience, namely:

First—That the cost of power per unit is much less in a large plant than it is in a small one—in other words, that the cost of producing 1 H. P. in a 1000 H. P. engine is much less than the cost of producing it in a 1 H. P. engine. This difference is more particularly marked in the case of steam.

Second—That among the several sources of motive power water affords in all respects the most convenient solution of the question, so far as first cost and maintenance of motive machinery are concerned.

The consequences of these facts are that the moderate power consumer, such as is the majority of the mine owners in California, will in many cases have apparently good reasons to buy his power from a large plant, because the first cost of his installation is thus reduced to a minimum, and also because he will have to pay for his power only so long as he actually uses it. A mine which requires a large amount of motive power will more commonly find it advantageous to have its own generating plant, and this will also be the cheapest solution in a very small exploitation.

Besides, since steam and compressed air power distributions at some distance are not to be considered in California, the situation can be summed up in saying that many mines in a given region often depend for their operation on a single water system, or else—and this is more and more the case nowadays—on a single electric plant; and we are now confronted by the fact that either one of these sources of power may find itself unable to meet the wants of the consumers for a more or less protracted period, with the result that what would already be bad enough in one isolated case assumes the proportions of a public calamity, when hundreds, if not thousands, of men are thus thrown suddenly out of employment for weeks or perhaps for months.

What, then, is to be done to prevent occurrences which, as far as water goes, have ceased to be rare exceptions? I have previously mentioned the use of an emergency steam plant, but in many low-grade mines the cost of coal or of firewood is such that working with steam power is hardly, if at all, better than shutting down altogether. Again, the purchase and erection of engines, boilers and transmissions means an immediate expense which in many cases will be prohibitive. It is at least interesting to note that while these difficulties have been making themselves felt of late—to a more marked degree, perhaps, than in previous years—California was slowly but surely, at the very same time, adding, so to speak, a new feather to its cap, and there is nowadays hardly any question but that this privileged land of the gold mine is also a great oil country.

There, in the writer's opinion, lies the salvation from present and future troubles.

The ideal emergency plant, both as to first cost and as to economy in running expenses, must consist of internal combustion engines, using oil, and more especially using crude oil as a source of motive power. No such array of conditions tending to secure economy and convenience can be found with any other kind of motor.

Self-contained engines, requiring a minimum of space and of foundations; no water, except for jacket circulation, and this can easily be saved and used over again; no more complication than in a good steam engine, and minimum of storage space for fuel; running expenses strictly proportional to the actual power developed, and stopping suddenly with the motor itself; absolute absence of danger inherent to the nature of the fuel; even in a rugged country, where transportation is expensive, the oil can be pumped over miles of ridges and canyons through a small-sized pipe, and at very moderate cost, from some accessible place, which in more cases than one will be the nearest railroad station.

Very satisfactory results have been obtained from the use of power plants using gasoline or distillates, and that this class of motors is well adapted to mining work is no longer a matter of doubt. Another step forward must be made, however, if the greatest economy is to be realized, and this will be found in the use of California crude oil, which careful experiments have shown to be very well adapted to that object. It is the writer's belief that a judicious combination of crude oil prime movers and of compressed air in the machinery of a mine will procure a degree of economy and security unattainable under the present conditions of motive power production, and that what was at first termed emergency plant will prove to be, at least in some cases, the cheapest type of permanent power installation.

(*To be Continued.*)

Official Statistics of the World's Gold Production.

The following table shows the gold production of the world from 1873 to 1898, inclusive:

1873	$ 96,200,000	1886	$106,163,900
1874	90,750,000	1887	105,774,900
1875	97,500,000	1888	110,196,100
1876	103,700,000	1889	123,489,200
1877	113,947,200	1890	118,848,700
1878	119,092,800	1891	130,650,000
1879	108,778,800	1892	146,815,100
1880	106,436,800	1893	157,287,600
1881	103,023,100	1894	181,567,800
1882	101,996,600	1895	200,406,000
1883	95,392,000	1896	202,251,600
1884	101,729,600	1897	238,812,000
1885	108,435,600	1898	287,428,600

The following table shows the production of gold in the world for the last three years by countries:

	1896.	*1897.*	*1898.*
NORTH AMERICA.			
United States	$ 53,088,000	$ 57,363,000	$ 64,463,000
Mexico	6,500,000	7,500,000	8,500,000
Canada & Newfoundland	2,817,000	6,089,500	13,838,000
EUROPE			
Russia	21,535,800	23,245,700	25,463,400
Austria-Hungary	2,152,700	2,235,600	1,859,500
Germany	1,139,100	1,373,100	73,600
Sweden	76,100	84,400	83 600
Italy	140,200	194,400	165,900
Spain	.....	37,900	37,900
Portugal	18,500	10,400	10,400
Turkey	7,300	7,300	7,300
Servia	13 300	13,300	13,300
Great Britain	24,600	35,100	6,600
SOUTH AMERICA.			
Argentina	315,000	137,700	137,700
Bolivia	250,300	343,500	343,500
Chile	611,000	340.700	340 700
Colombia	2,200,100	2,227,200	2,363,200
Ecuador	132,900	132.900	39,500
Brazil	1,001,100	1,204,200	1,583,700
Venezuela	948,500	1,057,400	1,057,400
British Guiana	2,213,100	2,086,700	2,048,700
Dutch Guiana	481,800	602,100	569,100
French Guiana	2,107,400	1,535,900	1,644,400
Peru	116,600	628,000	628,000
Uruguay	33,600	38,500	38,500
ASIA.			
Japan	639 300	693,600	790,800
China	8,058,600	8,833,500	6,078,700
Corea	731,800	1,020,200	1,020,200
British India	6,130,500	7,247,200	7,781,500
British East India	.....	686,400	660,900
Dutch East India	47,800	116,400	116,400
UNCLASSIFIED.			
Africa	44,581,100	58,558,700	80,428,000
Australasia	43,776,200	52,665,700	64,860,000
Central America	372,300	465,800	473,700
Totals	$202,251,600	$238,812,000	$287,428,600

Mining Summary.

ALASKA.

J. H. Woolery of Ketchikan says that ore from some mines is a clean white quartz, full of fine gold. Other ore is rich in copper and gold.

Cape Nome prospectors have signed a memorial to Congress, asking to have the size of Alaskan placer claims reduced to 500 feet square, and that locating by power of attorney be forbidden.

ARIZONA.

PIMA COUNTY.

H. E. Banes, Supt. Azurite Copper Co., announces that on the 100 level at Shaft No. 2 he has cut an ore body containing copper carbonates that is 32 feet wide.

PINAL COUNTY.

The *Star* reports a strike in the Collins mine, of the Mammoth group; the force will be doubled. A connection will be made from the 700 level of the Mammoth through a body of ore to the Collins mine, and the latter will be worked through the Mammoth shaft. The deepest shaft in the latter will be sunk 200 feet deeper. It has been decided to install an electric power plant on the Aravaipa river, fifteen miles from Mammoth. Sufficient power will be developed to run the mill with additional twenty stamps.

CALIFORNIA.

Amador.

W. Q. Mason and J. Griesbach, owners of the Madrone mine, at Pioneer, are making an upraise from the third level. They have a 2-foot ledge, which averages from $8 to $20 per ton.

Jackson *Dispatch*: Supt. Truscott of the Oneida says grading for the new 60-stamp mill has been completed. The new shaft is down 2020 feet and sinking. The old shaft has been unwatered and repaired to a depth of 100 feet, but it is in a bad condition. No ore is being taken from the mine at present, as it would have to be piled on the dump and handled a second time to get it into the mills. ——A large pump has been put in the Voorlander mine near Middle Bar. The pump is operated by water power and throws 3000 gallons an hour. The shaft has reached a depth of 160 feet and a contract has been let to sink an additional 100 feet.——The Altaite M. Co. has been incorporated to operate the old Mexican mine in Rancheria district, eight miles above Sutter Creek in the east belt. The incorporators are J. B. Francis, L. W. Borger, J. W. Caldwell, R. J. Adams and G. G. Fraser. The capital stock is $100,000, divided into 200,000 shares of the par value of 50 cents a share. The principal place of business will be at Jackson. A great deal of gold, it is said, was taken out of this mine in early times by the Mexicans, the ore being packed on burros to Rancheria creek, where eleven arrastras were in operation.

Butte.

Oroville *Register*: J. B. Watson, Supt. Golden Trout mine, on Feather river near Strawberry, says the stamp mill is crushing six tons of ore a day and that the other ten stamps will be in operation by the 1st of January. They have forty-one men on the payroll. The ledge in one tunnel is 7½ feet wide and 11 feet in the other tunnel.

Calaveras.

The Commodore mine, near San Andreas, is down 300 feet. It has been found necessary to substitute 12x12 timbers in the shaft for the 8x8 heretofore used.

Work has begun on the Shotgun mine, near Demarest, beyond Fourth Crossing. The new shaft is down 35 feet.

Good reports come from Wallace, where drift mining is said to be profitable, and in the mine located in the town rich strikes have been made. The deposits are found under a cap of lava. Dredging is also going on in the river, but little can be done there because of the low stage of the water in the stream.

M. C. Rigney and Mr. Thexton, one of the incorporators of the Ritter M. Co., are at the mine, near El Dorado, and pushing work on the tunnel.

Work on the Emery ditch, near El Dorado, is being prosecuted with vigor. Mr. Emery has been spending a great deal of money on his water system this year. A large number of men has been employed. Labor is in demand on the Rose Hill property.

The San Andreas *Citizen* hears that the Womble mine, in the Pine Log district, has been sold to an English syndicate. The Womble mine is near the Royal Con. mines. Wilbur, Castle & Peters formerly owned the Royal and sold it to Mr. Van Ee and his associates, comprising an English syndicate. ——The Silvery Queen mine, near Copperopolis, recently sold by W. H. Oxendine to Los Angeles people, has passed to the Zurich G. M. & M. Co., whose principal place of business is at Los Angeles, Cal.

Kern.

The Desert Lixiviation Co. at Barstow has started to handle 200 tons of ore per day. A 250-ton smelter is projected at Barstow.

J. A. Gowan has let a contract to E Shipsey to sink a double compartment shaft 100 feet on the Little Bonanza claim. The Defender and Little Bonanza join the Yellow Aster Co.'s property on the east. The Little Bonanza joins the side line of the Burcham and it is thought the extension of the Trilby ledge has been struck, as a vein 40 feet wide, which assays $8 to $10, has been found. Mr. Gowan will sink 500 feet.

Lovell White of San Francisco has sold to A. G. Newton of Los Angeles a tract of 5000 acres of oil land four miles northwest of Bakersfield, in the Kern river district, for $112,000. Boring operations are to be commenced by the new owner.

Bakersfield *Californian*: It is reported on what appears to be good authority that the California Standard Co.—an Oakland corporation—has a 400-barrel oil well on its land half a mile from McKittrick.

Mendocino

The Point Arena Oil & Land Co has been incorporated; principal place of business, Point Arena; capital stock, $750,000; R. F. Philips, H. E. Forst, C. M. Curley, E. P. Gilmore, W. C. Davidson, J. C. Halliday of Point Arena and E. J. Beane of San Francisco.

Mono.

At the Standard Con. of Bodie development work is in progress at the rate of 75 feet per week. One hundred and twenty men are employed. The mill concentrates are worth over $100 per ton.

Nevada.

Supt. Campbell, of the Mountaineer, intends to increase the capacity of the mill and install an air compressor for machine drills. The mill has ten stamps at present.

The Maryland-Idaho mine at Grass Valley has been bonded by A. P. Flaglor of New York in the interest of J. D. Rockefeller and other capitalists looking for mining properties.

A dam has been built a quarter of a mile below the mill at the California mine, near Washington, 337 feet long and 14 feet high. It will impound the tailings from the mill, which will be saved and worked later.

Nevada *Transcript*: J. Clark, owner of the Oro Fino quartz mine at Meadow Lake, has taken out $197 in gold from a pocket recently discovered on the claim. He pounded the decomposed quartz and sluiced it through a long tom. Mr. Clark has worked it to a depth of 3 feet and has a number of tons of rich quartz that he will pack out and mill next spring. The snow is 3 feet deep in the camp.

Nevada City *Herald*: Work at the Last Chance mine has been suspended until spring. ——The Imperial Copper & Paint Co. is working night and day, mining rock for shipment.

Placer.

The *Sentinel* reports a strike of gravel in the Oro gravel mine, near Iowa Hill. E. M. Armstrong is Supt. and has a large interest in the property.

Lincoln *News-Messenger*: At the Olgol copper mine, near Lincoln, a ledge of gold quartz 8 feet wide has been struck.

San Bernardino.

The Victory M. C. has been incorporated; principal place of business, Victory mining camp, Upper Holcomb valley. This company will work mines in Holcomb valley, near the Gold Mountain mine.

The Gold Mountain M. Co., near Holcomb valley, have suspended operations on their mine and are erecting a sawmill, which will cut 500,000 feet of lumber this winter for the mills and other buildings.

The Rose mine, ten miles east of Gold mountain, is employing fifty men.

San Diego.

The successful operation of low-grade gold mines at Hedges has furnished a practical illustration of what may be accomplished on the deserts of California, Arizona and Nevada under somewhat similar circumstances. Pumping water costs from 20 to 50 cents per ton at large plants.

The salt works at La Punta, on upper San Diego bay, have produced for the season of '99 about 500 tons. The property is owned by Shaffer Bros.

C. S. Josselyn, interested in property at Picacho and Copper mountain, near Yuma, is making preparations for extensive development work in both camps the coming winter.

Judge Torrance of the Superior Court of San Diego has authorized Receiver Trumbo of the Golden Cross mines at Hedges to erect a cyanide plant in connection with the works, with a capacity of 300 tons per day. It is stated that there are 900,000 tons of tailings available for treatment, and according to an analysis made they will average $2.03 per ton. The cost of treatment, it is said, will not be over 65 cents per ton.

Shasta.

(Special Correspondence). — The Reid & Clendenin group of six claims in Old Diggings district has been bonded for six months to C. D. Galvin, F. Grotifen and F. G. King, who will begin work soon. The price is said to be $75,000. The property has an aggregate of 1000 feet of tunnel. It has been shipping ore for some time to the Keswick smelter. A 5000-foot tramway and air compressors will be put in. F. G. King, Redding, will be Gen. Mgr.

The Cleveland Con. mines in the Bully-choop country started their 10-stamp mill two weeks ago. The ores of this property have always been considered of rebellious character, and the company who last worked it expended $152,000 in futile efforts, though they used every known process. The present operators—W. R. Beall & Co.—are making a success of their work under the personal supervision of Mr. Beall, who formerly operated in the ores of Silver City, New Mexico. He is saving his concentrates successfully and has reduced his tailings to $1 a ton.

It is reported that the sale of the Mammoth group of copper mines near Kennett will be consummated. A London and Halifax (Nova Scotia) company who have held an option for some months from J. F. Coleman have purchased through W. C. Boak of Halifax this property, which is in course of development by Mr. Coleman under an option from Saeltzer, Kahny, Jaegel & Wallace of Redding. The London and Halifax people are locally represented by W. A. Temple of Halifax, who also holds an option on the Balakala group of copper mines. The Coleman properties comprise 1000 acres, and sufficient preliminary work has been done to warrant additional large expenditures. In effect, Mr. Temple says it warrants an expenditure for as large a plant as there is at present on any copper mine on the continent. The ore body comprises an immense mass of copper sulphide.

Redding, Nov. 15th, '99.

Redding *Searchlight*: T. J. & F. O Jordan have taken from the Rabbit mine within a week $350.——In the Old Diggings district the Mammoth-Garfield mine, which was shut down on account of the inability of the Garlick electric plant near Copley to furnish power for its drills, has resumed operations. ——The Central mine that has long lain idle is being operated under lease to J. Thompson, who will ship his rock to the Keswick smelter. ——The Reid mine in Star gulch, O d Diggings, has been sold by E. A. Reid, J. Salnave and W. H. Clendenin to F. G. King, C. D. Galvin and F. Grotenfend. Mr. King says within ninety days he will put in machinery to work the mine on a large scale. Two power drills, an air compressor, pumping machinery and a double-wire ropeway leading to and across the river to rail connection will be the initial equipment. The Reid mine is a low-grade gold mine. The owners have for some time been shipping ore to the Keswick smelters.

Sierra.

Marysville *Democrat*: T. A. Carson, formerly Mgr. Good Title mine at Indiana ranch, has been developing a quartz claim three miles from Downieville, east of Goodyear Bar.

Quincy *Independent*: At the Claybank mining operations are being vigorously prosecuted by the company, which through Mr. Thomas has been reorganized.——At the Upper Dutch claim, under the management of Mr. Holgate, the mine is being put in order for next season.

Siskiyou.

The Carlshand-Walters copper mine, near Coles station, is reported sold to the Siskiyou Copper Co., of Rossland, B. C.

Yreka *Journal*: Strikes have been made at Willow creek, Squaw creek and Parks creek in the Gazelle district.——The Yreka Creek Dredger M. Co. has started scrapers excavating a basin for the dredger at the Booth claim, from which the dredger will work northward to Yreka—two miles. ——The privilege of mining the race track park belonging to the Siskiyou County Agricultural Society, a mile south of Yreka, has been sold to H. B. Gillis for a syndicate for $7000, of which $2500 is cash. Work is to be commenced as soon as machinery can be put up for pumping and hoisting.——The shaft in the Greenhorn No. 2 mine is down 160 feet and no bedrock yet. A large sandstone boulder was cut through last week, which was supposed to be bedrock.——F. W. Lloyd and D. W. Anderson have a ledge of quartz at Little Shasta, traced 500 feet, found to be 15 feet wide. It prospects in native copper and gold.

Tuolumne.

At the Santa Ysabel, near Stent, a shortage of water and non-delivery of the machinery in contract time have delayed operations. The directors, it is reported, have financed the company for any future needs. The mine, it is said, has ample ore reserves, officially estimated to run between $10 and $12 per ton, the cost of mining and milling being estimated at $4 per ton. When the forty stamps which are now in process of erection are completed they should treat 200 tons of ore a day.

The Spring Gulch mine, near the Buchanan, has been bonded by R. Marshall to Egbert & Willett.

At the Draper mine the machinery that recently arrived is set, and the mine is working night and day.

At the Santa Ysabel mine, near Stent, work on the new mill is making good progress. The new hoist, which will work down 2000 feet, has been finished. The ore at the 6th level, according to last reports, has widened to 3 feet.

Sonora *Independent*: Thirteen mines are in operation in the neighborhood of Carters.—— The unwatering of the Dead Horse mine at Carters has commenced.——The Grizzly main shaft is down 600 feet, and the mill running. ——The Jubilee M. Co. will put in water power at the Hazel Dell.——At the Providence, near Carters, the shaft is down 550 feet. Supt. Holland is drifting, raising and stoping from bottom level upwards. The rock carries 1½% of high-grade sulphurets and shows free gold. The 10-stamp mill is running.

COLORADO.

BOULDER COUNTY.

The San Blas M. Co., in Ward district, will soon have its mill in operation. Pending the completion of the improvements, no ore is being shipped except such as may be taken out in development. When making the upraise from the tunnel level for the new working shaft, a streak of ore was cut at 70 feet from the surface. The streak was 10 inches wide, of high-grade ore. A drift has been started to open this vein and is in about 16 feet; the ore body has widened to 16 inches. A large body of mill dirt accompanies the pay streak, the vein being 4 feet between walls.

CLEAR CREEK COUNTY.

Denver *Republican*: A strike has been made in the Gold Dirt mine at Empire by Byrne & Kilton. In crosscutting they have opened 2 feet of rich ore on a vein that lies parallel with the Gold Dirt. The same parties are also driving a tunnel to reach this and other lodes in Silver mountain. The tunnel has been driven 2000 feet and must go 2000 feet additional to reach the Gold Dirt and other mines in that locality. The company is working air drills.——The Newhouse tunnel is receiving its steel pipes for the tunnel. The blower now running will remove or blow in 12,600 cubic feet of air per minute from the heading of the tunnel, a distance of almost 1½ miles. ——A flinty rock mined in the Treasure Vault some time ago and thrown over the dump proves to be valuable. A party from Cripple Creek took a lease on the dump and has been cleaning up several hundred dollars a week. A shipment made recently ran six ounces gold to the ton.

FREMONT COUNTY.

(Special Correspondence). — The National Gold Extraction Co. are building an extension to their chlorination plant at Florence, whereby its capacity will be increased from 75 to 200 tons per twenty-four hours. An electric power plant is also being put in at this property.

The parties in control of the Arequa mill in Cripple Creek district have let contracts for the erection of a new chlorination mill at Florence. WASCOTT.

Florence, Nov. 13th, '99.

GILPIN COUNTY.

Central City *Register-Call*: At the Cook mine they are working both ways at the 800, and they have found from 9 feet to 15 feet of ore. Stoping is being carried on the 6th, 6th and 7th levels, and eleven air drills are being used. Seventy-five men are working night and day shifts, but with the completion of the Bobtail mill and the shipment of the ores through the Bobtail tunnel and Bates hill, the mine will give employment to 250 men. ——During the month of October the Burroughs Con. M. Co. shipped 462 cars of ore—3927 tons—nearly all of which was milling ore, the proportion of the smelting ore being 12 cars. The company is the heaviest producer at present in the county.

LAKE COUNTY.

The Yak tunnel, run from California gulch under Breece hill at Leadville, is in 8200 feet. Fifty men are employed in three shifts with machine drills run by compressed air. It has a depth on Breece hill of 1100 feet and will tap the Little Jonny mine at a depth of over 1300 feet. One of its principal objects was to exploit the territory of the Golden Eagle Co. of thirty-two acres adjoining the Little Jonny group on the west, which is being worked by lessees through four shafts. A good tonnage of copper sulphides is being shipped.

Leadville *Miner*: J. Rodman, agent of the Philadelphia smelter, is taking 300 tons of ore per day from Leadville.——A. Wuensch, who is directing the work on the Colorado No. 2 and Louisville mines, sent 1300 tons of sulphide ore to the local smelters in the month of October.——From the Colonel Sellers old zinc tailings dump 300 tons a day is being shipped to the New Jersey Zinc Works plant at Mineral Point, Wisconsin.——The Dollie B. at Leadville is shipping thirty tons a day of galena, which carries a good percentage of lead and good silver values, with some gold. ——J. S. Loder, constructor of the new smelting works at the Elgin site, says everything is in readiness to blow in the furnace. The Boston Gold-Copper Co. have a supply of ores on hand to commence operation and Leadville mines can furnish an unlimited supply of dry silicious and pyritic ore to run the furnaces.——Shipments of steel iron to the works of the Illinois and Colorado steel companies are on the increase. At present 300 tons per day is sent out. The lessees of the Catalpa-Crescent group, a heavy manganese producer, have paid out in the last three years $50,000 for ore hauling charges. Now their ore is loaded by the Colorado road at its bins and hauled to Denver, and in consequence the lessees make an entire saving of the hauling charges. The Kitchen shaft of the Morning Star is developing a large body of steel iron and sixty tons per day is being taken from development work.

LA PLATA COUNTY.

(Special Correspondence). — Half a dozen properties are being developed on the East Mancos, in the western section of the La Platas. The ore carries gold and is found in a contact vein between lime and quartzite. Among the properties is the Sundown, which shipped four cars of ore on the 5th inst. The October shipments from this property averaged $51 per ton in value. It is owned by Mancos people and is bonded to Cripple Creek parties. The Timberline mine, in same locality, shipped four cars of ore about Nov. 1. A good deal of activity in the matter of development is in progress in that district.

Mancos, Nov. 6th, '99. WASCOTT.

MONTROSE COUNTY.

Winters & Peterson have opened a copper find in Paradox valley, in the eastern extremity of the park, a section heretofore regarded as barren. They uncovered a vein of copper, 3 feet wide at the surface, carrying good values. The vein was traced on the surface for more than a mile and quantities of rich float found.

OURAY COUNTY.

A lead concentrating mill is to be erected on the Camp Bird at Ouray. The gold veins on the property extend east and west, and, crossing these, is a series of veins carrying lead of concentrating value that, when opened, will add largely to the output of the property.

SAN JUAN COUNTY.

(Special Correspondence).—The Gold King mill of forty stamps and twenty vanners is operating steadily, treating nearly 100 tons of ore per day. Supt. Hansen states that about 60% of the values, which are gold, are saved by amalgamation. Steps are being taken to add twenty more stamps to the same mill. The concentrates run heavy in iron. The Gold King people last spring organized the Silverton, Gladstone & Northerly Railroad Co., and built and equipped a railroad from Silverton to Gladstone, a distance of twelve miles. This road is a favorable factor in developing other mining properties up Cement creek.

The Sampson group, on Bonita mountain, has been purchased by the Gold King M. Co. and will be worked in connection with the latter. The purchase was an important one, as it put an end to costly litigation between the two ownerships, and it gives the purchasers the major portion of the ground on Bonita mountain.

The Red & Bonita Mountain M. Co. have completed a 10-stamp mill on their property in

this locality, which is opened by tunnel work amounting to about 3000 feet.

The Boston & Silverton M. & R. Co., made up of Boston people, have completed a 10-stamp mill on Cement creek, below the Gold King mill. Besides stamps it is equipped with crushers, rolls, trommels, jigs and concentrators. The mineral holdings of the company lie at different points above the mill, on which development work is in progress.

WASCOTT.

Gladstone, Colo., Nov. 11th, '99.

SAN MIGUEL COUNTY.

The Carribeau mines in Ophir district have been sold to the Venture Corporation, (Ltd.), of London, which also owns the Independence mine in Cripple Creek district. The price paid is stated to be $350,000. The Carribeau mine, which is the principal property of the group, is on Yellow mountain, half a mile from Ophir, and was owned by the Carribeau & Montezuma M. Co., of which C. S. Newton was Supt. It is one of the leading properties of the San Juan county. The ores are chiefly argentiferous galena and gray copper. In more recent years the deeper development of the mine showed an increase in gold values. A 20-stamp mill handles the output of the mine by concentration, the sulphides being sent to the smelters. The thorough sampling of the mine prior to the sale indicated an average value of $20.75 per ton. It is stated that the milling plant is to be enlarged to fifty stamps. The mill now at the mine suffered severely from a snowslide last winter, and it is the intention to remove it to a safer site before the enlargement is made.

TELLER COUNTY.

The production of the mines of Cripple Creek district is given by years as follows:

1891	$60,000
1892	687,310
1893	2,010,400
1894	3,250,000
1895	6,970,000
1896	9,100,000
1897	12,000,000
1898	60,060,000
1899 (estimated)	18,000,000
Total	$68,137,710

Lessees on the Flying Cloud, adjoining the Pinnacle group, are reported to have found an ore body on their vein at a depth of 180 feet, assaying nine ounces to the ton.

Mr. Winchester, lessee of the Doctor mine, has resumed shipments from the twelfth level of the mine, in which he has about 150 tons broken which will average $500 to the ton.

Whip & Glenn, leasing the Lansing of the Pinnacle group, have shipped eight tons of $1200 ore.

The output of the Lexington for October was 400 tons, some of which went $200 per ton.

A new compressor has been installed at the Volcano. Sinking is to be pushed. The shaft is down 125 feet and is to be deepened to 300.

The Grace, on Raven hill, is being equipped with machinery. The shaft is down 110 feet.

It is reported that a strike has been made on the Dead Pine, of the Ophir Co., in the seventh level of the mine. A winze has been started on the ore body. The mineral is rich in sylvanite.

IDAHO.

Martial law still rules at Wardner. Miners employed are obliged to have a good character certificate. The same rate of wages prevails: Underground men, $3.50 per day of ten hours; shaft men, $4 a day of eight hours; engineers, $4; surface laborers, $3; board, $1 a day; $1 a month hospital fees deducted from each man's wages. Idaho State militia are still on guard. Federal troops have not yet been withdrawn. A new miners' organization—The Industrial Union—has been formed.

The Boise assay office's shipment of $93,380 represents the receipts for the first ten days of November. The shipments for the corresponding period last year were $36,889.

BLAINE COUNTY.

The Hope group, on the Haily gold belt, has been bought by L. S. McLure and his company. The transfer is by a bond to run two years, and the price $80,000. During the dependency of the bond L. S. McLure will operate the mine, and will build a mill.

SHOSHONE COUNTY.

The United States Circuit Court is trying the suit between the Bunker Hill & Sullivan Mining & Concentratin Co. and the Empire State and Last Chance Mining Companies, which involves the title to a body of ore which the Bunker Hill & Sullivan Co. claims, and of which the Last Chance Co. has been in possession for some time. The attorneys for the Bunker Hill Co. are C. H. Lindley of San Francisco, Cal., J. R. McBride and A. Allen of Spokane, Wash., and J. H. Forney of Moscow. The Empire State and Last Chance Companies are represented by the firm of Heyburn, Price, Heyburn & Doherty of Spokane, Wash. The case is being tried without a jury. The Bunker Hill Co. has introduced testimony to show that its claim was located two or three days prior to the claim owned by the Last Chance Co., both having been located in September, 1885.

MISSOURI.

JASPER COUNTY.

The Commonwealth Zinc Co.'s No. 5 mine is to have a new mill of 150 tons capacity. Preparatory to sinking a second working shaft on mine No. 5 the company is drilling two 200-foot holes. The new mill will be located between the present working shaft, which at 70 feet depth has 65-foot face of high-grade ore, and the new shaft to be determined by the drill tests.

MONTANA.

The Anaconda Co. will not issue an annual statement this year.

FERGUS COUNTY.

McCornick & Co. of Salt Lake have bought the Spotted Horse mine. A. S. Bird, formerly of the Hope mine at Basin, will have charge of the property. The mine has been shut down for several years, lessees working the tailings from the old mill.

The Twin Bridges smelter has fired up after being shut down for two years. W. Owsley, who owns the smelter, with C. Schatzlein, will operate it, employing fifty men; 150 tons of ore will be treated daily.

A number of Butte mining men have contracted with the Michigan & Montana Copper Co. of Helena to produce 400,000 tons of concentrating ore within three years. The ore is to be taken from the Ibex, Cracker and Big Horn lodes at St. Mary's lake. A. M. Essler of Helena is at the head of the organization. He has a 300-foot tunnel on the Ibex, which will a depth of 450 feet.

LEWIS AND CLARKE COUNTY.

The biennial report of the Montana Limited M. Co., operating the Drum Lummon mine, near Marysville, presents some interesting facts concerning that property. The report was presented to the directors Oct. 24th and is for six months ending June 30th last. It shows that during the first six months of this year 37,652 tons of ore were treated by the 50 and 60-stamp mills, from which was obtained $212,638 in gold and $27,349 in silver, a total of $239,987. The expenditures were $221,987, and the net profit $18,030. The ore averaged $5.65 per ton in gold and 72 cents in silver. The cyanide plant during the period from April 18th to June 30th treated 28,459 tons of tailings, realizing $97,144, at a cost of $49,744, leaving a profit of $47,400. The cyanide plant can only be operated during warm weather, having to be closed on the approach of winter. In April a dividend of £16,428 was declared, or 6d per share. Development during the half year consisted of shafts, drifts, upraises, winzes and crosscuts, representing a total of 3708 feet of cutting, at a cost of $1.41 per ton of ore treated. The development of the south end of the property has been disappointing. Concerning this Supt. A. Burrell says: "Although the expenditure on development has not discovered any new ore bodies, it has demonstrated that the south end of the mine, in the neighborhood of shaft No. 3, is the most encouraging region at which to develop to great depth. The payable values in the ore bodies discovered on the 700 level only extended upward to the 600 and below to the 800, yet the 900 shows a wide, strong vein, filled with quartz and crushed slate, which extends a greater longitudinal distance north and south of the winze than the vein on the 700 or 800. The theory suggested in one of my reports may yet prove true, that we have irregular horizontal ore occurrences in this part of the mine, and this is to some extent borne out by the fact that the ground from the 400 to the 600 is barren, then from the latter level to the 800 it is productive, while on the 900 there is again a lack of pay ore."

NEVADA.

ELKO COUNTY.

The Dexter at Tuscarora produces over $1000 a day. It recently shipped to Salt Lake gold valued at $16,500, which represented a run of fifteen days.

LANDER COUNTY.

The Glasgow & Western M. Co., of Salt Lake, has bought the Copper Gulch group near Battle Mountain, and made the final payment of $30,000. Since taking possession of the group, the company has prosecuted work upon it with satisfactory results. The ores carry a uniform percentage of copper, with some silver and gold, and afford a good margin at the company's smelter.

LINCOLN COUNTY.

A strike of high-grade ore was made in the De Lamar mines last week in one of the lower levels, where a streak of ore 1 foot wide was uncovered. Drifting on this vein is in progress.

STOREY COUNTY.

No. 1 elevator has not yet been replaced in the C. & C. shaft and No. 2 holds the water at about 100 feet below the 1950 level. The latest official report is as follows:

VIRGINIA, Nev., Nov. 16, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 102 feet and 2 inches below the 1950-foot level station. No. 1 elevator has been running 18 hours and 30 minutes and No. 2 elevator 5 hours and 30 minutes. JOS. R. RYAN.

NEW MEXICO.

Socorro *Chieftain*: J. Morris has opened a 7-foot vein of coal, three and one-half miles northeast of Socorro.

COLFAX COUNTY.

The Thunder lode, fourteen miles west of Cimarron, has 7 feet of ore carrying 15% copper and gold which brings the value to $100 per ton.

OREGON.

BAKER COUNTY.

The total number of stamps now dropping in eastern Oregon, with those that will be in operation by January 1, is about 450, of which 276 are now in place in the vicinity of Baker City.

MALHEUR COUNTY.

(Special Correspondence).—There has been discovered here an ore body consisting largely of amphibolite schist with calcite. The deposit is 1200 feet in length. A shaft has been sunk to a depth of 100 feet. The ore was encountered at a depth of 60 feet. Crosscuts have been run from the bottom of the shafs 140 feet, with faces in ore. It is said all the ore will pay to mill. The property is five miles from the town of Malheur, on Union creek, and is known as the Golden Eagle mine. It is equipped with hoisting machinery and preparations are being made for the erection of a crushing plant of 200 tons daily capacity. The ore shows some free gold, but is found mostly in combination with iron and copper sulphurets.

Malheur, Nov. 12th, '99.

UNION COUNTY.

The Union copper mine, twenty miles from Union, is reported sold to Portland capitalists for $100,000.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Hawthorne Co., at Lead City, have put in a number of new concentrators and have commenced the erection of a large cyanide plant on Gold Run, half a mile below the mines, to treat the concentrates.

The Grantz Hidden Fortune mine, on the Poorman divide, has been closed down for the winter season. Three cars of ore have been shipped to Denver, Colo. The first shipment of one car returned $79,000. In the spring Mr. Grantz will build a milling plant.

PENNINGTON COUNTY.

While excavating under a 10-stamp mill on Jenny creek, near Rochford, recently, a vein of gold rock that assays $7.50 per ton was found on the Gorman claim.

UTAH.

The Utah land office decided this week that guano is a mineral and that the guano deposits on Gunnison island, Great Salt lake, can be worked under the law regulating placer mining locations.

BOX ELDER COUNTY.

M. E. Anderson, who is developing locations eight miles southwest of the Copper Mountain group, owned by Lewisohn Bros., reports that there is enough ore in the Copper Mountain group to justify the erection of a smelter.

SALT LAKE COUNTY.

The Shawmut M. Co. has bought the Crown Point mine for $25,000. The latter is an old producer, its copper, gold and silver values running up to $35 per ton. The Shawmut will begin a new tunnel that is to tap the Cuba, which will be made the main outlet for the company's ores.

Tribune: The Bingham Copper & Gold M. Co. has decided to build its smelter at the mouth of the tunnel being driven by the Bingham Tunnel Co. Sixty days ago a proposition came from A. H. Tarbet of the tunnel company in which he volunteered to construct a tramway that will transport the ores from the mine to the smelter at a gross cost of 25 cents a ton. The tramway will be 18,000 feet in length.

SAN JUAN COUNTY.

The Boston Placer Co., operating high bars on the Colorado river, has put in a gasoline pumping engine to raise water to a height of 120 feet by means of which 200 to 300 cubic yards are worked daily. They will put in a larger engine to increase capacity. Dr. C. E. Watkins, of Boston, Mass., is president of the company.

TOOELE COUNTY.

Operations at the Cigale mine and mill of the Boston & Mercur M. Co. on the West Dip have been suspended and will not be resumed until the roasting plant has been installed and the mill enlarged to a daily capacity of 500 tons. There are said to be 500 tons of ore blocked out.

WASHINGTON.

The United States assay office at Everett has a new furnace, owing to the instructions received some time ago to make all assays by the dry instead of the wet method. As the Puget Sound Reduction Works won the suit against the Government, in which the relative merits of the wet and the dry processes were at issue, it will be necessary for all previous assays, which were made in the old way by the wet method, to be duplicated by the dry. The smelter is understood to have about $35,000 at stake in these assays.

FERRY COUNTY.

Three cyanide plants are in course of construction or being contracted for at Republic—one of 75 tons, one of 100 tons and one of 200 tons daily capacity.

The Quilp M. Co. at Republic are getting a large quantity of water in the winze and will be obliged to put in a pump.

SNOHOMISH COUNTY.

The Marshall group of mines on Trout creek, near Index, has been sold to Eastern parties.

WYOMING.

CROOK COUNTY.

C. H. Miller has located a number of claims on the west side of Inyan-Kara mountain, west of the Black Hills, and has obtained good assays on float found there. He has a ledge 100 feet wide. Inyan-Kara peak is a postular outburst of rhyolite which has raised the Cambrian, Carboniferous and later formations on its shoulders, the sedimentary rocks standing nearly vertical about the peak and dipping away on all sides toward the plains. It is a prominent land mark.

FOREIGN.

AUSTRALIA.

Assays giving 3% of nickel and 17 dwt. gold have been obtained from samples of surface stone from a lease held by a prospecting syndicate at Gidgi, nine miles from Kalgoorlie.

The sulpho-telluride ore shipped from the Lake View Consols, and smelted in the eastern colonies, from April to July, inclusive, totaled 2250 tons, yielding 80,317 ounces fine gold, valued at $1,594,670.

BRITISH COLUMBIA.

(Special Correspondence).— Mines on the north fork of Kettle river are showing up well, considering the short time development work has been going on. W. F. Robertson, Provincial Mineralogist, has completed an examination of the different properties. The C. P. R. R. has spent $4,000,000 in getting into this section, after inspection by their experts. One hundred miles of main line and twenty-seven miles of spurs have been built since June, 1898. The main line runs to Greenwood, though the passenger trains stop at Columbia for the present, and the spurs reach Summit, Greenwood, Wellington and Deadwood camps. The grades are finished and the steel is being laid as fast as it can be obtained.

Hardy Mountain camp is three miles northwesterly from Columbia. It contains the Eagle, May Queen, Gladstone, Little Babe, Maple Leaf, Vancouver, Oak Leaf, American Eagle, Monte Carlo, Yankee Boy, Girl and Belle, Ruby, Golden Queen, Banjo and Caledonian. The Yankee Boy group are the only shippers as yet. Last week twenty tons were sent to the Trail smelter and shipments are to be made each month hereafter.

Goat Mountain camp is an extension of Hardy mountain. The best claims so far are the Independence, N. P., U. P., Copper Queen and Eastern Star. These are mostly gold-copper ores, assays running about 15% copper and up to $20 in gold.

The Eagle on Hardy mountain is a silver-lead proposition and the Maple Leaf and Vancouver at 20 feet are free milling, but they will probably alter to the typical ores of the district in depth.

The Seattle group is in Seattle camp, which is seven miles above the junction of the forks of the Kettle upon the north branch. The Seattle was discovered in '95. The group consists of four claims. The mine has large bodies of ore blocked out. The railway to Greenwood runs through the property. The Humming Bird and O. K. have the same vein as the Seattle. They changed hands last spring for $40,000 and are being developed.

Brown's camp is located on Volcanic mountain, ten miles from Columbia. The Volcanic, owned by R. A. Brown, is the best developed property. A tunnel 345 feet long has been driven to cut the ledge at 1300 feet. The Golden Eagle, Phil Sheridan and Earthquake are also in this camp. Near by are the English and French properties, on which much money has been spent with encouraging results.

Summit camp is ten miles from the valley. The C. P. R. R. has its spur almost in working order and the freight in ore from the camp will be heavy, as some of the largest bodies of ore in the country have been found in it. The B. C. was sold to a syndicate of Montreal capitalists last spring for $300,000. A three-compartment shaft is being sunk to 1000 feet.

Easterly from the B. C. is the Rathmullin group, and south of it the Oro Denoro. The main shaft is being sunk to the 300 level. This property was discovered by the rockmen working on the grade of the railway spur.

Four of the best properties in Central camp are owned by the Granby smelter people, and it is from them that much of the ore for that furnace is expected. The four claims are named the City of Paris, Lincoln, Denver and No. 4. The vein on the City of Paris is 12 to 16 feet wide and carries 9% copper, $22 gold and six ounces silver. The Lincoln ore is richer, but of the same character. The City of Paris, Lincoln and No. 4 are being developed by a tunnel, which will be 1300 feet in length and will tap the vein 700 feet below the surface. The Mabel, Lexington, No. 7 and Four Hundred are also promising properties in this camp.

In Wellington camp is the Winnipeg, which has made a favorable showing. Smelter returns give $70 in copper and gold. The mine is equipped with a good hoisting and compressor plant and seven air drills.

In Greenwood camp the Old Ironsides contains an ore body 83 feet wide, assaying $15 to $20. The total width of the ledge is about 300 feet. The Knob Hill has, however, the largest ore body in the camp and also the largest so far uncovered in the Province. The vein is 230 feet wide and the masses already blocked out are immense, though values are low—from $6 to $14 in copper and gold. There are 10,000 tons of ore on the dump. This property, as well as the Old Ironsides, belongs to the Granby smelter people, and the ore will go to the furnace in the Kettle river valley. The Victoria, Ætna, Fourth of July and Phœnix are near-by properties which have been acquired by the same people. The Stemwinder, Brooklyn, Rawhide, Snowshoe and Gold Drop in Greenwood camp each have immense ore bodies, assaying low in gold and copper. Nothing of a bonanza nature exists, but it is believed that with economical smelting and careful mining a large and permanent industry will be established.

Greenwood, Nov. 4th, '99.

The cleanup from the 5-stamp mill on the Granite & Banner, in Camp McKinney, recently, was valued at $633, from thirty-seven tons of ore. A crosscut shows the ledge to be 40 feet wide.

Grand Forks is to have a second smelter, J. A. Manly having donated twenty acres to E. T. Bradford, Gen. Mgr. of the Southern Smelting Co of Denver, Colo., and H. Gager. The plant will have a capacity of 200 tons daily.

CANADA.

Superior *Telegram*: At the Randolph, on Seine river, night and day crews are sinking in richer ore than ever. Things are looking well in the Seine river gold fields, particularly in the Randolph and Golden Star. Both properties are in better ore than at any time in the history of their development. The Randolph management are contemplating putting in a stamp mill and the erection of a compressor plant.

INDIA.

Indian Engineering: The Deccan M. Co. has struck a rich lode in the workings in the Linsagoor district. Specimens of the quartz show gold in remarkable quantities.

LOWER CALIFORNIA.

San Diego *Union*: The mines on Cedros island are to be reopened, after an idleness of seven years. It has been ten years since they

were first discovered. T. R. Lombard, Sr., of San Diego has bought out the interests of O. G. Schulenburg of St. Louis, Mo., amounting to 51% of the capital stock, and will develop the mines. Mr. Lombard is not the sole owner of the mines, though practically so. Some stock is owned by Nicholson & Michaelson of Philadelphia, Pa. It is said that the ore will be treated by the cyanide process. The cyanide plant is to be erected on the island and will be of large capacity. An expert, who examined the property some time ago, reported 80,000 tons of ore in sight that would average $12 50 a ton.

MEXICO.

The Batopilida mines of Chihuahua are producing eighty tons of ore daily. The mines are worked through the long adit completed last spring. A. R. Shepherd intends to enlarge the mill to 100 stamps, which will give a capacity of 200 tons. Over 1000 men are employed in the mines. The reduction works, compressor, electric works and foundry are run by water power.

SOUTH AFRICA.

The Simmer & Jack mill at Johannesburg will be increased after the war is over from 280 to 320 stamps. The lowest levels are reported looking well. The report at a recent meeting of the company shows that during the eighteen months ending June 30th the mill ran 508¾ days, crushing 685,010 tons, or a mean duty of 5.209 tons per stamp per twenty-four hours. The total amount of gold won on the plates was 215,137 ozs., or 6.281 dwts. per ton. In the cyanide works 490,221 tons were treated, resulting in a yield of 99,474 bullion ozs., or 4.058 dwts. per ton treated. The slimes process treated 122,635 tons, giving a return of 10,388 ozs., or 1.694 dwts. per ton of ore treated. The Simmer & Jack has taken place as the leading producer of the Rand.

The gold output from the Witwatersrand district during September (in bullion ounces) amounted to 411,762 ounces, against 459,709 ounces for August and 384,080 for the corresponding month of '99. From the outside districts 14,794 ounces were reported. The total return amounts to 426,556 ounces, as compared with 482,108 ounces for the previous month, a decrease of 55,552 ounces.

Personal.

DAN'L GRANT is the new Supt. Melba mine, Mokelumne Hill, Cal.

GEO. H. ROBINSON, one of Utah's prominent miners, is in San Francisco.

MATT W. ALDERSON is erecting a large cyanide plant near Sheridan, Madison county, Mont.

C. H. LINDLEY is now in the Cœur d'Alenes, Idaho; he will return to San Francisco about Dec. 1st.

O. S. LYFORD succeeds C. S. Knight as Vice-Pres. and Gen. Mgr. Siemens-Halske Electric Co., Chicago.

RICHARD A. PARKER has removed from San Francisco. His future headquarters will be at 8 Congress St., Boston, Mass.

A. W. MCCUNE of Salt Lake, Utah, is at Rossland, B. C., in an effort to adjust the trouble over the eight-hour law.

H. G. MURRAY, formerly Supt. Lightner mine, at Angels Camp, Cal., will soon leave for China and Japan on mining business.

L. P. GOLDSTONE, formerly of Grass Valley, Cal., leaves West Australia to take charge of an English mining concession at Tientsin, China.

EX-GOV. PIFER of Illinois gets the appointment as member of the Interstate Commerce Commission, that, it was expected, would go to W. R. Wheeler or N. P. Chipman of California.

BEN WILLIAMS and brother, long prominent in the Copper Queen Co., Bisbee, Arizona, say they will establish headquarters in San Francisco Jan. 1, 1900. Walter Douglas is mentioned as the probable new Mgr.

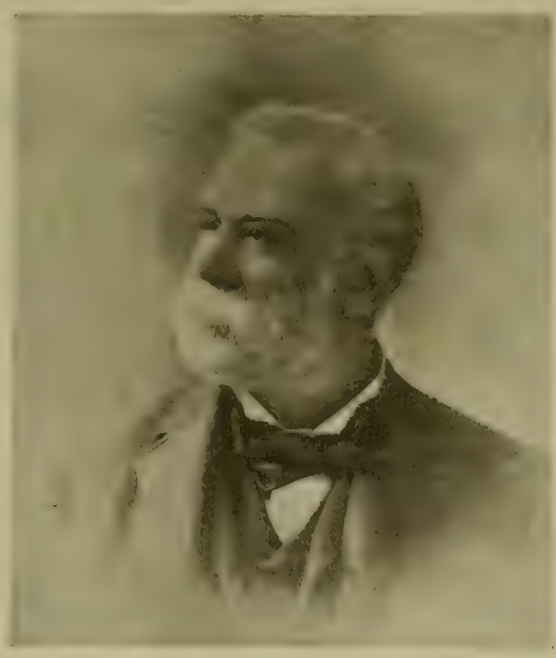
GEO. F. BECKER, Government Geologist, sent to report on the mineral resources of the Philippines, has returned. He says that, while gold exists in Luzon and Mindanao, it is in no way comparable to other gold fields, and that any American miner going there would be disappointed.

F. W. HORNE, now in New York, says he wants to place a contract for the Chinese Eastern Railroad Marine department for eighteen vessels, averaging 4000 tons, to carry freight from Shanghai to Port Arthur and Vladivostok. Big repairing shops will be constructed at Port Arthur, and the entire equipment will be bought in this country. He proposes also to buy $150,000 worth of machine tools, and is ordering an entire equipment for the construction shops of the Shanghai docks. The contract calls for $50,000 worth of American pumps, tools, etc.

Commercial Paragraphs.

THE Compressed Air Machinery Co., 11-13 First St., San Francisco, Cal., is building an air compressor plant for the Ratcliff Con. G. M. Co., Ballarat, Cal.

CONTRACT has been given Fraser & Chalmers, Chicago, by S. S. Fowler of the Ymir Gold Mines, Ltd., B. C., for machinery for a mill of forty additional stamps, making a total milling capacity of eighty stamps.



THE LATE LYMAN C. PARKE.

The Late Lyman C. Parke.

Lyman Curtis Parke died at his home in Oakland, Cal., on the 11th inst., in the sixty-fifth year of his age. Deceased was well and widely known as a successful mechanical and mining engineer, a practical miner, and an originator and manufacturer of improved mining machinery. He was a son of Dr. Parke, a native of Pontiac, Michigan, one of five children, four of whom were prominent in the mining world. Three—Frank, Ira and L. C. Parke—were well and favorably known on the Comstock lode in the early days of mining in Virginia City, Nevada. L. C. Parke had some experience in the copper mines of Lake Superior, where his brother, Hervey C. Parke, was connected with one of the large copper companies owned in Detroit.

In 1870 Mr. L. C. Parke associated himself in business with John Waring in New York, under the firm name of Waring-Parke Co., for the purpose of manufacturing the Waring air compressor, which they introduced, and later the manufacturing of these air compressors was taken in hand by A. C. Rand, now the Rand Drill Co. In 1872 Mr. L. C. Parke determined to locate on the Comstock lode, Virginia City, and in 1873 associated himself with Mr B. T. Lacy, under the firm name of Parke & Lacy. Mr. Parke remained on the Comstock for a short time and later removed to San Francisco, where the firm that he was connected with for so many years has made so enviable a record by establishing itself as dealers in mining machinery. They introduced the first air compressing and rock drilling machinery on the coast, and also other special mining machinery and appliances. They also established houses in Salt Lake, Utah, and Butte, Montana, as well as in Sydney, N. S. W., Australia. To Mr. Parke and his associate, Mr. Lacy, is largely due the credit of establishing a market in the colonies for American mining machinery, which has become a large and growing business. Mr. Parke retired from the firm of Parke & Lacy Co. in 1889, Mr. Lacy having purchased his interest in the firm, and since then Mr. Parke continued to identify himself with mining interests.

Personally Mr. Parke was a genial gentleman, warm-hearted, affectionate, generous to all, and his kindly presence will be missed by his numerous friends and late associates.

Recently Declared Mining Dividends.

Raven G. M. Co., Colorado, $10,000; payable Nov. 20.
North Star Mines Co., California, $50,000; payable Nov. 20.
Silver King M. Co., Utah, $50,000; Nov. 10.
Swanswea M. Co., Utah, $5000; Nov. 10.
Total, $246,000.
Modoc M. Co., $10,000; Nov. 15.
Helena-Frisco M. Co., Idaho, 25 cents per share; payable Nov. 20.
Bullion-Beck M. Co., Utah, $10,000; Nov. 15.
Rambler-Cariboo M. Co., British Columbia, 1% on capital stock; payable Dec. 1.
Bonanza M. Co., Washington, $2500; payable No. 20.
Daly-West M. Co., Utah, $30,000; payable Nov. 20.
Creston M. Co., Colorado, $60,000; Nov. 15.
Portland M. Co., Colorado, $60,000; payable Nov. 20. Total, $2,497,080.

Industrial Notes.

—Lake Merritt, near Oakland, Cal., is to be dredged by contract.

—Denver, Colo., will spend $4,700,000 and own its water works.

—Spokane, Wash., has pooled all its light and transportation franchises.

—Oregon has sent 700,000 bushels of wheat since July 1st, '99, to Algoa bay, South Africa.

—The Pacific Improvement Co. is winding up its affairs. Its true history would be interesting.

—The Mexican Government is going into competition with private telephone and telegraph companies.

—During the first ten months of '99 the Seattle, Wash., gold assay office bought gold to the amount of $12,014,875.56.

—Chicago proposes to furnish annually 10,000,000 tons coke "equal to Connellsville coke" at $2 per ton. Doubtful.

—The Pennsylvania R. R. Co. has contracted for 100,000 tons steel rails to be laid in 1900, for which it pays $3,300,000.

—San Diego, Cal., expects in 1901 to be the Pacific terminus of the Utah & Pacific railroad building westward from Salt Lake City.

—The United States postal deficit for the fiscal year amounted to $6,413,885. The money order system was conducted at a loss of $105,106.

—A trainload of forty-five cars of steel rails—1000 tons—is at San Francisco loading on government transports for a government railway at Manila.

—B. M. DeLong of Quincy, Cal., has a franchise to build an electric railroad along the north fork of the Feather river through Plumas county, Cal.

—The Colorado Trades Assembly have abandoned their Denver organ. Many a newspaper has supported a cause, but no cause ever yet supported a newspaper.

—The Oregon Midland Ry. Co., of Ashland, proposes building a railway sixty miles down the Klamath river from Klamath Falls to Klamathon, Cal., a station on the S. P. R. R.

—Arizona will have active railroad building in 1900. A railway is to connect Flagstaff and Globe—200 miles, with a branch to Jerome. A smaller line is contemplated from Phœnix to Florence.

—So far in '99 twenty-six railroads have been chartered to operate in Oklahoma Territory. They are said to have 8312 miles of track; their capital stock aggregates over $50,050,000.

—From Tres Piedras, New Mexico, ten men monthly ship four carloads of mica to Cleveland, Ohio. The mica, such as cannot be split in plates, is ground fine and used in axle grease by the Standard Oil Co. and on wall paper.

—There are 2360 central station plants for generating electricity in the United States. These plants are owned by companies having a combined capital stock of $279,704,610, and employing 1,159,788 H. P. in engines or water wheels.

—The Continental Telegraph, Telephone and Cable Co.'s leading directors and stockholders in the Western Union Telegraph Co. are said to oppose the Bell Telephone Co. The old contract between the Bell Telephone and the Western Union, under which the Bell concern paid 20% of its income to the Western Union, expired in '95. The Telephone Co. has been since then a competitor of the Western Union.

—The White Pass & Yukon Railroad, illustrated on pages 572 and 573 of this issue, bought $200,000 worth of steel rails to extend its line from Lake Bennett to Closeleigh, on Fifty-mile river, four miles below White Horse rapids.

—A new industry has developed—gathering scrap iron. Everywhere throughout the United States men are scouring "the rural districts," buying up old metal of every kind procurable and selling it at from $12 to $15 per ton. Even the junk business reports a "boom."

—Sheet lead for tea packing in Formosa is brought from Australia in pigs; after being melted it is poured between two large tiles, the required degree of thickness for the sheet being obtained by foot pressure, then trimmed to suitable sizes and shaped for soldering.

—An automobile designed to take the place of the present motive power on the Erie canal, and tow the canal boats, is now building in Hartford, Conn. The automobile will be the largest and strongest ever made and will cost about $3000.

—The Manila hemp held by Americans has been profitable. In '98 the price of this product of new American possessions in the Philippines was between 6 and 7 cents a pound. When the war between Spain and the United States broke out there was a fair supply of the fiber in the United States and a large supply on the way to the United States. After Dewey's blockade the price went up, but ships laden with the fiber for the United States were allowed to sail. When this limited supply was exhausted there was a total cessation of supply, not only in the work of the blockade, but in the interference with the supply for export by the armies working in the interior. The price of fiber has increased gradually until it is now about three times what it was at the outbreak of the war, and the prospect is that it will go considerably higher. Substitutes in the Manila hemp line are not numerous. The substitute in general use at the present time is the sisal or Yucatan hemp. It is not so good as the Manila article, lacking nearly all of the strength and fineness of the latter, but does for binding twine and similar purposes. Even this substitute has advanced in price, selling now for about 9 cents a pound. There is no reason why this should be the case except the natural sympathy of this product with the hemp market and the increased demand for it by reason of the decline in the use of hemp. The supply of the Yucatan article is ample, and there has been no interference with getting it to market. There is also an American hemp which is used to a considerable degree in the manufacture of binding twine. It gives fair satisfaction. It is the common belief of people generally that jute is also used for this purpose, but there seems to be no confirmation of this belief from the cordage people.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING NOVEMBER 7, 1899.

636,703.—AGRICULTURRL IMPLEMENT—M. J. Anderson, Dufur, Or.
636,628.—DUST SHIELD FOR HUBS—Burch & Walling, Amity, Or.
636,494.—BICYCLE BRAKE—G. M. Collins, Davenport, Wash
636,245.—FRUIT EVAPORATOR—B. Cunningham, Liberty, Or.
636,649.—WHEEL WRENCH—W. J. Fay, Colegrove, Cal.
636,258.—COIN CONTROLLED MECHANISM—H. Hahn, S. F.
636,662.—ACCOUNT BOOK—R. W. Hamilton, San Diego, Cal.
636,349.—NUT LOCK—F. M. McCartea, San Juan, Cal.
636,345.—TROWEL—P. S. Mille, Seattle, Wash.
636,391.—VALVE—Smyth & Reardon, S. F.
636,586.—GAS GENERATOR—O. P. Swem, Tacoma, Wash.
636,600.—NECKTIE FASTENER—E. M. Wickersham, Phœnix, Ariz.
636,702.—TIE PLATE SETTER—G. R. Wilton, Los Angeles, Cal.
31,810.—DESIGN—C. O. F. Youngstrom, Phœnix, Ariz.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Death of an Engineer and Inventor.

At Middletown, N. Y., William Franklin Durfee, engineer and inventor, died on the 15th inst., aged 66 years. In June, '62, he went to Lake Superior to test the suitability of the iron ores for the manufacture of steel by a method invented by William Kelly. He succeeded in producing some ingots of steel from which on May 25th, '65, were rolled the first steel rails made in this country. He then established at Wyandotte, Mich., the first analytical laboratory built as an adjunct to the steel works in the United States, for the purpose of studying the Bessemer process and the use of the regenerative furnaces.

This Paper Fifty-Two Times, POST PAID, $3.00

Cheaper Way of Sending Circulars.

SOME firms dealing in mining machinery occasionally issue circulars that are supposed to be distributed by mail, mostly to men who moved from the place a year ago. Everybody understands what a waste of money is always involved in issuing circulars—whether distributed by hand or sent by mail; and while it is evident that those who get out circulars really want to advertise, it is apparent that they don't know how to get at what they do want. As there appears to be a few (mostly believers in "mining directory" lists) who still think that a circular is a good thing and forget that the circulars that they send out, even when received, are always accorded the same fate that they themselves give to any circular that they receive, namely, throwing it away unread, it is deemed advisable to suggest to them a way in which they can have their circulars do them some good.

To those who have mining machinery for sale, or who want to reach the mining world, and feel disposed to cling to the ancient notion of circulars sent by mail at random to probable or possible customers, it is suggested that they can, without doing violence to their established notions, secure better results in a better way. The following tells them how it can be done, being an illustration of how to do effective circular work at a greatly reduced cost. There are very few circulars that contain more than can be prominently displayed in one page of this paper. Of this issue, for instance, there are printed 8,856 copies.

8,856 good circulars, well printed on fine paper, would cost -	$30 00
Envelopes for same - - - - - - - - -	7 00
Addressing them - - - - - - - - - -	6 50
Postage (sealed envelopes) - - - - - - -	177 12
Total - - - - - - - - - . -	$220 62

Thus we find that to get 8,856 circulars as far as the postoffice would cost $220.62. This is on the supposition that the 8,856 names to whom the circulars are addressed are those of men likely to be customers of the concern sending the circulars, which is very improbable, as no one firm can secure a live list of possible customers that would equal in value a list containing the same number of subscribers of a good live paper that is bought and paid for and seen every week and passed around until in many cases it is worn out from the number of readers through whose hands it goes. Now, instead of spending $220.62, which is mostly thrown away, how would it do to take the same circular and put it on one page of the **MINING AND SCIENTIFIC PRESS,** the cost of which in place of $220.62 would be $42, or less than one-fifth of $220.62, with a hundred times the greater likelihood of value? The manufacturer or dealer in mining machinery who will spend $220.62 in an attempt to get his business before 8,856 people could save $178.62 by putting that same circular on one page of this paper, and be sure to get it before 8,856 definite, known men, thus securing a certainty instead of an uncertainty, and at less than one-fifth the cost of the old way.

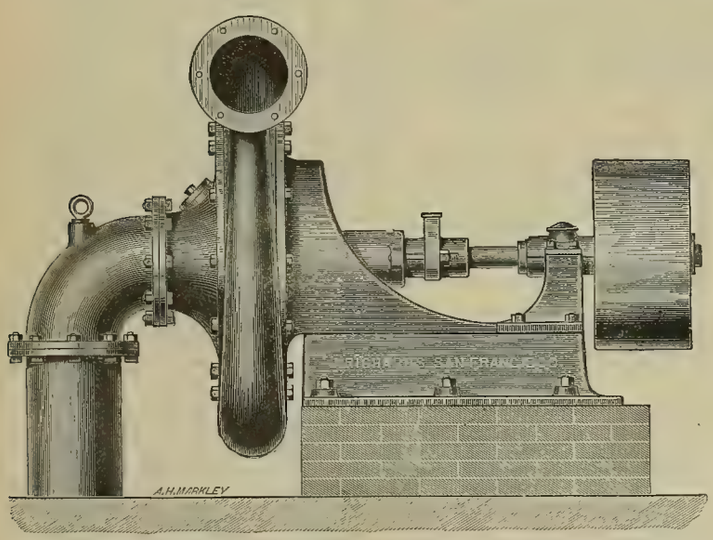
If a circular is so good a thing as some seem to imagine, here is a chance for them to get what they want at less than one-fifth what it would cost them by the old way, and with certainty of result.

In figuring on the cost of these circulars it is assumed that each one is sent sealed, which involves a two-cent stamp, but even were they sent unsealed they would still cost one cent apiece for postage, which would make them cost $132.06. Herein we show how lovers of circulars can substitute certainty for uncertainty, and at much less cost to themselves. The force of these remarks lies in their personal application.

SAN FRANCISCO, CAL.
Nov. 18th, 1899.

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For low lifts and large volume of water a Centrifugal Pump cannot be excelled.

We make the RICHARDS PATENT CENTRIFUGAL PUMP. Single suction, consequently less tendency to churn. Perfectly balanced runner. Protected bearings. Removable side plates. Accessible runner. Runners made of diameter to suit the lift. Will not churn at high speed.

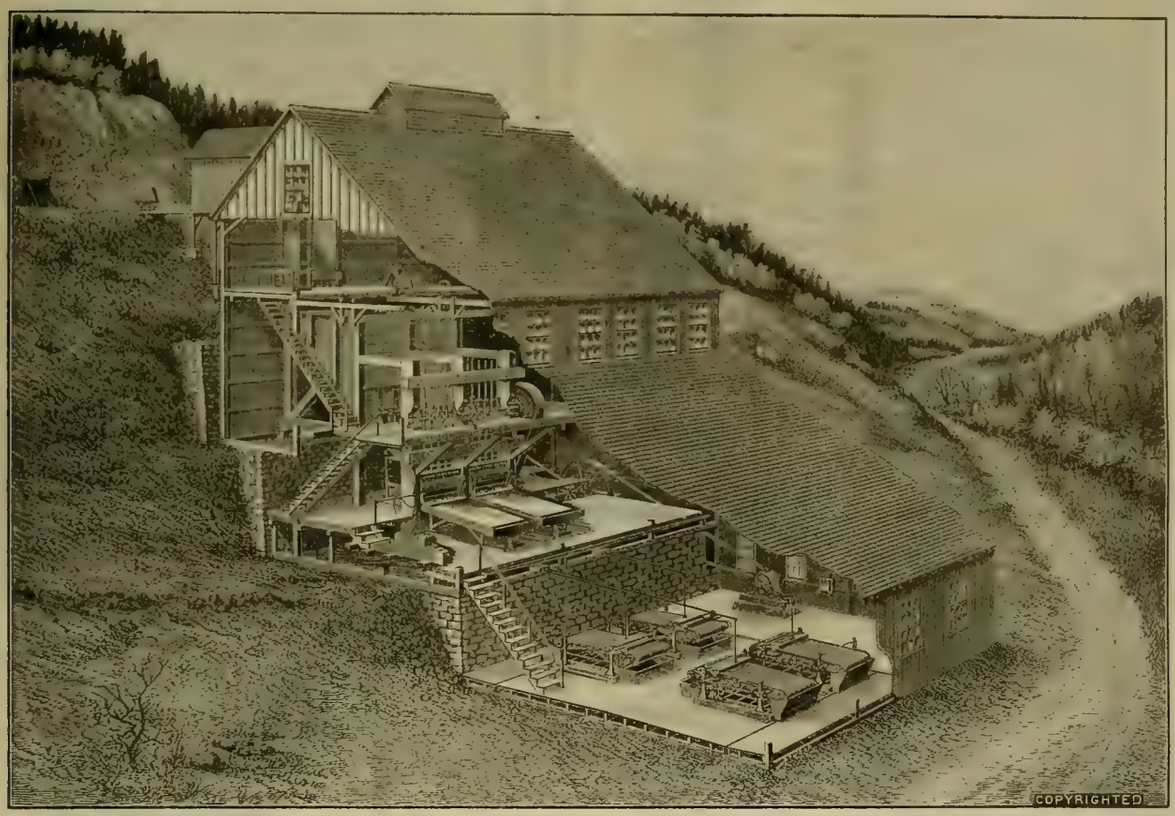
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The work is being done **FIFTY PER CENT** Cheaper than it is possible to do with Animal Power. They can be operated over any ordinary road where it is practicable to use mules or horses, doing the same work. They can ascend grades as much as 10% to 20%, hauling their loads of 35 to 40 tons, depending upon the condition of the roads; loads may be increased to even greater amount on a firm and moderately level road.

Send for descriptive Circulars and Price List of Engines and Wagons. We solicit correspondence. No trouble to answer questions.

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Especially if it is a conveying plant, is a considerable item of expense. Many of these expensive pauses are made to repair or adjust faulty belting. To economize in this respect, use the

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It is not only adapted to the heaviest service, but will run under any conditions in underground, drippings, extreme heat or cold.

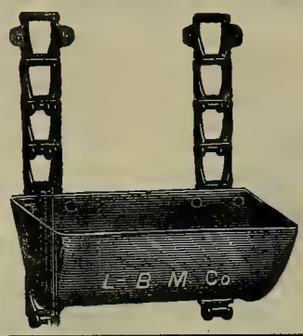
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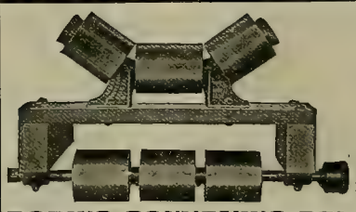
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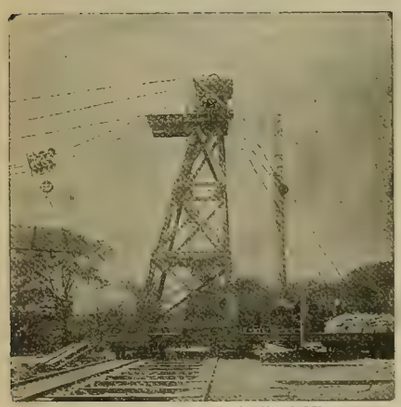


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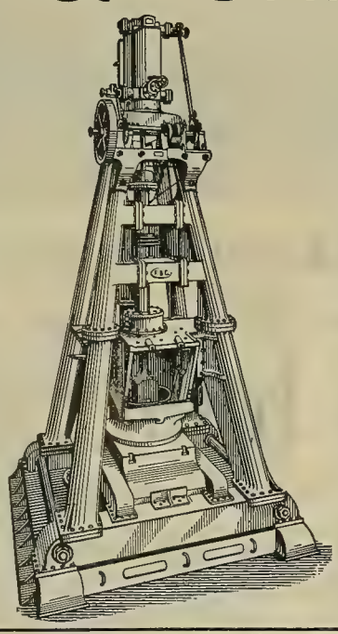
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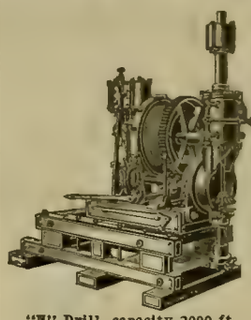
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Keep Your Boilers Clean While They Are New. You Know What to Use;

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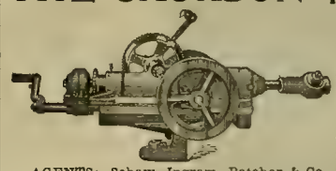
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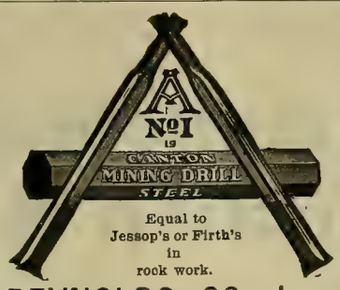
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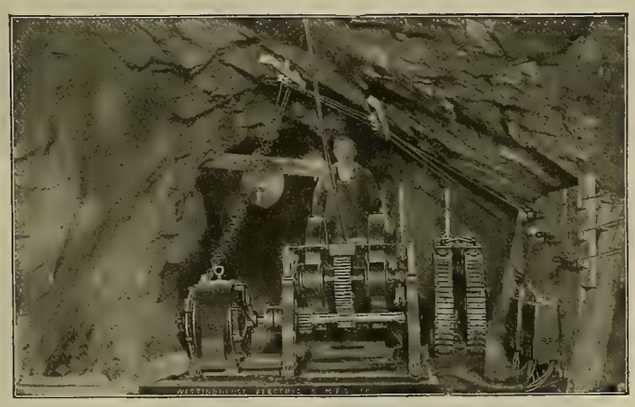
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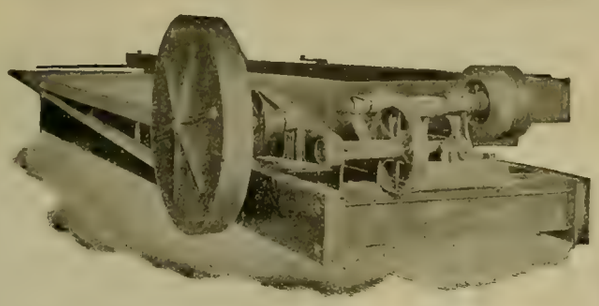
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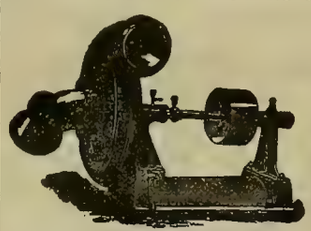
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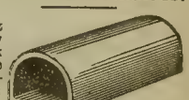
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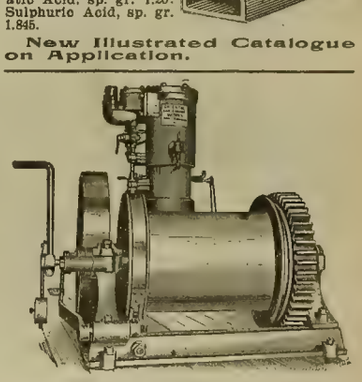
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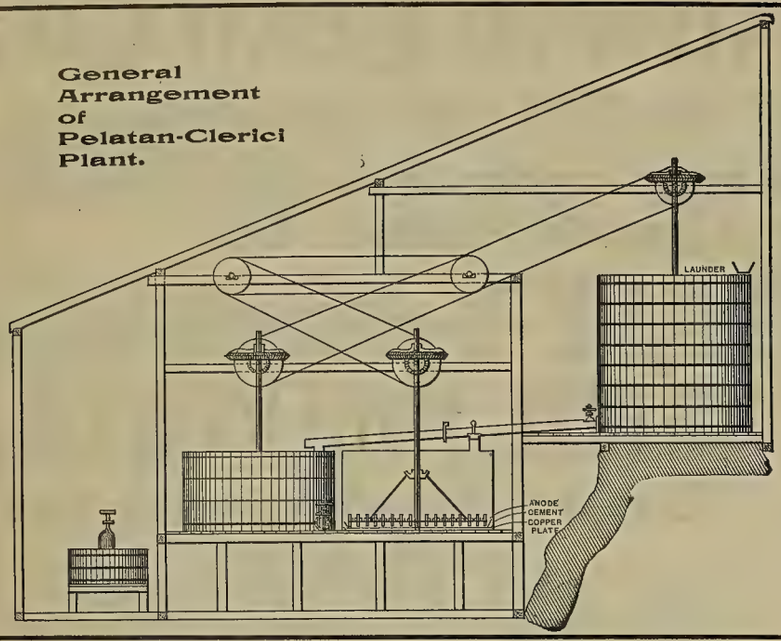
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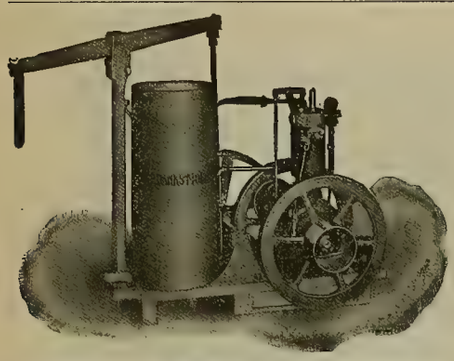
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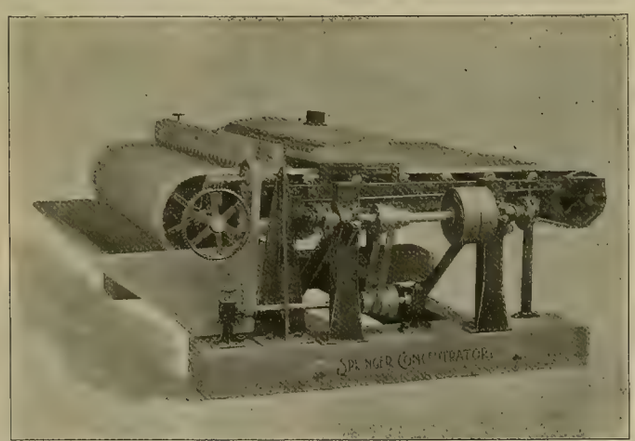
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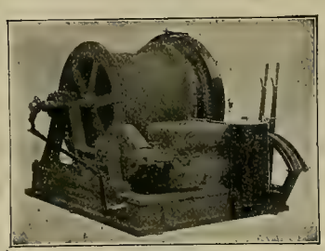
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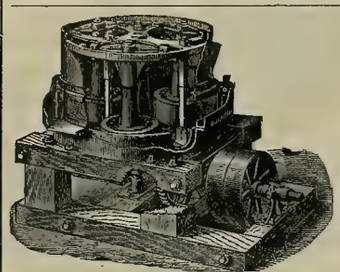


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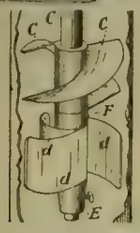
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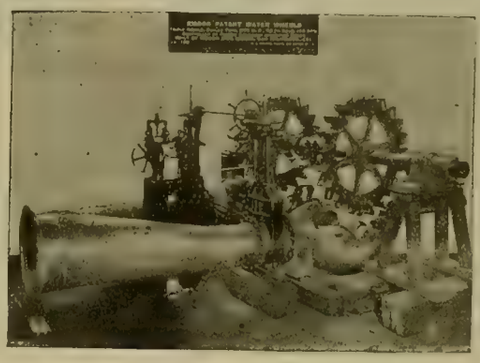
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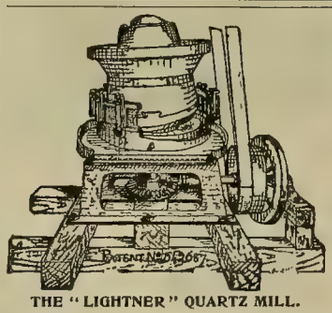
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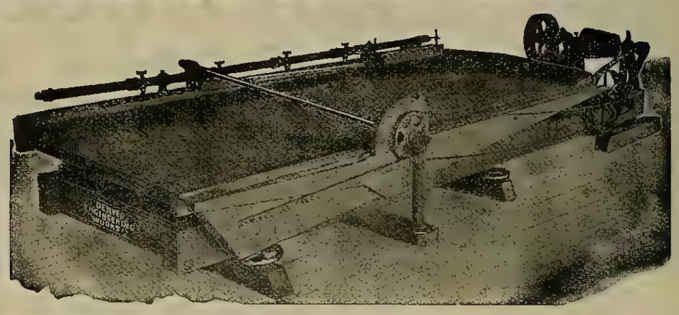
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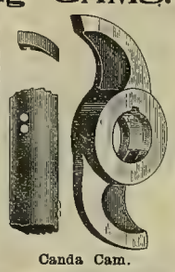


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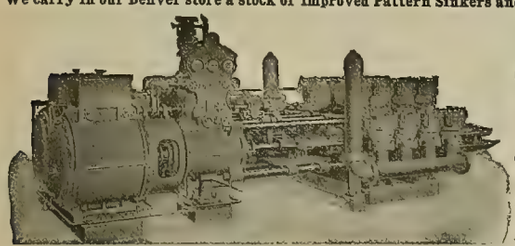


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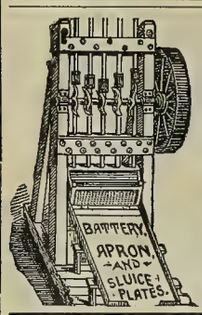
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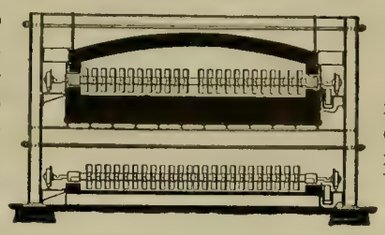
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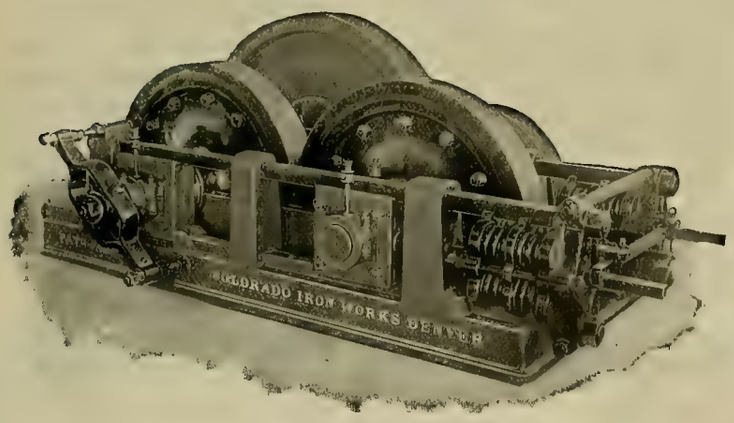


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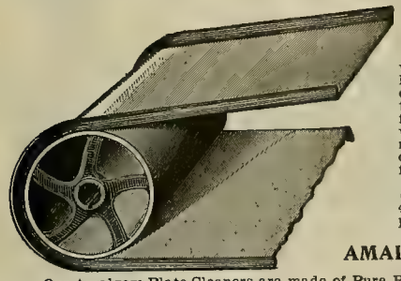
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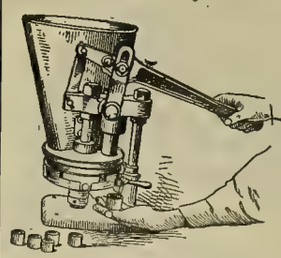
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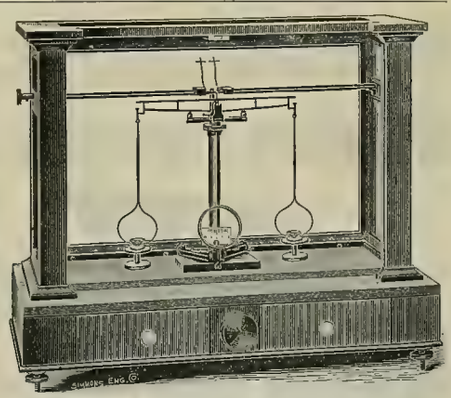
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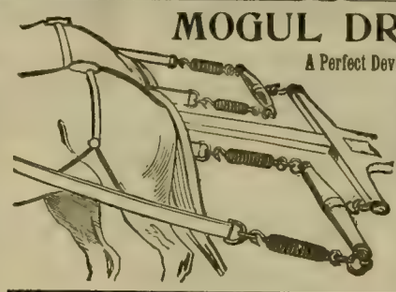
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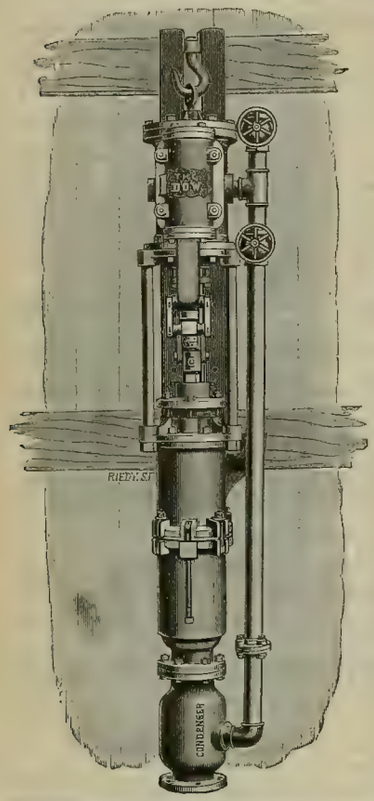
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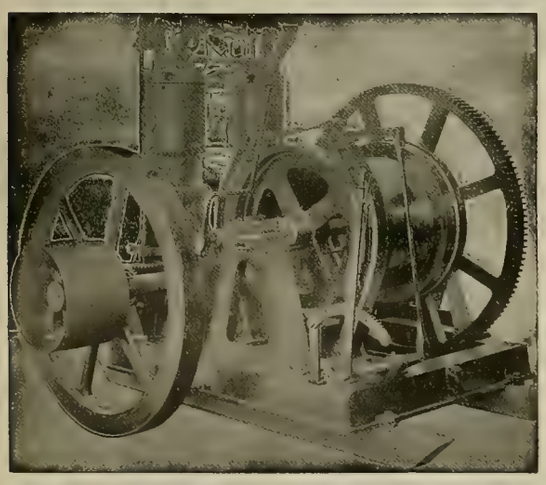
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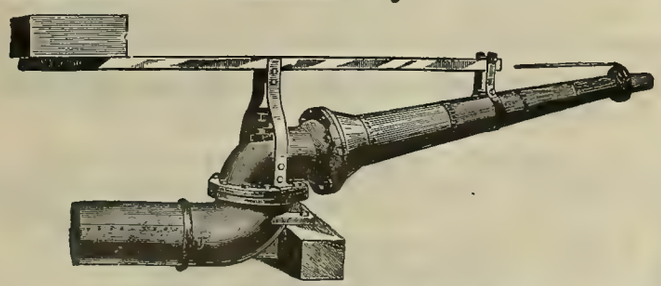
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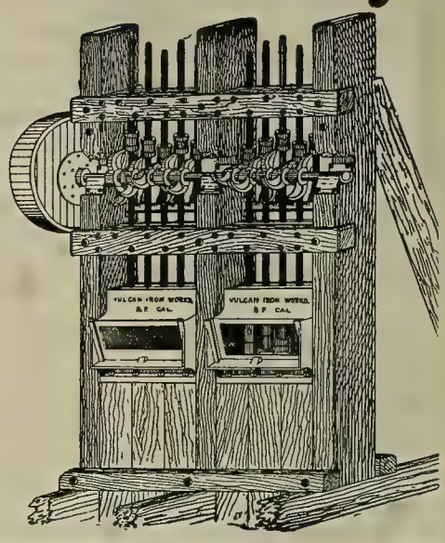
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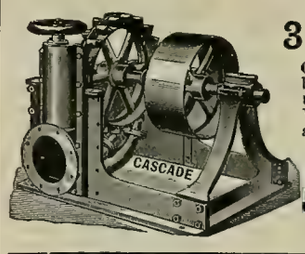
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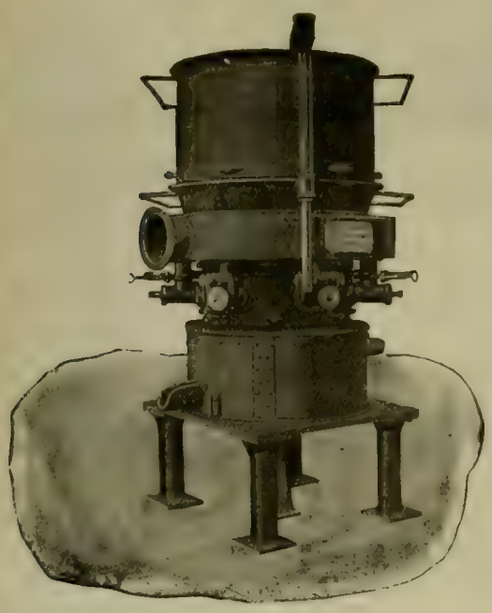
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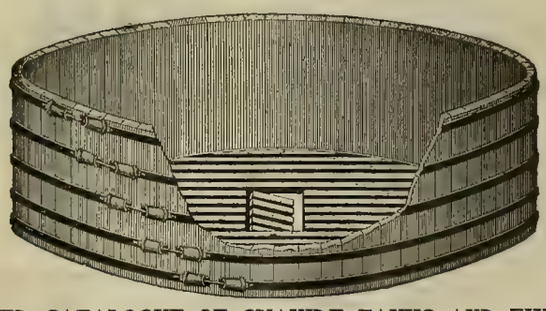
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Market Reports.

SAN FRANCISCO, Nov. 16, 1899.

SILVER.—London, 27⅛d; New York, 58¾; San Francisco, 58⅜@58¾; Mexican Dollars, 47⅛@48½; New York exchange, sight, 10; telegraphic, 12½ cents premium.

LEAD.—New York reports quiet, $4.57½ bid, $4.62½ asked; brokers' price, $4.40. Local, pipe, 7¾@7¾c; sheet, 7¾@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake dull at $17; brokers' price, $17. Local—Mill copper plates, 23¾c.

The Calumet & Hecla Co. has concluded the sale of a large quantity of copper to both domestic and foreign consumers at 17c, with deliveries extending into March, 1900. The quantity of copper marketed by this sale has been one of the largest for a long period, and is said will aggregate several millions of pounds. According to figures compiled by the New York Metal Exchange the production of copper in October was almost 24,000 tons, an amount in excess of any previous month in the history of the exchange.

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Unsettled, $26.50 bid and $27 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $50; export, $45.50 @46; carload lots, special rates.

Within the week quicksilver for export has gone up 50 cents—a small increase, but denoting that the highest price has not yet been reached. Unless old producers can make an increased output, and the new mines add materially to it, the prices may be expected to go still higher.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Dull and easy; $4.70 bid, $4.80 asked.

Although the Missouri-Kansas Zinc Miners' Association issued orders to resume operations last week, many owners were unable to start their plants for want of coal. The zinc mining district is threatened with a coal famine, and there seems to be little hope for improvement. The new zinc ore schedule puts the price of 60% zinc ore at $40 a ton in the bin, instead of $43, the old rate. Notwithstanding the recent troubles between the smelters and mine owners, this year's output for the ten months to Nov. 1st shows an increase in the value of the zinc and lead produced amounting to $3,735,532 over that of the corresponding period of last year.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ℔ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1½c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8½c; 6s, 12 oz., 7¼c; 6s, 10 oz., 6½c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 00
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.20; less than 200 gals., $1.25; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 66c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19c; Astral, 19c; Star, 19c; Eocene, 21c; Extra Star, 23c; Elaine, 24c; Water White, bulk, in tanks, 13c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 47c; cs., 52c; No. 1 bbl., 42½c; cs., 47½c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

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San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 15, 1899.

9:30 A. M. SESSION.

200 Alta	02c	100 Ophir	$1 10
200 Andes	16c	200 Overman	18c
100 Belcher	33c	200 Potosi	34c
400 Best & Belcher	50c	200	33c
100	51c	500 Savage	19c
1250 Con. Cal. & Va.	$1 55	100 Seg. Belcher	08c
300 Con. Imp.	02c	400 Sierra Nevada	48c
200 Crown Point	13c	200	47c
100 Gould & Curry	27c	100 Union Con.	37c
100 H. & N.	42c	100	38c
100	41c	300 Utah	10c
700 Mexican	55c	200 Yellow Jacket	23c
800 Ophir	$1 15	100	24c

2:30 P. M. SESSION.

400 Belcher	30c	100 Ophir	98c
300 Best & Belcher	41c	350	97c
200 Con. Cal. & Va.	$1 40	700	96c
100 Gould & Curry	33c	700 Overman	16c
200 Justice	03c	500 Potosi	29c
400 Mexican	42c	100 Sierra Nevada	40c
100	43c	100	41c
800	41c	100 Union Con.	32c
200 Ophir	$1 00	800	31c
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Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

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A fine set of assay scales with pulp balances, all in good order, will be sold for $125.00, if applied for soon. The outfit consists of one Troemner's No. 5 balance, of latest pattern, with aluminum beam and agate bearings, original cost $175.00; also, one Becker's pulp balance, No. 18, with 9-inch beam and weights, costing $26.00. Both said balances mounted in glass case with sliding doors. Further particulars by addressing Box 4, San Andreas, Cal.

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Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 3. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
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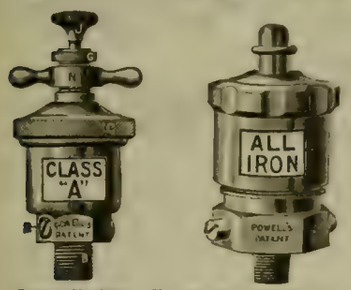
We print in legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the California Legislature. The law is entitled "An Act to Establish a Uniform System of Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and Rules, printed on cloth so as to withstand dampness. **50 Cents a Copy.**

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DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY.—Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 13th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Jno. L. Bradbury, Trustee	75	100	$200 00
S. L. Harris, Trustee.....	45	50	100 00

And in accordance with law, and an order from the Board of Directors, made on the 13th day of September, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 28th day of November, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.

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Assessment Notices.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 18th day of October, 1899, an assessment (No. 9) of ten (10) cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 773 Mission St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 27th day of November, 1899, shall be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 21st day of December, 1899, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission St., San Francisco, California. Office hours from 1 to 3 P. M.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of November, 1899, an assessment (No. 117) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on THURSDAY, the 7th day of December, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of December, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of November, 1899, an assessment (No. 4) of Ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of December, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 3d day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

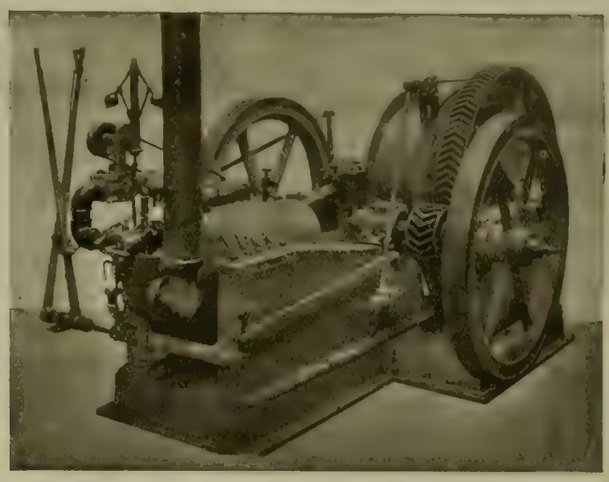
By order of the Board of Directors.

J. MIDDLETON, Secretary

Office—213 Jackson St., San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. H. Secombe, in the Landecker Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine tributary to Webber Creek; from Jos. J. Hoffman and T. M. Browne, in the Paragon Mine, at Bath, Placer Co., to deposit tailings in Volcano Canyon; and from G. W. Coates and E. S. Randall, in the Pebble Hill Placer Mine, near Smith's Flat, El Dorado Co., to deposit tailings in Little Chunk Canyon, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 4, 1899, at 1:30 P. M.

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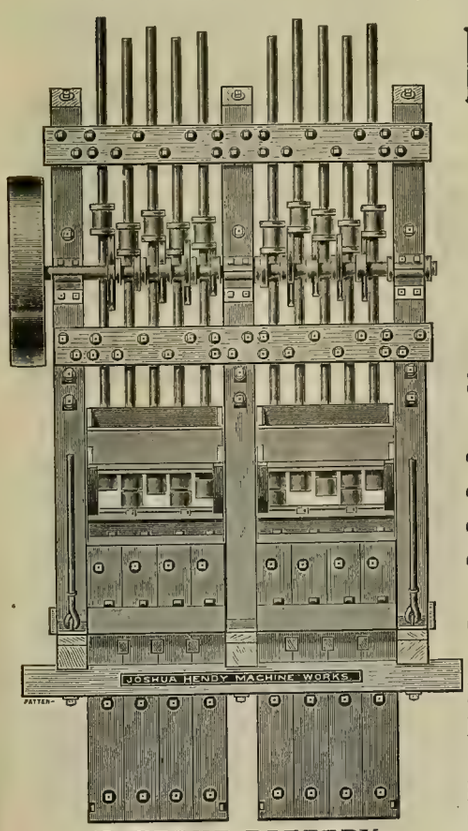
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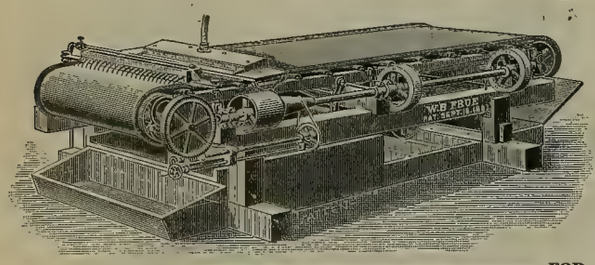
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The results obtained by this machine are the "acme" of concentration, and several cheap and untried machines that have lately come on the market compare by it. The manufacturers will tell you that they are "just as good, and cheaper," etc. The facts are that no other concentrator made has an equal capacity, or will yield as clean a concentrate with as small loss in the tailings as the Frue Vanner. The amount saved from the lower first cost of an inferior machine counts little in the year's results, when compared with the increased output from a Frue. This machine not only gives better results at both ends of the belt (i. e., clean product and poor tailings), but is operated at less expense and requires less attention than any other machine on the market. At the Alaska-Treadwell mine, where they have ordered over 350 Frue Vanners, one man attends 48 machines for 12-hour shift.

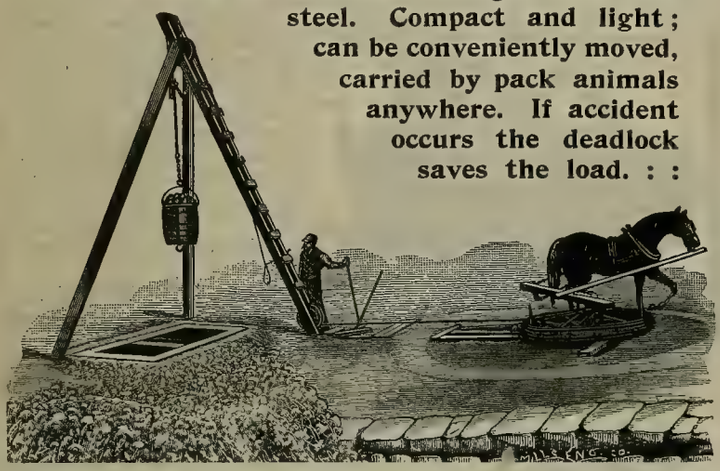
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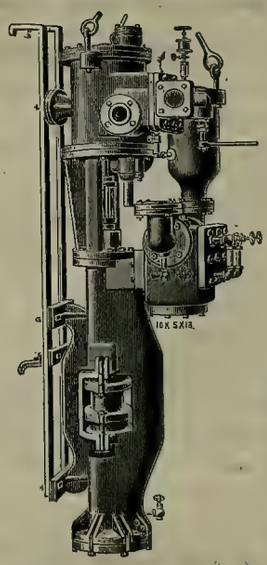
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Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

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"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The **ROPP FURNACE** is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal. (two furnaces); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); Broken Hill Proprietary Co., Broken Hill, New South Wales (four furnaces); Puget Sound Reduction Co., Everett, Washington; Colorado Ore Sampling & Reduction Co., Cripple Creek, Colo.; Consolidated Kansas City Smelting & Refining Co., for the Arkansas Valley Smelting Works, Leadville, Colo.; Robert Lanyon's Son's Spelter Co., Iola, Kansas (two furnaces); Mountain Copper Co., Ltd., Keswick, Cal.

Catalogue on Application.

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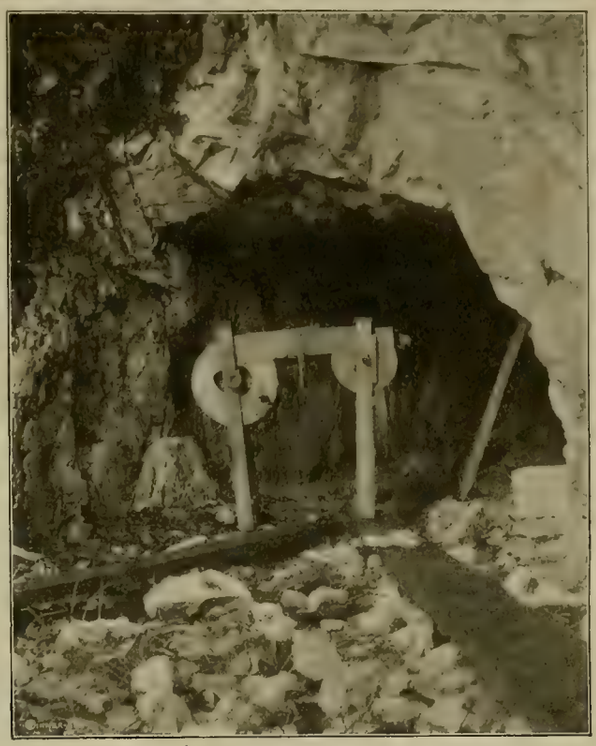
MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 2055.—VOLUME LXXIX Number 22. SAN FRANCISCO, SATURDAY, NOVEMBER 25, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

In British Columbia.

The Silver King mine, near Nelson, at the foot of navigation of the west arm of Kootenay lake, is one of the oldest mines in the country, and, as far as development has progressed, is the most valuable in the district. The mine is eight miles south of Nelson by road on Good mountain. It is owned by the Hall Mines Co. of London, England, who also own the smelter in connection with the property. There are eighteen claims in the property, of which four are in the silver-copper belt, and the remainder in the gold belt, of which Rossland is the center. The silver-copper lode strikes east and west through the diabases, and has the peculiarity of having no distinct walls, the country rock on both sides of the fissure being highly impregnated with ore. The ledge has been traced continuously for over 3000 feet, and has branched to the east. A great deal of work has been done on it, and in prospecting the diamond drill has been used advantageously. The first twenty tons of ore shipped from this mine netted $8000. One of the accompanying illustrations was taken in a station at the shaft in one of the lower levels.



VENTILATING FAN MADE FROM CEDAR SPLIT WITH AX, ALL UP MINE, PHILIPP'S ARM, B. C.



MAIN SHAFT UNDERGROUND, SILVER KING MINE, NELSON, B. C.

Prospectors in a new country are often obliged to resort to makeshift methods and some ingenious contrivances result. At the All Up mine, on Philipp's Arm, in the western part of British Columbia, the tunnel was greatly in need of ventilation. Accordingly, the miners decided to make a blower, but having no lumber rived out boards from cedars with an ax and constructed a serviceable fan which accomplished the desired ventilation. The accompanying engraving gives a good idea of the appearance of the ventilator. Among the numerous picturesque streams in the province is Elk river which, near the town of Elko, dashes among abrupt walls, forming a series beautiful cascades. A mining camp has been established on Elk river, from which some rich ores have been shipped. About the divide between Bull river and White Horse creek the country is rugged and little prospecting has been done. The formation consists of limestone, quartzite, conglomerate and shales, much broken and distorted. The accompanying engraving illustrates the appearance of the country. It is taken at an elevation of 9000 feet, the surrounding mountains rising far above it. No vestige of vegetation is discernable. It is one of the wildest spots in the Southeast Kootenay.

Two dykes cross Bull river below the divide. These have been traced from the summit east of Bull river, across the river to Burnt Bridge creek. On the most southerly of these dykes mining locations have been made.



DIVIDE BETWEEN BULL RIVER AND WHITE HORSE, SOUTHEAST KOOTENAY, B. C.—ELEVATION 9000 FT.



ELK RIVER, NEAR TOWN OF ELKO, SOUTHEAST KOOTENAY, B. C.

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J. F. HALLORAN.....Publisher

San Francisco, November 25, 1899.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Ventilating Fan Made from Cedar Split with Ax, All Up Mine, Philipp's Arm, B. C.; Main Shaft Underground, Silver King Mine, Nelson, B. C.; Divide Between Bull River and White Horse, Southeast Kootenay, B. C.—Elevation 9000 Feet; Elk River, near Town of Elko, Southeast Kootenay, B. C., 601. Longitudinal Section Hidden Treasure Mine; Cross-section Hidden Treasure Channel; Method of Working Drift Mines; Shops, Sluices, Etc., Hidden Treasure Mine; Electrically Driven Sawmill, Hidden Treasure Mine, 604. Morning Star Drift Mine, Iowa Hill, Placer County, Cal.; Electric Tramway, Hidden Treasure Mine, Placer County, Cal.; Gravel Washing Plant, Hidden Treasure Mine, Placer County, Cal., 605. Electric Locomotive, Hidden Treasure Mine, Placer County, Cal., 606. Latest Mining and Metallurgical Patents, 607. Elko and Tuscarora, Nevada, 608.

EDITORIAL.—In British Columbia, 601. Factors of Success in Mining; The Value of Mining Shares; Important Decision; Miscellaneous, 602.

MINING SUMMARY.—611-612-613.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 626.

MISCELLANEOUS.—Concentrates, 603. California Drift Mining, 604-605. Motive Power at the Mines, 606. Latest Mining and Metallurgical Patents; Charcoal as a Precipitant for Gold; Plant for Treating Refractory Ore at Nevada, 607. Electric Power Transmission in Colorado and Utah; In the Great Basin of Nevada; Palladium in South Australia; Manufacture of Carbon Steel, 609. The Walls of Mineral Veins; Compressed Air in Mines; The Uncertainty of the Adaptability of Cyanide Treatment, 609. The Mount Morgan Mine of Queensland; Translucent Paper; An Automatic Pump Governor; The First Patent Issued, 610. Mineral Specimens; Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Commercial Paragraphs, 614.

RESPONSIBLE INFORMATION from the Cape Nome region is to the effect that there will be no great hardship or suffering there the coming winter, as there is an abundant store of provisions on hand to sustain those wintering there—about 2500. A great rush to these diggings is anticipated in the spring of 1900.

THE Paris Exposition will open April 15, 1900, and close November 5 of the same year. The Exposition grounds are in the heart of the city of Paris, including the Champs de Mars and the Trocadero, both banks of the Seine for nearly a mile, and the Esplanade des Invalides and a portion of the Champs Elysees.

THE magnitude of some of the mining operations now being undertaken in various parts of the world in the development and operation of propositions which a few years since would have been considered worthless, is an indication of the rapid and successful development of new conditions in the industry of mining. This change has largely been brought about by the application of the latest and best scientific knowledge. Electricity and the cyanide process are to a great extent responsible for many changes for the better in mining, and there is a tendency toward the adoption of further and still more radical changes than those which have marked the development of the past decade in several branches of the industry.

IN the metal market there is at present a downward tendency. Copper was the first to drop, then zinc and lead, and now iron is wavering. A false condition in either the money or metal market cannot be sustained very long at a time, for so many interests are vitally affected that a remedy for any critical or oppressive condition is at once sought and generally found. Some predict a lower price for iron, but unless there is a radical change in the industrial world, and a great falling off in demand for machinery, it is doubtful whether this year's prices for iron may not be considered low next year. In the meantime the iron miners will endeavor to arrange to meet the demand next season. They made an effort to do so the past season, but were unable to create a surplus.

Factors of Success in Mining.

In Colorado the leasing system is largely in vogue, and to this system is due to a great extent the rapid development and success of the mining industry of that State. It has been argued that this system will work equally well anywhere, but such is not the case. Generally speaking the Colorado mines are high grade, or where low grade the transportation and reduction facilities are such as to render the cost of handling and treating the ore after it is mined a matter of moderate expense. The active competition of railroads, smelters and custom mills for business has been of great advantage to the miners of that State, and there are found those conditions which approach most nearly the ideal. Arizona has many mines producing high-grade ores but economical transportation facilities do not as yet obtain, except to a limited extent. A single instance of the operation of an Arizona mine illustrates the prevailing condition. When the Hillside mine was first discovered in western Yavapai county, the nearest wagon road was twenty-five miles distant, and the nearest railroad point about fifty miles away. The first shipments of ore were made on burros. A wagon road was then built to the nearest railroad point at Garland and the ore hauled in wagons to that station and shipped to Colorado smelters for treatment, at an average cost of $52 per ton for transportation, sampling and reduction charges. The conditions are now greatly improved but there are still many mines in Arizona so distant from railroads or other cheap transportation that the ores must be very rich to pay.

What applies to Arizona applies with equal force to parts of California, Nevada, Utah, Montana, Idaho, Washington and Oregon. If the railroads in those States were to show the same enterprise as is shown in Colorado, in extending their lines into mining districts, a great change would result and a remarkable impetus would be given the industry in those sections.

The lack of these facilities has resulted in the owners of many mines, at great distance from railway transportation, putting in reduction plants at the mines, and it can be said of the installations of recent years that but few are failures, owing to advanced knowledge of ore treatment.

Twenty-five or thirty years ago large plants were built in many places remote from railroads, hundreds of miles across deserts, or high in the rugged mountains, at great expense for transportation and first cost of machinery, and, in many cases, when these great plants were completed, it was found that they were wholly unsuited to the treatment of the ore. It was no uncommon thing to find a smelter built to treat silicious ores and amalgamating mills set up to reduce carbonates of lead.

The great fortunes made in mining have been the prime factor in working a change—in bringing order out of chaos. The necessity of employing technically educated men to superintend various branches of the mining business has long since been recognized, and old, time-honored but inefficient methods have been forced aside for new ideas and common sense application of scientific principles.

Each year sees mining upon a higher plane than before, and it is now known that, with a knowledge of the requirements of a mining enterprise, and with the necessary means to provide for them, mining is robbed of its risks to such a degree as to render it as safe an investment as any other business, and safer than many which have heretofore been considered as among the least hazardous of commercial enterprises.

The Value of Mining Shares.

The idea of basing the value of mining stock on the annual earning capacity of a mine, without due regard to the length of time during which the output can be maintained, is clearly an erroneous one and is calculated to place a fictitious value on the stock. There is no reason because a mine is able to produce a million dollars net profit in a year that the stock should be given a valuation of $10,000,000 unless it can be shown by ore reserves in sight that it is actually capable of producing that amount. And even if it does output this amount the value of the mine constantly decreases as the ore is extracted unless development increases the ore in sight as rapidly as it is removed. An ore body is like a reservoir filled with water. There is but a given amount in the deposit and no more can be extracted than it contains, and when it has once been removed it is never replaced, though other ore bodies may be discovered in close proximity. Often these deposits are so erratic in form and value that a knowledge of their net value can only be obtained by mining and reducing the ore.

Important Decision.

In the case of the Buxton Mining Co. vs. the Golden Reward Mining Co. of South Dakota, the United States Court of Appeals has sustained the judgment of the lower court in favor of the plaintiff for trespass by defendant company. The Golden Reward Co. drove drifts from the workings of the Golden Reward and Silver Case mines into the Bonanza claim of the Buxton Company and extracted a large amount of high grade ore from the latter property. The Buxton Co. did not discover the trespass for nearly three years when the caving of the workings was indicated by surface subsidence. An investigation was made, and it was then discovered that the Golden Reward Co. had been guilty of trespass. Plaintiff demanded judgment in the sum of $220,000, with 7 per cent interest. The action was tried at great length, and at unusual expense to both parties, the trial lasting from February 9, 1898, to March 18, 1898. The jury awarded judgment in the sum of $61,500, which verdict has been sustained by the court of appeals. No questions of geology were raised in this action except incidentally, the whole question being one of fact and value.

Geology in Mining.

In order to intelligently prospect and develop mines, a knowledge of geology is almost indispensable. It is true that often when the outcrop of a vein has once been found, the fissure is continuous and there is little danger of losing it; but, as often, the vein is faulted and all trace of it lost, when a knowledge of geology is useful, if not necessary, in rediscovering the lost fissure. But it is in prospect work that geological knowledge is most valuable. There are numerous monuments of ignorance of the rudiments of geology in every mining district: shafts sunk and tunnels driven uselessly, being started too high or too low to intersect the ore-bearing stratum. In the oil fields it is the same. Wells are driven without regard to geological conditions, based on luck, and these ventures are generally failures. It is remarkable, in the time of unusual activity in mining or in the oil fields, how quickly "geologists" and "experts" develop among those who have never given the subject previous attention. Ordinarily, it requires years of study and careful observation in the field to entitle one to be called a geologist or to make his opinion of value in geological matters.

THE combination of zinc mining companies in Missouri has been unable to keep up the price of ore as they had anticipated. The smelters' combination was evidently the stronger, and has been victorious for the time being. The zinc producers now threaten to build a co-operative smelter. The falling off in demand for spelter owing to war in South Africa has also been a factor in affecting the market price for ore.

A PECULIAR mining suit is to be tried in the district court of Eureka county, Nevada, wherein the alleged owner of a patented mining claim seeks to recover possession of his property which he claims was taken and withheld from him by a mining corporation, which caused his mine to be "jumped," and which has held the same adversely for several years.

A DECIDED IMPETUS is being given the mining industry at Cripple Creek, Colo., by reason of the rich strikes recently made there. The Isabella mine is credited with shipping two cars of ore last week worth over $160,000. Within the twelve months ending November 1st over $17,000,000 have been produced in the district.

AMERICAN PRODUCTS are gaining favor at present more rapidly in China than those of any other nation.

Concentrates.

A POUND of coal, when burned, develops 11,000 heat units, English.

ARKOSE rocks are those having essentially the same constituents as granite, from which rocks they are derived.

GRANULITE is a rock consisting essentially of orthoclase (potash feldspar) and quartz with, usually, small garnets.

AT the Mount Morgan mine in Queensland, Australia, open vat chlorination has proven cheaper than cyaniding.

MINERS in various parts of California, who are working placer mines, are now saving the black sands, that contain gold.

IT is said some gold-bearing veins of promise have been discovered near the Sierra Pintada placer fields in Lower California.

MANGANIN is an alloy of mangan, nickel and copper. It can be drawn or cast, and is used in the manufacture of measuring instruments.

IT is not good practice to open mines by surface excavations in the early history of a mine, unless those workings can be readily drained.

PRINTERS' INK is a mixture of oil and lampblack fused at a temperature of 550° F. It costs from 4 cents to $16 per pound, according to quality.

THE Supreme Court of California has decided that a contract signed by a portion only of the owners of a mine is not binding and cannot be enforced.

SOME tufas make excellent building stones. They occur of various colors and shades, are easily quarried and dressed, are enduring and ornamental.

QUICKSILVER deposits are usually accompanied by serpentine in California, but cinnabar is found in California and elsewhere, where serpentine does not exist.

THE pressure of the atmosphere is 14.7 pounds per square inch, with the barometer standing at 30 inches; when the barometer reads 28½ inches the pressure per square foot is 2010.96 pounds.

DOLOMITE is a composition of carbonate of lime and carbonate of magnesia. Sometimes the dolomite is rendered impure by the presence of sand and clay and often of bituminous matter.

THE large tonnage of low grade ores available in Boulder county, Colo., mines are to be treated by milling, concentration and cyaniding of the tailings, experiments in that direction having proven satisfactory.

THE sulphide of manganese is of rare occurrence. It is called alabandite. It is an iron-black mineral, and might readily be mistaken for iron. It is not of large commercial importance by reason of its scarcity.

MARLOID is produced by burning untanned leather in oil. It resembles celluloid, can be polished and pressed into any form. When hardened, it can be made soft and elastic by immersion in a salt or alum solution.

AN iron cap or gossan does not always denote the existence of copper ores in depth, though this not infrequently proves to be the case. Some copper mines show very little iron at the surface and no copper at all.

ANDALUSITE and chiastolite slates usually occur in the neighborhood of granitic intrusions. Staurolite slate is a dark micaceous slate in which occurs crystals of staurolite. In some cases these latter pass over to chiastolite slates.

UNDERHAND stoping is not commonly practiced in the United States. It is sometimes employed in mining small veins of rich ore, where little timber is required. Where timber is used in underhand stoping it cannot be recovered.

IN recent years much attention has been given to large deposits of gold bearing rock, which are devoid of defined limits (walls), the pay determining the extent of the ore deposit. Some deposits of this character have yielded largely.

THE rolling, billowy appearance seen in some regions, generally called "hog wallows," is supposed to have resulted from the accumulation of sand about clumps of brush, which was subsequently destroyed, leaving the hillocks, which are usually found matted with roots of the dead bushes.

IN some old English mines in Cheshire copper carbonate is found impregnating sandstones of the Triassic age. The copper was leached from the crushed sandstone by means of sulphuric acid and the copper recovered by precipitation on scrap iron. The sandstone contains about 1% copper.

AN atmosphere containing 15% carbon dioxide extinguishes a light, though a light will burn in a mixture containing 75% carbon dioxide if the other 25% be oxygen. Air mixed with 50% carbon dioxide occasions rapid death. A candle will be extinguished when the percentage of oxygen falls below 17%.

THE oil-yielding formations of California are known to extend along the entire length of the interior valley between the coast range and the Sierra Nevadas, from Tehama county on the north to Kern county on the south, and beyond the Tehachapi mountains in southern California from San Luis Obispo county to San Diego county.

AT the Hafod smelter at Swansea three samples are taken from ore sent in. One is used by the smelter for arriving at the assay value; another is given to the miner or his representative to get assayed wherever he sees fit; a third is inclosed and sealed so that it may be used in the event of considerable difference between their assays and some other.

WHITE LEAD is supposed to be lead carbonate, but the mixture varies greatly. It is generally composed of lead carbonate, lead hydroxide, lead oxide and water. Acetic acid, particles of metallic lead and lead acetate are not uncommon admixtures. The different shades of white are caused by these varying mixtures. Wherever coal is burnt or gas used for any purpose, wherever animal matter decays, the white lead painted surface blackens. The effect or color of such paint cannot be brightened by the addition of ultramarine or Prussian blue.

IN the case of Johnson vs. Sage, 44 Pac. Reporter, 641, the Supreme Court of Idaho decided that the president and secretary of a mining corporation have no power to appoint an agent or attorney in fact, to manage, control, sell or transfer the property of the corporation without being themselves authorized so to do, by order or resolution of the directors, duly adopted by such board.

THE Wilden process for coating steel and iron consists in the use of a bath composed of zinc, tin and aluminum. This mixture, it is claimed, produces a coating on iron and steel so firmly adherent that the sheets will stand working after it has been applied, will resist corrosion, and can be heated red-hot without injury. The most approved mixture is the following composition, by weight: Zinc, 84%; tin, 14%; lead, 1.5%; aluminum, 0.5%.

THE construction of tanks underground for the purpose of "catching up" water on the various levels and preventing it going to the bottom of the mines is recommended. These may consist of boxes made of planks, or may be excavations in the rock. They are placed below the floor of the level. By providing the tank with an outlet pipe and valve, skips in the shaft may be loaded and the water removed without use of a pump.

A SUMMARY of geological conditions on Keweenaw point, Lake Superior, is as follows: A deposit of sandstone and conglomerates were overlain by lava flows, which was either later overlaid by sandstones or the lavas were injected into the sandstones in flat sheets; subsequently the beds were fractured and faulted when mineral-bearing solutions penetrated the rocks from below, depositing the copper in the conglomerates, sandstones and lavas and in veins of the fissure type.

QUARTZITE is a compact, crystalline, granular aggregate of quartz, either in irregular crystalline grains or in developed crystals. In some quartzites which were originally sandstones there has been a secondary enlargement of these grains, silica having infiltrated and cemented the fragments into a hard, dense quartz rock. The polarization microscope shows this silica to have crystalline form, and that separate crystals envelop each grain of the original sand rock. The occurrence of small quantities of mica sometimes gives the quartzite a schistose appearance. With a considerable increase of the mica, the rock becomes a mica schist.

THE California Supreme Court has declared unconstitutional the legislative act of 1897 which provided that every California corporation must pay its employes at least once a month, and that it is unlawful for a mining or other corporation to contract to pay for a longer period than one month. In the Superior Court of Sierra county A. Johnson got judgment against the Goodyear Mining Co. for labor. The Supreme Court held that the law was class legislation, modified the judgment, affirming that portion awarding to the laborers their dues, and reversing that part which gave a lien upon the mining company's property for the payment of the attorney's fees.

THE following "Concentrate" appeared in the issue of the 11th inst.: "Next Saturday's issue of this publication will comprise a total of 52,144,128 square inches of surface." An explanation is asked. The issue referred to was that of the 18th inst. The statement was exact; the fact was in precise accord therewith. Of last Saturday's number—the 18th inst.—there were printed 9000 copies; deducting sheets preserved for files, spoiled proofs, etc., there were 8856 complete copies printed and issued. Each page of the paper (11½x16 inches) contained 184 square inches of surface; the thirty-two pages, therefore, contained 5888 square inches of surface. Multiplying the number of square inches in each copy by 8856, the number of copies printed and issued, gives 52,144,128 square inches of surface in the issue, as stated.

THE mines of Gilpin county, Colo., have produced in the past forty years over $80,000,000. Most of the ore shoots outcrop at the surface. Rich discoveries are not of uncommon occurrence in the district now. The veins are of the fissure type, continuous both longitudinally and in depth. The veins are divided into gold-bearing and silver-bearing lodes. Where these merge into each other, the values are found in both metals. The usual proportion of gold to silver in the mines of the county is five ounces of silver to one of gold, though in the silver belt proper the ores carry little or no gold. The veins lie in two systems—one striking east and west, the other northeast and southwest. Dykes of porphyry (andesite) accompany many of the veins of each system. The dykes frequently form a wall of the vein, and it is stated that a departure of the vein from the dykes is marked by a low tenor of the ore.

THE geology of the Cripple Creek, Colo., region has been described by Whitman Cross as a group of rounded hills seven to twelve miles southwest of Pike's Peak, 9000 to 10,000 feet above the sea. These hills consist almost entirely of volcanic rocks, and indicate the successive phenomena of a volcano, the principal material being breccia or tuff, resulting from a succession of explosive outbursts, while the igneous magmas erupted were, first, andesite; then phonolite (in numerous eruptions, alternating with explosive outbursts); and finally a number of highly basic eruptions in small dykes. Gaseous exhalations played a part at certain periods, and later hot waters circulated through the mass, and decomposed the rocks to a great extent. The formation through which the Cripple Creek volcano burst, and upon which its superficial materials lie, is granite gneiss. Since the close of volcanic activity these hills have been greatly modified by erosion.

LYDDITE, the high explosive, is picric acid in a solidified state. Picric acid was first made in 1771, and was for more than a century used as dye without its explosive qualities being even suspected. If lyddite be heated gently it may be poured from one vessel to another with safety. If heated over an intensely hot fire it chars with a slight fizzle. If pounded on an anvil there is no explosion. When a detonator is exploded in contact with it the explosive force of lyddite is liberated. This detonator is a sensitive body which explodes with great violence, and in practice it is not placed in the lyddite shell until the gun is about to be fired. In making lyddite carbolic acid and sulphuric acid are mixed in equal proportions and the temperature raised to the boiling point, when nitric acid is allowed to flow into the mixture. The yellow crystals which form in the bottom of the vessel after cooling are pure picric acid. When it is desired to make lyddite shells, the picric acid crystals and the semi-fluid mass are poured into the empty shell.

WHEN the walls of a vein are too soft to safely support stulls, heavy plates (3-inch plank) may be put in at head and foot to give the necessary resistance and security; but if the walls are too soft to render this method secure, the stulls must be set at right angles to the walls, the ends resting on posts, and the stulls must be framed, in the same manner as a cap, to abut against the posts above and below the stull, to afford security. Mining upward, the posts of each set or floor rest upon the stull of the set beneath, the foot being held in place by the shoulder on the stull. If the stulls are not framed, sprags must be inserted to keep the posts from being crowded in by the pressure of the walls. In this manner a stope may be carried up to any desired height. Where necessary, lagging may be driven behind the posts. To keep sets thus placed in position, they should be strengthened by ties extending horizontally from stull to stull along each side of the set. It then becomes virtually a square set, though differing from the latter in framing of the timbers.

THE ore bodies of the Bunker Hill and Sullivan mines at Wardner, Idaho, occur in a mass of hard, dense quartzite, which has a breadth of several thousand feet and a length of many miles. A great compressive stress has fractured this metamorphic rock along a plane marked by a fissure which cuts the bedding of the upturned quartzite in its strike, and also intercepts them on its dip, the fissure having a lower angle of dip than the quartzite. Mineral solutions have come up along this fissure plane and deposited their contents in the numerous branching fissures which extend into the hanging wall quartzite, and the spaces of dissision occasioned by the crushing of large masses of the normal rock have also received the minerals from these solutions, and now form the large ore bodies of the mine. That replacement has been an important factor in ore deposition here is not likely. The minerals are normally the sulphides of the base metals, principally galena, with gold and silver. The hanging wall is not defined, being irregular and practically limited by the commercial value of the material. The foot wall has been a plane of great movement of these rock masses during and subsequent to the formation of the ore deposits, resulting in the formation of heavy gouges. The extreme width of the mineralized zone is 300 feet.

PETROLEUM is recognized as a mineral substance obtained from the earth by mining, and lands in which petroleum occurs are properly classed as mineral lands. Judge Ross decided that oil lands were subject to entry under the placer laws, but Secretary Hoke Smith, in 1896, ruled that petroleum was not mineral and that petroleum lands were not mineral lands and might be taken by the States as lieu land to compensate for the loss of the sixteenth and thirty-sixth sections. Congress in February, 1897, passed the following: "That any person authorized to enter lands under the mining laws of the United States may enter and obtain patent to lands containing petroleum or other mineral oils, and chiefly valuable therefor, under the provisions of the laws relating to placer mineral claims; provided, that lands containing such petroleum or other mineral oils, which have heretofore been filed upon, claimed or improved as mineral, but not yet patented, may be held and patented under the provisions of this Act, the same as if such filing, claim or improvement were subsequent to the date of the passage hereof." Oil lands may therefore be located in a manner the same as placer grounds in twenty-acre tracts, and an association of eight individuals may locate 160 acres. Where the lands have already been subdivided by Government survey these claims must conform to the established lines of the survey.

A GOOD ventilating device for mine workings, either shaft or tunnel, may be constructed where a stream of water and a fall of 30 or more feet are available, by arranging a vertical box 6 inches square, having both ends open, with the lower end projecting downward into a tank or barrel of water a foot below the surface of the water. Above the surface of the water about 6 inches an aperture is provided into which is inserted a pipe or box which leads into the shaft or tunnel. A stream of water is conducted by flume or pipe to the top of the vertical box and the water allowed to fall into it. A hopper at the top is beneficial. The falling water carries downward with it a large volume of air which, unable to escape upward through the descending column of water, rushes out at the aperture near the bottom of the box and is driven forward by the constantly accumulating air, thus supplying a quantity of fresh air in the mine workings at the end of the ventilating pipe. The water falling in the column pipe overflows from the tank or barrel and escapes. All joints should be tight and the ventilating pipe made as smooth as possible on the inside and constructed without sharp bends, as these inequalities of surface and changes in direction obstruct the free passage of the volume of air. The higher the vertical column pipe the greater the quantity of air. A good-sized stream of water should be employed and several slats of wood nailed across the hopper to break the solid stream, increases its efficiency.

THE announced perambulating smelter on wheels to ramble round the country turning out gold bricks as it rolled through the mining camps has not materialized. Probably some of the necessary details of success escaped the attention of the originators. The latest in that line comes from a New York establishment which is building miners' prospecting wagons, "constructed so as to possess strength, and all machinery carefully shielded, so that underbrush, etc., will not interfere in any way with its operation. The idea in these prospecting wagons is to provide a miniature mining camp complete which can be transported at the rate of two and a half to four miles an hour. A small ore crusher is mounted upon the truck, so that it can be connected directly with the motor, and an assay furnace is also provided to test the gold-bearing ore as it may be found. The seat in front can be turned down to provide a bunk for two persons, and while one man drives the wagon his companion can busy himself making assays of the findings. Ample food supplies can be carried, and with one of these wagons a trip of two or three weeks can be made by prospectors." Such a "miniature mining camp" would doubtless be provocative of hilarity among real miners and might thus be of value in contributing to the gayety of the passing hour. It is believed, however, that the result of the work of the "companion" who "busied himself making assays of the findings," would not be of sufficient accuracy to justify serious mention.

California Drift Mining.

Written for the MINING AND SCIENTIFIC PRESS.

Drift mining originated in California and has reached its present magnitude largely as an outcome of the inhibition of hydraulic mining. At first an experiment, it proved successful, and rapidly developed into a great industry. It is in some respects unlike other mining, though the general principles are essentially the same as those in other mines. It consists of removing the richer gold-bearing gravel lying in the channels of the ancient rivers from the bedrock without disturbing the overlying low-grade gravel and volcanic material, which is sometimes hundreds of feet in thickness. By the hydraulic method, these deep deposits of gravel, sand and lava were washed down by the powerful streams from the monitors and the material carried into the flumes by the large volume of water employed. Some of the largest and most remunerative hydraulic mines had banks several hundred feet in height, from which the volcanic cap had been previously removed by erosion, and all of the remaining material—the detritus accumulated at the bottom of the ancient river—was gold-bearing and easily washed down. The greater number of channels, however, were covered under hundreds of feet of volcanic mud, tufa and brecciated lava fragments, and some of them by massive flows of basalt and andesite. These could not be economically hydraulicked, and drift mining had already made considerable progress before the courts enjoined the hydraulic miners, compelling them either to cease operations altogether or to resort to the drift method.

Most of these ancient river beds lie flat, or nearly so, having a normal grade the same as modern streams, though in some localities—as about Murphys and Vallecito, in Calaveras county—the channels are tilted and faulted by the movements of the earth's crust, indicating that dynamic disturbances have occurred there within comparatively recent time.

The gold-bearing channels are reached through tunnels driven directly in on the channel, or through a crosscut tunnel extending through the bedrock into the rim or underneath the channel; or else a shaft is sunk through the lava cap and upper layers of gravel to bedrock and the channel worked from the station at the foot of the shaft.

A long, main gangway is run up the channel, from which the gravel is breasted out on either side, the roof being usually supported by a system of posts and breasting caps. The gravel is removed only to such height as is necessary to recover the pay, or, if the pay streak be shallow, only sufficient gravel is removed to permit the work of mining to proceed, and, in many drift mines, low roofs result, the miners having to crawl upon hands and knees into the workings and to work for hours daily in a cramped, stooping position, this being considered more economical than the removal of a larger amount of ground, permitting of more freedom of action to the miner and a corresponding increase of work. Experience has shown that it pays to take out as little ground as possible.

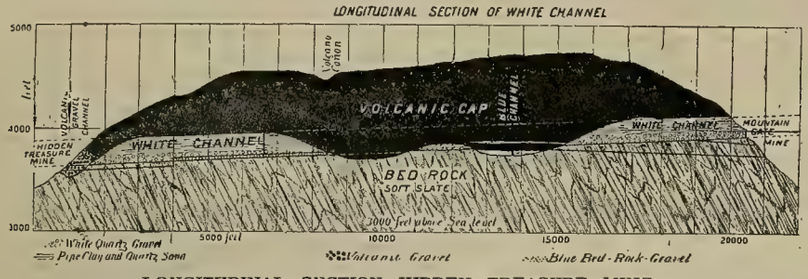
The main gangways are substantially timbered, are often of large size, having two tracks, and in most respects resembling the main drifts of a quartz mine. It not unfrequently occurs that the bedrock of the channel swells upon the removal of the gravel, and this becomes a source of great annoyance and constant expense by reason of the movement and breaking of the timbers and the constant shifting of the tracks. When swelling ground is encountered, selected, heavy timbers are employed, the sets placed a short distance apart; the legs of these are given a very wide spread at the base, sometimes setting at 45° to 50°. This is found to afford the most satisfactory results, and, by frequently relieving the ground as it pushes upward, the sets are kept in fairly good shape. The tracks, however, require constant attention.

Ordinarily the main gangway of a drift mine is carried low—that is, below the general level of the bedrock—because of the inequalities of the latter, it being always desirable to have the main drift and drainage passages as low as the lowest portions of the bedrock along which the workings extend, and also to afford convenience in handling the gravel removed from the breasts which are on either side of the main gangway. Along the gangway loading platforms are laid, upon which the gravel is thrown by the miners, who, as they proceed, shovel out the small material and pile up the large boulders behind them to assist in supporting the roof. From the platforms the gravel is loaded into the cars standing on the tracks in the main gangway, their tops being usually but little above the loading platform, and sometimes below it.

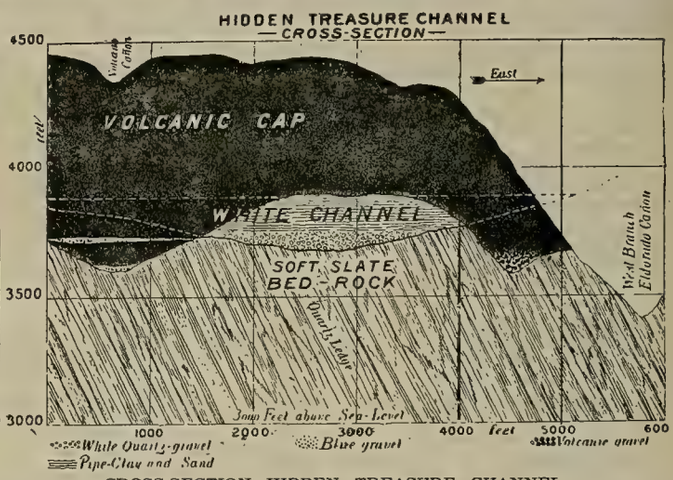
The posts used in breasting gravel are short and have a stout, heavy cap placed above them. Lagging is inserted between the cap and the gravel, or not, as the case may require. Some ground is so firm as to require no timber support at all, being held up by walls and piles of boulders.

In the early days of drift mining in California the business had to be learned; the miners were apt scholars and made rapid progress, but their methods were comparatively crude and necessarily expensive, though with the advance of time improvements were introduced in almost every branch of the business, particularly in ventilation—a most important matter in the system of mining and in the underground haulage of the gravel.

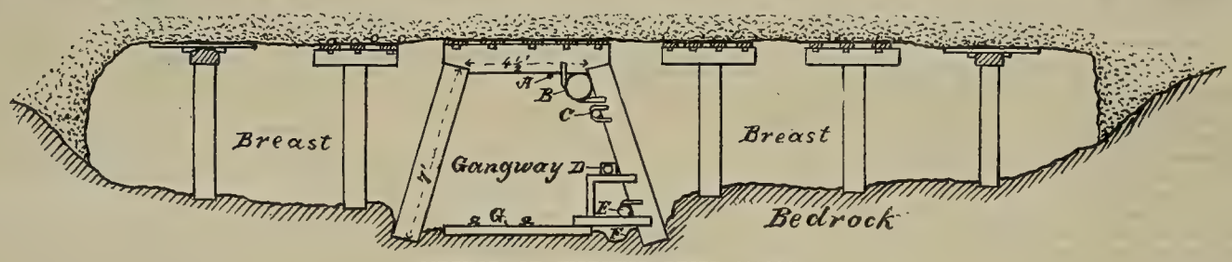
The largest drift mines in California are on the Forest Hill divide, in Placer county. It is estimated that the drift and hydraulic mines of this county on the Forest Hill divide, at Iowa Hill and about Dutch Flat, have produced nearly $70,000,000 in gold. A large area, constituting miles of channel, has been worked and exhausted, but there still remains untouched far more than has been exhausted. Hydraulicking in Placer county has nearly ceased, but drift mining will be continued for many years to come. Whether or not the result of the past operations in these mines constitutes a safe basis for calculation of



LONGITUDINAL SECTION HIDDEN TREASURE MINE.



CROSS-SECTION HIDDEN TREASURE CHANNEL.



METHOD OF WORKING DRIFT MINES.



SHOPS, SLUICES, ETC., HIDDEN TREASURE MINE.



ELECTRICALLY DRIVEN SAWMILL, HIDDEN TREASURE MINE.

the value of that remaining, cannot be said with certainty; but, from present knowledge of existing conditions, the outlook for a long continued era of prosperity is more than favorable.

Among the largest and best equipped drift mines of the Forest Hill divide are those owned by the Hidden Treasure Mining Co., whose lengthy tunnels have outlets at Sunny South, Centerville and Damascus. The property comprises a group of claims having a total area of 2328.8 acres. Within this area are several channels, some large, others small, but all rich in gold. These channels lie at various levels and intersect each other, often rendering their identity uncertain, until a large amount of work has been performed. The variation in elevation of these channels and their intersection at various points has given occasion for some unique mining engineering in the development and operation of this extensive property.

The main gangway at Centerville is 3715 feet above sea level at its mouth, and has been driven under the mountain over 8000 feet. The entrance at the Hidden Treasure tunnel is at an elevation of 3644 feet, and it has run into the hill 8500 feet. This tunnel enters the mountain at Sunny South. The Mountain Gate tunnel is at Damascus, on the opposite side of the Forest Hill divide, at an elevation of 3748 feet, and penetrates the ridge over 7000 feet. The summit of the divide is nearly 1000 feet higher than the channels of the ancient streams now being exploited for the gold they contain.



MORNING STAR DRIFT MINE, IOWA HILL, PLACER COUNTY, CAL.

The Hidden Treasure–Mountain Gate channel runs through this property for a distance of 18,000 feet. This was a river of unusual size among the ancient streams, and at one place is more than 1600 feet wide. The greatest width of gravel breasted on this channel is 800 feet, the average being about 400 feet. The bedrock is soft and requires but little powder to break it. On exposure it swells, and, as above mentioned, this proves a source of trouble and expense.

A second important channel, known as the Deep Blue channel, also has great length within the company's lands—its extent having not been determined.

The last annual report of Superintendent H. T. Power shows that during the year the average number of tons of gravel extracted per day was 332, the average number of tons of waste 46, making a total average of 378 tons. The gravel is breasted to the height of 6 feet. The average number of men employed for the year was 170. The cost of mine timber per day was as follows: Timbers framed and ready to load in cars, $30; one-sixth cost of operating electric plant, $2.25; labor, saws, etc., $8.75; total, $41. The average flow of water from the tunnel at Sunny South was 310 gallons per minute. The flow from the tunnel at Centerville was 375 gallons per minute. A ditch three miles in length conveys water from the mine below Centerville to the storage reservoir below Sunny South, for use in developing electric power for traction and other purposes. The flow from the tunnel at Sunny South is also conveyed to the reservoir. The pipe line from the reservoir is 1820 feet in length and consists of 820 feet of 9-inch double-riveted steel pipe, 500 feet of 8-inch and 500 feet of 7-inch standard screw pipe. A 3-foot Pelton water wheel, with flywheel weighing 2000 pounds, works under a vertical head of 850 feet, and is capable of developing 200 H. P. Water is delivered through a cast iron double nozzle, fitted with cut-off hoods, with levers to work successively, connected to a Replogle electric relay governor by rack and pinion. This governor serves the two-fold purpose of economy in the use of water, and that the supply shall be approximately proportioned to the instantaneous demand for power at that point. The water wheel is belted to two general electric direct-current generators, with capacity, at full load, of 50 amperes at 250 volts. It is set to maintain a constant voltage (under all loads up to the capacity of the plant) at the blower plant in the tunnel at Centerville, 14,000 feet distant. A skeleton switchboard, with switches, rheostat circuit-breaker, fuse, lightning arresters, potential and current indicators, is installed. The length of the transmission line from the generator station to mouth of tunnel is 13,000 feet. The size of wire is No. 0 B. & S. gauge. The electric motor car, for traction purposes, which is here illustrated, weighs 6500 pounds. It is fitted with two railway motors of 10 H. P. each, geared to the axles and equipped with brake, switches, controller, electric headlights, etc. The speed at which the tunnel trains are operated varies from six to twelve miles per hour.



ELECTRIC TRAMWAY, HIDDEN TREASURE MINE, PLACER COUNTY, CAL.

At the mine at Centerville a 5 H. P. motor drives two circular saws used for framing mine timbers, making wedges, foot blocks, etc. A second motor of like capacity operates a No. 4½ blower, which forces the air through a line of 11-



GRAVEL WASHING PLANT, HIDDEN TREASURE MINE, PLACER COUNTY, CAL.

inch pipe to ventilate the mine. Trains of fifteen to thirty-two loaded cars are taken each trip, the total carload weight being 2700 pounds, viz., weight of car 750 pounds, weight of gravel 2000 pounds.

The trolley is of copper wire, securely fastened to the roof of the tunnel, 6½ feet from the rail. The single trolley wire and return rail system is used. The tunnel is laid with twenty-five and thirty pound steel rails, resting on ties 3 feet apart. The present plant is designed for an eventual length of 10,000 feet of tunnel. It is being operated at this time over 7320 feet of trolley line, viz., 6500 feet under ground and 820 feet outside.

With horses the maximum average capacity was 180 tons of gravel per day. The record by electric traction for the six days ending December 3, 1898, shows 3019 tons of material delivered at the dump, or an average of 503 cars per day. This maximum output by no means taxed the plant to its capacity. With animal traction the daily output would decrease as the tunnel advances.

The daily expenses of operating by animal traction is as follows: Two dumpers at $2=$4; four drivers and swampers at $2 25=$9; one stableman, $2.50; feed, shoeing and harness of eight horses at 75 cents =$6; interest and depreciation on capital invested in horses and harness, four years, $1 25. Total daily expense of tunnel operating by animal traction, $22.75.

The daily expenses of tunnel operating by electric traction are: Two attendants at generating station, $4 50; repairs, oil, etc., $1.50; depreciation at



ELECTRIC LOCOMOTIVE, HIDDEN TREASURE MINE, PLACER COUNTY, CAL.

ten years' life of mine, $4; interest on capital invested, $3.50; cost of operating plant, $13 50; two-thirds cost of operation charged to traction, $9; the other one-third is properly chargeable to lumber, framing and ventilation, one-sixth each; two motor men, $5.50; two dumpers at $2=$4. Total cost of daily traction by electricity, $18.50; traction by animals, $22.75.

A saving also results from the shorter time required to take the shifts in and out of the mine. From the station in the tunnel it required thirty-five minutes for animals to make the trip, so that seventy minutes, or more than 12½% of the time of the shift, was lost. With electric traction the time of making the round trip is reduced to about thirty minutes, or 5%.

Taking cost of mining at 90 cents per ton by animal traction, the reduction by reason of rapid transit is 6 cents, or a saving of 7%, making the cost 84 cents. By animal traction an average of not more than 180 tons per day could be handled. The cost of material handled, then, results at $22.75 for 180 tons, or 12.6 cents per ton.

By electric traction a daily average is 378 tons at a cost of $18.50—less than 5 cents per ton.

The cost per ton by electric traction is: For mining or extracting, 84 cents; haulage, 5 cents. Total cost, 89 cents.

This shows a saving of about 13 cents per ton in electric haulage.

The Hidden Treasure is the most thoroughly and modernly equipped drift mine in California. On the opposite side of the ridge at Damascus the Red Point mine is arranging to put in a compressed-air haulage and ventilating plant.

The principal owners of the Hidden Treasure Co. have recently acquired a valuable addition to their holdings in the purchase of the Morning Star drift mine at Iowa Hill, which is herewith illustrated. The Morning Star adjoins the Big Dipper mine, owned by the same syndicate, the consolidated mines forming a valuable property.

Motive Power at the Mines.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by A. E. CHODZKO.

It is now in order to develop the subject beyond general lines, and to consider some applications of emergency plants to specific cases, such as may be found in the mining regions of California; and in attempting to do it, a clear understanding of the question at issue seems desirable.

No discussion is contemplated of the relative merits of water, electricity, or other sources of power distribution. The situation, in a few words, is this:

A mine owner has been in the past, or else intends using motive power furnished by a water or electric concern; at the same time, he wishes to protect himself against possible failure of his power supply.

Oil engines have been pointed out as the proper kind of machinery in the case, and the writer would remark incidentally, touching this suggestion, that he is in no way engaged, nor financially interested in the manufacture or sale of some particular make of oil engines.

But while refraining from individual reference, he realizes that a treatment of this subject would be devoid of practical usefulness, should any suggestions be made outside of actual results, and of such machinery as may be found, at the date of writing, in the American market; in other words, in the following remarks he has implicitly in view certain existing types of motors.

Oil engines, in their application to mining work, are not universally known, and no exaggeration exists in the statement that not a few people entertain a decided prejudice against their adoption.

These are some reasons for it:

First, the introduction of these machines in that particular field is recent, at least on the Pacific Coast; then again, the miner feels a natural recuctance to abandon the well known, time-honored steam engine or water wheel for a motor whose operation involves some unfamiliar features.

The validity of these arguments is merely a matter of time, and there is little doubt but that the man who operates a steam plant will have few reasons to complain of the change, after replacing it by a good oil motor.

It is not useless, however, to examine more closely the nature of the work which may be required from an engine at a mine.

The various applications of motive power to be met are: (*a*) Hoisting the ore and waste skips up a shaft, and incidentally baling out with a water skip. (*b*) Pumping, generally done by a direct acting pump, actuated by steam or compressed air. (*c*) Operating the air compressor for rock drilling or other purposes. (*d*) Milling, and incidentally generating current for electric light. (*e*) Ventilating —This last class of work need not be mentioned in the present case, because natural ventilation is commonly adopted in California.

All these can be classified under two distinct heads, namely: 1st—Work at constant speed, and either continuous, or intermittent at only long intervals. This includes items (*b*) (*c*) and (*d*). 2nd—Intermittent work, involving frequent starts and stoppages. To this class belongs item (*a*).

Little is to be said about continuous work; an already extensive experience has demonstrated the fitness of oil engines for this purpose. While the fuel consumption at part load is not proportional to the work accomplished, it follows it much more closely in these motors than in a steam engine, and their automatic regulation will meet satisfactorily the variations of demand for motive power.

The oil engine will therefore be well adapted to running a quartz mill of any description; the same may be said of an air compressor, whether it be used for operating rock drills, or for pumping—the latter, if done underground, becoming of course a necessary consequence of the use of oil engines. Some automatic device can readily be arranged whereby the engine is thrown in or out of gear by the variations of air pressure in the receiver, so that no novel feature will be introduced by the use of oil engines for the above categories of work, and the previous remarks also apply to Cornish pumps operated from the collar of the shaft.

In considering their adaptation to hoisting, it is well to recall two features connected with the operation of an internal combustion motor and which clearly differentiate it from a steam engine.

In the first place the former is not, by far, as responsive and easy to start as the latter. In order to set in motion a gasoline or oil engine it is necessary to turn its flywheel, by hand or otherwise, so as to produce at least one compressive stroke, and thus put the mixture of air and oil vapor in proper condition to be ignited.

Another noteworthy feature lies in the very limited range of speed variation of an oil engine; as it only has one operative stroke out of four in each cylinder, the inertia of a heavy flywheel plays an essential part in the operation of the machine, and this means that its speed cannot be reduced below a certain point.

On these two points, and as far as convenience of handling is concerned, the internal combustion motor is decidedly inferior to the steam engine, which starts or stops instantly and whose speed can so easily be controlled by the action of the throttle.

It is also evident that, while there is no reason, in principle, why an oil engine should run under or over, or in other words, while it may revolve in either direction—letting aside some practical considerations which may determine the sense of its revolutions—such a machine cannot be reversed like a steam engine; and when this is required by the nature of the work, it is customary to keep the engine in constant motion, and turning in the same direction, the reversing being done by means of a friction clutch.

Again, if a variable speed is necessary, several sets of gears must be used to connect the motor to the work, with proper appliances to pass from one to another.

These two requirements belong essentially to the attributes of a hoist, and an essential difference will be here noticed between the steam and the oil engine, inasmuch as the former is always connected to, and in control of the load, whereas in action of reversing by means of a friction clutch, or else, in passing from one speed to another, there is a moment—very short, perhaps, if it is done quickly, but yet, it actually occurs—when the load is disconnected from the engine. For any other kind of work than hoisting, no special importance would attach to that point; and even in this particular application of oil engines, actual facts demonstrate that good practical results are obtained with gasoline hoists. It may be remarked that with but few exceptions, these machines are of but moderate power; again, it will often happen that the service demanded from the hoist never requires reversing or changing speed except at the end of the skip's travel, when the load is supported in some way. But in a deep shaft, when the loading of the skips may take place at several levels, and when heavy loads are to be handled at sometimes very variable speed, and occasionally stopped in the shaft between stations, the writer does not believe that the present types of hoists actuated by oil engines would possess that degree of absolute control of the load at all moments and in all positions which is one of the requisites of deep mining. Safety depending too completely on the coolness and the quick action of a man hardly deserves its name. And since it has been assumed that steam could not be used to advantage for emergency plant under consideration, compressed air is indicated as the proper agency for actuating a large hoist of the direct acting type, exclusively used in deep mining. The function of the oil engine will be, in this case, to produce compressed air, and a few words about this subject will show that economical conditions of work can combine with safety in such an arrangement.

So that summing up the previous remarks at the present stage of the question, the writer would say that for a mine of moderate depth, where very heavy loads need not be handled, the existing types of oil motors and hoists will be mechanically well

adapted to the various operations required from an engine, and that for deep shafts and heavy loads, the only exception suggested should consist in using a compressed air hoist supplied by a stationary oil motor.

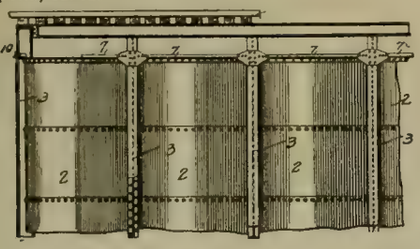
(To be Continued.)

Latest Mining and Metallurgical Patents.

Patents Issued Nov. 14, 1899.

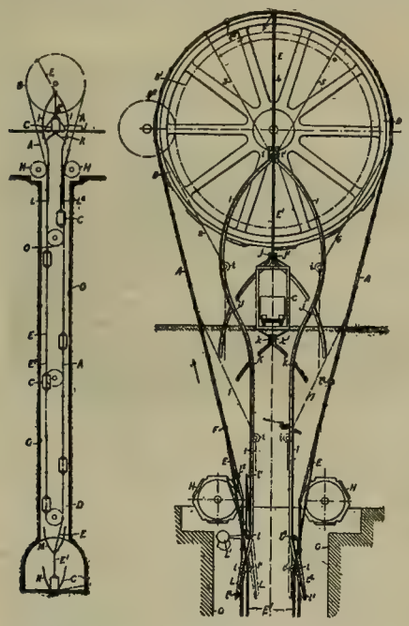
Specially Reported for the MINING AND SCIENTIFIC PRESS.

STEEL ORE BIN.—No. 636 869; A. P. Turner, Minneapolis, Minn.



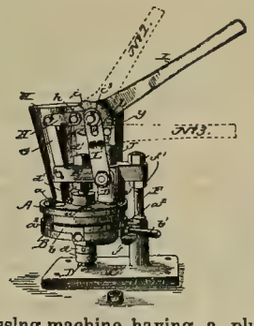
The combination in a bin, with a series of posts, held together by suitable bracing, of siding consisting of curved plates having flat portions near their edges, plates being arranged with their convex surfaces outward and with their flat portions arranged inside of and secured to posts.

RAISING OR LOWERING APPARATUS FOR MINES.—No. 637,092; D. Davy, Parkhead, England.



An endless-chain elevator consisting of a pair of continuously traveling endless chains passing over pulleys, a series of cages suspended by links from the chains, and curved stationary guides at top and bottom whereby each cage on reaching the highest and lowest position is diverted from the direction followed by the chains and is brought into a position midway between the ascending and descending members of the chains and is there retained during the loading and unloading of the cage.

CUPEL MACHINE.—No. 637,081; A. C. Calkins, Los Angeles, Cal.

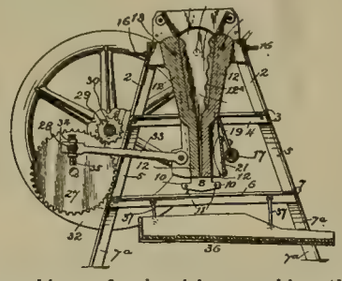


A compressing machine having a plunger and a lever joined to the plunger and having two separate fulcra-bearings, one of which is located in a slotted bearing near the plunger and comes into action during the first part of the stroke to give a powerful compression, and the other of which is located more remote from the plunger and comes into action during the last part of the same stroke of the lever to make a discharge of the object compressed by a continuation of the same stroke of the lever.

A compressing machine, consisting of a rotating disk with cells, an independently rotating false bottom, having a hole through it and connected with the disk above by a pawl, and a plunger, and plunger-guide.

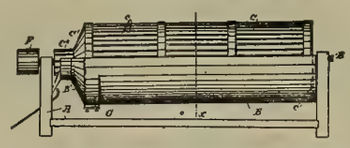
A compressing machine, comprising a base with two standards *D* and *F*, the two rotating disks *A* and *B* connected together by a pawl, the frame *E* connected to the tops of the two standards and having a chamber for the plunger, the links *L*, bar *H*, and link *G* jointed, and the lever *I* with stops i i^2 and having a plunger closely connected thereto.

CRUSHER AND PULVERIZING MACHINE.—No. 637,076; W. B. Folsom, Salt Lake City, Utah.



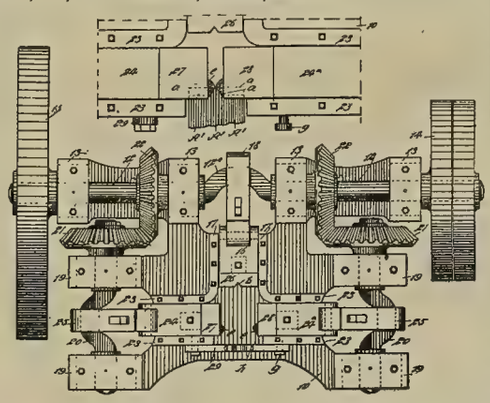
In a crushing and pulverizing machine, the combination, with the oscillating jaws, each having a single top pivot, of the pivoted hangers, the tie rods by means of which and the hangers the lower ends of the jaws are connected, and the follower-roller journaled in the ends of the tie rods and hangers to make the jaws follow each other; the adjustable pivots in the top of the frame of the machine, one of the pivots being out of the horizontal plain, the crushing jaws hung only on pivots, with the lower ends of the jaws free to swing.

CLAY OR GRAVEL WASHING MACHINE.—No. 636,995; B. Horr and C. H. Gibbons, Jackson, Cal.



A device for separating gold from clay or gravel, consisting of an inclined cylinder having one end open and the opposite end made conical and provided with an extension of reduced diameter, cylinder and extension formed of longitudinal interspaced bars connecting the one with the other by means of a conical imperforate section whereby the reduced portion of the cylinder serves to separate the material which passes over the intermediate imperforate surface to the final discharge, a retaining flange c' at one end of the cylinder, means whereby the cylinder is rotated, a semicircular trough adapted to contain water and conforming to the cylinder and the reduced extension and conical portion thereof, and a well or chamber in trough proximate to the conical end of the cylinder and provided with a gate-controlled outlet.

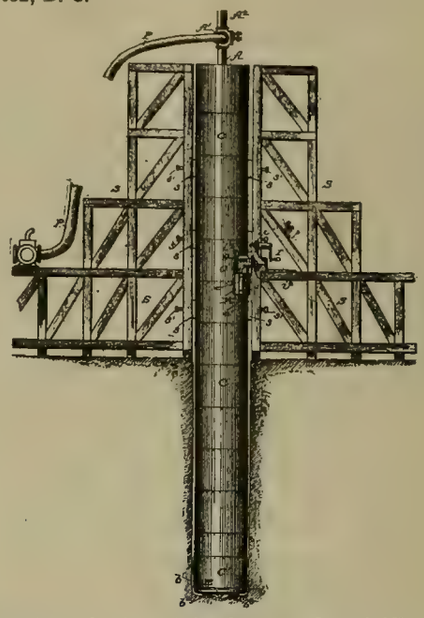
DRILL FORGING AND SHARPENING MACHINE.—No. 637,102; W. J. Evans, Butte, Mont.



The combination with a frame, a die-actuating device on frame, comprising similar side-blocks supported to move toward and from each other, a slide-block supported to reciprocate at right angles to the other slide-blocks, all the slide-blocks working in the same plane, a cranked main shaft, cranked countershafts, rotatable at right angles to the main shaft, pitmen connecting shafts with the slide-blocks, gearing connecting the main shaft with the countershafts, and means for rotating the main shaft, of forming dies securable upon the aligned slide-blocks, an edge-forming die securable upon the other slide-block, and a bracket arm adjustable on the forward side of the frame, for support of a drill in the same plane with the dies.

In a drill-sharpening device, two forming dies, each consisting of a tenoned block, horizontally channeled across its working face, the back wall of channel being sloped to widen it toward the rear end, and a fuller projection on the lower edge of the working face of the die, and having its upright face sloped from the rear forwardly.

MINING CAISSON.—No. 637,137; A. F. Lucas, Washington, D. C.



A caisson having at its lower end a rigidly attached and closed driving head made in sections, and a central water supply pipe also rigidly connected and bearing on the lower side rigidly attached boring devices connected to and turning with the caisson about its vertical axis. Means for holding the caisson in vertical position, and oscillating devices for the caisson comprising a plate with vertical guideways rigidly attached to the caisson, a toothed and curved rackbar having corresponding sliding guides fitting those of the rigid plate, and gear wheels operating upon the rackbar, whereby the caisson is turned and is allowed to settle down without disconnecting or interfering with the gears.

PROCESS OF PRECIPITATING GOLD FROM CHLORIDE OR BROMIDE SOLUTIONS.—No. 637,140; F. W. Martino and F. Stubbs, Sheffield, England.

The process for the precipitation of gold from aqueous chloride or bromide solutions, consisting in treating such solutions with a hydrocarbon gas such as is produced when a metallic carbide is decomposed by water, and the addition of a metallic carbide to the chloride or bromide solution to produce the hydrocarbon gas in a nascent condition.

An Australian mine manager gives the following reasons for adopting charcoal as a precipitant for gold from cyanide solution in place of zinc: Charcoal precipitation gives a higher percentage of gold extraction, is more simple in the cleanup, and the treatment in furnace is more reliable. It affords safety against theft or pilfering. Charcoal ash, if stolen, is of no commercial value except to an expert, and requires a complete fluxing plant; zinc slimes do not require an expert to reduce it. Charcoal improves with exposure to air and light; zinc on exposure to air and light becomes oxidized, and fails in being so active an agent as charcoal in the precipitation of gold. Charcoal can always be obtained on the mine at a fixed price; zinc fluctuates in price and supplies are frequently delayed.

An ingenious Nevada miner has rigged up a plant for treating his refractory ore at El Dorado canyon. He crushes the ore in arrastras and then leaches it by the cyanide process in two barrels, doing all the necessary work by hand. In this crude manner he has taken out several hundred dollars the past two months. As he has no assay outfit, he is unable to keep a check upon his work, but is evidently satisfied with the result of his labor and enterprise. Such men as this will make a success of life in any country, and although this simple plant is not up to date, it illustrates the character of the American miner in the West.

ELECTRICITY is being introduced in the mining of precious stones in the far East. In Burmuh the cost of wood is becoming greater every year, and it is computed that one mining company alone saves $2500 a year by the use of electricity for various purposes.

"A SATISFIED customer is the best advertisement," but you wouldn't have the customer if you didn't advertise.

Electric Power Transmission in Colorado and Utah.

Written for the MINING AND SCIENTIFIC PRESS.

The Telluride Power Transmission Co. began operations in 1891 by installing two alternators, each 100 H. P., 10,000 alternations, wound for 3000 V. One was placed at the discharge of a flume in Ophir canyon, San Miguel county, Colo., as generator; the other at the Gold King mill, three miles distant and at 4000 feet higher elevation. The one used as generator was separately excited and compounded, while that used as a motor at the mill was self-exciting and simple-wound and had a starting motor. The apparatus provided for starting and operating consisted of a synchronizing switch, with transformer, to reduce from 3000 V. to 100 V., attached to each side; also, a synchronizer consisting of two lamps in the series connecting between secondaries of the transformers and single-pole plug switches by about 6 feet of flexible cord for breaking circuits. The starting motor was adapted to 3000 volts direct impressed. No transformers were used, except for switchboard and lighting purposes. Two wires, No. 4 copper, were used, costing about $800. Some difficulty was experienced with lightning; but, as the armatures wore off the iron or T-toothed type coils were kept on hand and attendants became expert in replacing them. About fifteen or twenty coils were lost at the two points during the first season. It is claimed the success of this plant was the first demonstration of an alternating power plant for commercial purposes.

Within the succeeding four years a larger generator of the same type was installed, additional motors were connected and the transmission distance increased to ten miles. As the number of motors operated in multiple increased, difficulties were encountered as to adjustment of field charge, dropping out of step, and inductive effects of false currents.

In 1895 two 1000 H. P. two-phase, 7200 alternations, slotted armature, closed-circuit winding generators were installed, together with an equal capacity of two-phase rotating primary, 220 V. induction motors and raising and lowering transformers of units designed to step up from 500 V., two-phase, at generating station, to 10,000 V., three phase, for line transmission and to reduce to 220 V., two-phase. The method of connecting employed in the transposition from two-phase to three-phase, and vice versa, was that known as the C. F. Scott system. The equipment for protection against lightning was the A. J. Wurtz non-arching metal type, and consisted of six choke coils in series, each containing 94 feet of underwriter's wire. From the line terminal of each choke coil a ground shunt was carried through four units of type "C" porcelain encased arresters The line, as equipped for 3000 V., employed tripple petticoated glass insulators. So little difficulty with lightning has been met with that the danger from that source has been almost forgotten. The hydraulic plant consists, for one generator, of three miles of flume from Trout lake, being 2600 feet of 16, 18 and 20-inch pipe, delivering water to a 32-inch Pelton wheel under 860 feet head; the other generator is driven by a 32-inch Pelton wheel, propelled by water from a 2000-foot line of 18, 20, 22 and 24 inch pipe, under 580 feet head.

From 1895 to 1897, by an arrangement between this company and the Westinghouse Electric & Mfg. Co., a series of experiments were carried on in connection with this plant, with the purpose of making demonstrations of transmission longer distances at higher pressure. Generators of different frequency, and equipped with different types of armature, were installed. Two transformers, 100 K. W., so designed as to give potential of from 10,000 to 75,000 by frequent steps, and so arranged as to be adjustable, were installed at opposite ends of the transmission circuit of the original plant, three miles in length. Subsequent experiments were made to determine how high a voltage could be commercially employed and under what conditions, and as to various transformer requirements, etc. Readings were taken designed to show the effect of frequency, wave form, self-induction and capacity, distance between wires, arrangement of wires, atmospheric influences, altitude, etc. Potentials were employed reaching as high as 140,000 V., these being conveyed over the three miles of line and upon insulators of all the different types and in all sorts of weather.

At the close of these experiments—July, 1897—the Telluride Power Transmission Co. began the development of water power in Provo canyon, Utah, installing there an electric plant of General Electric generators of 1000 H. P. units. These machines are "star" wound, three-phase, 50 cycle, 800 V., slotted armature. The transformers were designed by the Telluride Co., being constructed in the shops of the Wagner Electric Co. of St. Louis, Mo., under the supervision of V. G. Converse. They are "star" connected in both high and low-tension winding, and the centers of the stars are directly grounded, being of the multiple coil, self-cooling, oil-immersed type. The insulation used is untreated cotton and treated fullerboard, the oil being the 300° test. The transmission is at 40,000 V., three-phase, and for distances of thirty-five to fifty miles. The line construction employs a single 7-foot crossarm, attached sufficiently low upon the pole to accommodate two wires, the third being carried out at the top of the pole. The equilateral triangle thus formed gives 76 inches between wires. Motors of all types, both two-phase and three-phase, are operated, varying in size from 1 to 250 H. P. Preference is now given to the three-phase system throughout, and star connection of transformers, where same are used in connection with high-tension, long-distance transmission. Where transformers are used on distribution circuits at 5000 to 10,000 V., the mesh or delta connection seems to be preferred.

Upon test, the thirty-five-mile line, with three No. 4 copper wires, showed electric static capacity of between 3½ and 4 amperes, the radiation loss in fair weather amounting to less than 7 K. W., which, added to C^2R of the line, gives a net transmission loss of less than 5% of the 100 H. P. transmitted over this particular line.

In the Great Basin of Nevada.

Upon the highest table lands of the Great Basin is situated the county of Elko, in Nevada. It contains 10,972,000 acres of land. The Ruby range of mountains, which divide the Salt Lake and Humboldt divisions of the Great Basin, are the highest in the county. They are steep and precipitous, with huge granite crags, bluffs hundreds of feet high jutting over narrow canyons, inaccessible peaks and mountain torrents that furnish the water supply to fertilize the plains below. The other mountains are lower in elevation and their rough edges are worn off by erosion, presenting smooth, rounding outlines and covered with soil and grasses from base to summit. On some of them are forests of cedar, juniper, nut pine and mahogany. Most of the mountains are rich in minerals, though the country has never been thoroughly prospected and but few mines are developed extensively. One mineral belt, extending east and west, is about 40 miles wide and 130 miles long in the county. For this distance gold, in both placers and ledges, has been found in paying quantities. Silver mines have been worked continuously since first discovered. The first discoveries of mineral were made about the time it was becoming known that gold existed in other places than California, and men were led from place to place by stories of rich strikes. Early in the '60s the first placer mines were found, and in a short time the country was swept over by a wave of prospectors. Disappointed at not finding the country as full of the yellow metal as they expected, and allured by stories of rich diggings elsewhere, most of them left the country as soon as they entered it. A few ledges containing gold and silver were worked, and thus quartz mining commenced; but this was too slow a method for gold hunters. The tide of prospectors ebbed from the country, leaving unprospected claims, abandoned shafts, half constructed ditches, caving tunnels and mountains filled with minerals for those who may in the future make better use of them. Of the mining districts in the county, Tuscarora stands at the head, being one of the first discovered, and it has been worked continuously ever since. Placer mines were first found there, and are still being worked. Silver ledges were developed, and have turned out $10,000,000 worth of silver. More recently the gold ledges in the district have been opened and are being profitably worked.



ELKO AND TUSCARORA, NEVADA.

Palladium in South Australia.

The numerous discoveries which have been made recently in various parts of South Australia, of tellurium, associated with gold in auriferous ores, says the London *Mining Journal*, have induced assayers and mineralogists to give a little more attention to the detection of the various metals which accompany gold in ores. At the end of August last, the assayer at the Mount Torrens ore crushing works, while examining some ores from the Mount Torrens district, noticed an unusual mineral in them. After careful testing he found that it contained the rare metal palladium. Assays yielded 17 ounces 6 dwts. 11 grains palladium, and 16 dwts. 21 grains gold per ton.

Palladium is a light-colored metal intermediate between the grey of platinum and the white of silver. It is generally found in small, flattish grains which have a tendency to exhibit a fibrous, radiated structure. Palladium is chiefly found in alluvial deposits accompanying gold and platinum. Metallic palladium has a hardness of about five—that is to say, it is as hard as platinum. It is not so ductile as platinum, and is soluble in all the strong acids. It is unique in its power of occluding hydrogen, which it does to the extent of nearly 1000 volumes, forming the alloy Pd_2H. Palladium is used for making graduated circles and scales for scientific instruments, for plating certain silver goods, and to a small extent in dentistry. The French Government are said to possess a highly polished cup made from pure palladium, which weighs over three pounds. Palladium was named, in 1804, by Wollaston, after the asteroid Pallas, which was discovered in 1802 by the German astronomer, Henrich Olbers. Metallic palladium is at present worth about £112 per pound.

IN the manufacture of carbon steel microscopic diamonds are formed. A number of steels from a variety of processes have been examined and gave identical results. A piece weighing 300 grammes was cut from a lump of steel and treated with nitric acid; the insoluble residue collected was mainly graphitic carbon. After being washed with water, it was boiled three times with fuming nitric acid, which partially dissolved the residue; hydrofluoric acid and then fuming sulphuric acid, were used. There then remained nothing but graphite, which, after being washed, was melted with chlorate of potash. This long series of operations was recommenced, because it was necessary to subject the residue to all the treatments mentioned. The insoluble residue obtained fell to the bottom of a vessel filled with iodide of methylene, and the little transparent octahedrons visible through a microscope burned on a sheet of platinum without leaving any ash. These were the diamonds.

The Walls of Mineral Veins.

Written for the MINING AND SCIENTIFIC PRESS.

There is much diversity of opinion as to the relation of mineral veins and ore deposits to their walls. Some cling to the lateral secretion theory of which Dr. Sandberger was a firm adherent, but in more recent years there is a general tendency to the belief that the source of the metallic and other contents of mineral veins were derived from great depth, and that the walls of the vein have practically no effect upon ore deposition.

A mineral vein traversing rocks of unlike character would be most likely to substantiate the lateral secretion theory, as it is scarcely reasonable to expect that two rocks of wholly unlike composition, as, for instance, diabase and clay slate, would contain equal values in gold, silver, iron, lead or copper, presuming that the minerals found in the veins were derived from these wall rocks. Their difference in structure and in composition suggests that the vein would be effected thereby. Structurally this is found to be the case, for in the slates the vein is usually characterized by a banded structure, the inclusion of more or less of the slaty material, and the semi-silicification of slaty portions, while in the diabase the vein usually has a more massive appearance, the banded structure being generally lacking. As to the values contained in either case, it is not apparent that the character of the wall rocks have an influence on them, for we find beautifully banded veins in slate with merely a trace of value in gold and silver, with a small amount of sulphides which are also low grade, and we find similar appearing veins in black slate running into the hundreds of dollars per ton in gold. In the massive veins in greenstone similar conditions are observable. Clean massive white quartz is found practically barren of values and again matted with gold, and these variations may often all be found in a single mine.

The Rosario mine, on the high Plazuelas mountains above San Jacinto, a few miles from Cantarranas, in Honduras, offers an illustration of vein formation in two distinct rock formations. The country rock consists of an intensely hard metamorphic black clay slate, through which courses an infinite number of veinlets of calcite and quartz. This rock is intruded by a greenish gray eruptive—rhyolite. The Rosario vein is partly in the slates and partly in the rhyolite, and is in no sense a contact vein. The contact of rhyolite and slate is not always sharply defined, the slate having been torn into fragments along the edge of the intrusion and the pieces included in the magma of the rhyolite with much consequent alteration.

The vein occupies a fault fissure which cuts alike through sedimentary and eruptive rock, and in places are found indications that the fissure was, in part, an open crevice, as evidenced by a beautifully banded structure. It has a straight general course, though with many local flextures and bends. It varies greatly in width, from a foot or two to upwards of 20 feet, the best ore being usually found in the swells of the vein.

The wall rocks are the black slates in part and in the lower levels extending under the mountain wholly in rhyolite. The gangue is quartz, the values being in both gold and silver associated with the ordinary sulphides of the base metals, copper, lead, iron and zinc. A peculiar feature of this vein is its tendency to split into two veins, the foot wall vein being usually the richer, through in the larger or better ore bodies the two veins are essentially one.

The mine has been very extensively developed but it does not appear that the character of the wall rocks—so wholly unlike—has had the slightest influence on ore deposition, for equally rich ore has been found in those portions of the vein in the slates and also in the rhyolite. Ore is scattered along this fissure for thousands of feet and thousands of tons have been mined and milled, but, as stated above, as yet there is not the slightest evidence to indicate that the ore was derived from the wall rocks or that the character of the walls in any manner affected the ore deposition. Another fact of note is that the wall rocks of the Rosario mine are practically without mica, augite or hornblende, and these Prof. Sandberger considered essential to the secretion of valuable minerals from the walls, being, in fact, the mineral constituents from which the vein values were derived.

In the early development of the mines of Leadville, Colo., the character of the ore deposits was quickly recognized as belonging to that order of mineral veins known as contact deposits. Dr. S. F. Emmons, examining these deposits, expressed the belief that the mineral constituents were derived from the overlying porphyry. Mr. Emmons' conclusions as to the origin of the Leadville ore deposits were as follows:*

I. That they were derived from aqueous solutions.

II. That these solutions came from above.

III. That they derived their contents from the neighboring country rocks.

IV. That in their original form they were deposited not later than the Cretaceous epoch.

And as regards their mode of formation:

I. That the metals were deposited from their solutions mainly as sulphides.

II. That the process of deposition of the vein material was a chemical interchange, or actual replacement of the rock mass in which they were deposited.

III. That the mineral solutions or ore currents concentrated along natural water channels and followed by preference the bedding planes at a certain geological horizon, but that they also penetrated the mass of the adjoining rocks through cross joints and cleavage planes.

And with regard to their distribution:

I. That the main mass of argentiferous lead ores is found in calcareo-magnesian rocks.

II. That the silicious rocks, porphyries and crystalline rocks contain proportionately more gold and copper.

Dr. Emmons believed that the values in gold, silver, lead, iron and copper came from the overlying porphyry. He also recognized the occurrence of intrusive dykes which cut up through the mineral-bearing formations, and that they seemed to favor the concentration of rich masses of ore in their vicinity. Concerning a prominent dyke cutting through Fryer Hill mines he said: "It is supposed to have acted as a dam, causing an interruption of the ore currents, the stagnation thus produced having influenced a first deposition on its northeast side, leaving a barren portion immediately under its southwest side, but through the gaps the currents passed, slowly depositing as they went, and in the eddy beyond was formed a second accumulation of ore."

This was in the early days of mining in Leadville. Chas. M. Rolker and others, having the advantage of later development, did not agree with Mr. Emmons, that the ore-bearing solutions came from above, but thought that they came from below, following the fissures occupied by the intrusive dykes of the region. In some of the mines over considerable areas a dolmitic sand or solid limestone was found lying between the ore bodies and the overlying porphyry. The very extensive development of recent years has shown that the ore deposits were not confined to a single horizon, as was at first supposed to be the case. Throughout the Leadville district the conditions are much the same as to the character of the rocks lying above and below the ore bodies and it has not yet been demonstrated that these wall rocks have any appreciable influence upon ore deposition.

W. H. S.

*Geology and Mining Industry of Leadville, Monograph U. S. Geological Survey.

Compressed Air in Mines.

It is a mistaken idea among mining people that compressed air is one of the most wasteful forms of mechanical energy. Yet it is upon the use of this force that engineers will be compelled to depend when they are asked to mine at depths much below those which are now considered as within the range of practical management, says the *South African Mining Journal*. If the use of compressed air is to be continued under conditions of less waste, in order to make this advance probable, it is obvious that the mining intelligence must be brought to bear upon the subject with more persistence and determination to achieve better results than has hitherto been the case. It is necessary, before discussing the matter, to lay down the self-evident axioms, yet so much neglected, that (1) compression must be done on clean, dry, cool, prepared air, and (2) expansion must be conducted without any undue loss. It appears from the practise of several mines that it apparently does not matter what kind of air is supplied to the compressor: "anything will do;" nor does it seem necessary to the buyers to consider what losses are made through imperfect air valves; air pipes reduced in area, thus choking the flowing air; fractures of mains by falling rock, or through imperfect joints that tend to form "whirls" and "eddies" through the existence of projections or recesses in each joint. It would certainly appear to be false economy to use light air pipes if dents, rents, and loss accompany the use of such pipe lines. All pipes, joints, fittings and valves should be internally smooth, "easy" bends where change of current direction is made. No one disputes the value of a reheater for heating below ground the air admitted to the drills, etc., yet the reheater is not generally adopted. It should not be impossible, if the air mains were properly designed and installed and all other points seen to, to obtain at a depth of 6000 or 7000 feet below the surface an efficiency very little below the surface efficiency. With the general adoption of double stage winding from great depths, the first lift on the incline of the ore bodies will be performed by the compressed air hoist. In this connection it will not be inadvisable to call attention to the points which many earnest men have been urging in various parts of the world with some measure of success. These are as follows: (1) The supply of clean, dry, cool, prepared air to the compressor; (2) the use only of the most economical engine to supply H. P. at the lowest total cost per I. H. P.; (3) the use of the best form of air valves and fittings to provide against frictional losses; (4) the use of smooth, regular, tight air mains of correct size; (5) the use of the reheater. These are matters which must not only be considered when installing the plant, but about which a constant supervision must be exercised if a high efficiency is to be maintained.

The Uncertainties of the Adaptability of Cyanide Treatment.

The first cyanide plant built in Montana was erected at the Revenue mine, in Madison county, by R. R. and F. B. Turner. Ordinary milling methods had absolutely failed to extract the gold from the ores of this mine, even when fine crushing, grinding in pans and pan amalgamation followed by concentration were resorted to. The ore yielded its gold readily to cyanide treatment, however, even with comparatively coarse crushing.

This plant is still in operation. Its capacity has been increased from time to time till it now handles seventy tons per day. In Fergus county, commencing on a small scale, the Gilt Edge mill has grown to a capacity of 140 tons a day.

Since then improvements have been made in the application of the process, particularly in the handling of material, in the solving of mechanical problems and the extraction of gold with solutions of much less strength than were at first employed. A series of exhaustive experiments have also demonstrated that ores which were at first considered unadapted to the process are now easily treated by it, showing that great improvement has been made in the chemistry of the process.

In every gold mining section are found some ores adapted to the cyanide treatment, but without tests it is impossible to tell what ores can and what can not be satisfactorily treated by cyanide. As a rule, it may be said that oxidized ores are more readily amenable to it than sulphuretted ores, but to this general proposition there are notable exceptions. One of the latest installations in Montana is that in Jardine, in Park county, which is being built to treat arsenical sulphide gold ores in the form of concentrates which were previously supposed not adapted to this treatment.

Concerning the treatment of a certain sulphide ore, Matt W. Alderson, of Sheridan, Montana, says:

"A few months ago a sample of pyritic ore was left at my laboratory to be tested as a possible good cyaniding ore. Having no idea from its general appearance that it would be amenable to cyanide, nothing was done with it for some time. When tested, however, the consumption of cyanide was found to be light and a fair extraction was secured in a short time. Investigation followed, and it was found that the ore would range in value from $4.50 to $9 per ton. It was, supposedly, a concentrating ore, but it would only concentrate two or three into one, so the concentrates were too low in grade to stand expense of shipment and smelter charge, let alone leave anything for mining and milling. Subjected to direct treatment by cyanide, a way was found whereby a working extraction of over 90% could be depended on. Ores containing little gold and such an amount of copper and lead as to make them valuable for these metals would better be sent to the smelter. Test the ore—that is the only way to tell—and if results of the tests are not satisfactory they will not be conclusive. Ores are successfully cyanided to-day that a few years ago seemed to offer insuperable objections to such treatment.

"Ways will be found to render ores amenable not now believed to be so. Solutions containing much less cyanide will be used. In some places solutions containing eight or ten pounds of cyanide per ton are now used. This is entirely unnecessary in very many instances. A few years ago it was held that satisfactory precipitation could not be secured by the aid of zinc from solutions containing less than two and one-half to four pounds of cyanide per ton. To-day we know that as perfect precipitation can be obtained from solutions containing one-half pound of cyanide per ton as from those of any greater strength, and results secured from Silver Star this past summer would indicate that even this amount is not actually necessary. I think the greatest improvement will be in reduction in the cost of treatment, still further advancing the process which, though younger than any other, has no rival in either economy or efficiency in the treatment of refractory ores."

In Lewis and Clarke county, Montana, the first successful work was on tailings from the mill at Gloster. That was the beginning of the work in the Marysville district, where the present output runs into the thousands of dollars per annum. More slimy material—tailings which could not be handled by the more generally adopted percolation method—was treated in Montana the past summer than in all the rest of the United States put together. The cyaniding output last year was nearly double what it was the year before. This year will show a vast increase over last and new plants under construction will swell still further the revenue from this source in the future.

The Mount Morgan Mine of Queensland.

Australia's greatest gold mine is located in Queensland. It was discovered by cattle men who, not realizing its value, sold it for a nominal sum. It was located in a desert-like country, and at the time of its discovery was far from communication with the settled parts of the country nearer the coast. A recent review of the changes which have taken place at Mount Morgan, with a description of its present condition, written by Edgar Hall, appears in the Australian *Mining Standard*, an abstract of which is herewith given:

The writer recently visited the Mount Morgan mine after an absence of eight years. He knew that great alterations had taken place, but was not prepared for the almost revolutionary changes which he found—changes embracing every department of the mine, and, happily, for the better. Formerly one reached the mine over a road of the worst possible description; now the railway takes one to the township, and the mine is connected by a branch line. This forms the keynote to the alterations all through; the management of the mine is changed. Old men and old ideas have given way to young men and new methods, and the place has been transformed by the skill and ability of a properly trained and organized staff of officers.

The early management at Mount Morgan was a glaring example of the waste and extravagance often accompanying extreme wealth. The mine was big, but everything else was petty except the dividends. Now the general manager is assisted by a staff of professional men, most of them young and graduates of a mining school, organized into a system of departments, each of which is responsible for its own work alone. The general manager—G. A. Richard—has communicated his own enthusiasm and energy to his staff, and they on to the workmen.

The changes in the mine are not so remarkable as in the treatment of the ore. Externally, one sees a difference due to the extension of the open-cut system and to the removal of so much ore. The improvements consist mainly in the introduction of labor-saving devices for handling the ore and in a system of tunnels and drives for development and access below ground. A main shaft is being sunk to open the mine below the lowest tunnel, and is furnished with winding engine capable of sinking the shaft to a depth of 1500 feet, *i. e.*, over 2000 feet below the top of the hill and surface of the deposit. This engine is driven by compressed air.

A large and increasing amount of mundic ore is being mined; and as the stopes are now well below the level of oxidation, theories can be applied direct to the facts. The facts have proved rather bad for some of the theories.

A result of the climatic conditions prevailing in the Queensland locality in which it is situated, and the extent of the superficial deposits, is evidence of the long continuance of similar climatic conditions to those now obtaining. Those conditions were assisted in their decomposing effects upon the huge pyrites deposit by the fact that at one time the deposit had been intersected by dykes of dolerite, which rapidly decomposes under atmospheric influences. Dolerite and pyrites decompose rapidly enough when separate; but, standing side by side, they help each other, the acid products of the pyrites acting upon the basic dolerites, and thus was produced surface decomposition of more than ordinary intensity, and the products of that extra rapid decomposition formed the ever-varying mixtures of material which once covered the crest of Mount Morgan.

Along the junction of the oxidized and sulphide ore the decomposition of the latter can be seen in all stages, passing from a cellular, slightly brown quartz to hard pyritous rock quite unaltered. In the intermediate portions the pyrites is seen lying loosely in cavities in the quartz. Of two specimens, taken at a distance of 15 inches apart vertically, one is a cellular lump of quartz and silicified country rock, containing no pyrites, but having the cellular spaces partially filled with a soft brownish material, which looks like a magnesian mineral. The other is white quartz, speckled with pyrite crystals, many of which are loose; in this lump are portions free from pyrite, which look like an altered feldspathic rock. Both lumps have the smell peculiar to the action of sulphuric acid on clays and feldspars. Within a space of a few square yards a great variety of decomposition products can be seen, and all the openings in ore give evidence of rapid oxidation in the efflorescence of sulphates of lime, magnesia, iron and copper existing everywhere. Veins of satin spar, which have been formed in this way, occur, filling cracks and fissures, and are still forming, and in a few places possess an emerald tint, due to the presence of copper. The irregular association of kaolinic material with silicious and iron ores, which seemed so extraordinary in the upper levels of the mine, is now easily explained.

The dykes that have intersected the Mount Morgan lode have penetrated in erratic manner, and in the lower levels of the mine masses of country rock and ore can be seen entangled in arms of dolerite of all shapes and sizes. In places it is hard to tell at first glance which is ore, dolerite or country rock. No simple fissures took place here, but a tremendous crushing in several directions, forming numerous irregular openings, into which rushed the probably very fluid, basic lava now forming the dykes. The weathering of such a mixed mass would produce the curious blending of the Mount Morgan gossans and so-called sinters, and lead to local peculiarities of form, in which the fanciful could easily see funnels and basins, bombs and boulders. One of the features of the new Mount Morgan is a perfect series of mine plans kept plotted up to date, showing the network of dykes which intersect the ore body. These plans will possess, as the mine development progresses, a high scientific value to the student of ore deposits. The size of the great ore body is well maintained, and it is satisfactory to know that there is no falling off in value, ore being found at the lowest point reached and going underfoot as rich as ever was found above.

Regarding the reported existence of tellurides in the mine, Mr. Richard says that while no large quantities of tellurides have been detected, almost all of the ore will give reactions for tellurium. Much as the appearance of the mine has changed, the metallurgical department shows still greater changes. The method of treatment is still that of chlorination, but, though the same in principle and involving the same chemical reactions, yet the mode of application has so altered as to make the present system almost a new process. By the former system, the ore was crushed dry in rolls, calcined in small hand reverberatories at a heat too low to dehydrate the kaolin; then chlorinated in barrels, the gas being generated under slight pressure, the gold chloride leached out by water and the gold precipitated on charcoal. Although the plant was in the aggregate the largest chlorination mill in the world, yet the separate units —furnaces, barrels and filters—were all small, involving an immense amount of labor and supervision, to say nothing of the loss by leakage, waste and imperfect extraction at each of the many parts of the whole. The chlorine is now applied to the roasted ore as a solution in water, the method being similar to ordinary cyanide and hyposulphite lixiviation, in that the solvent flows on to the ore contained in large open vats, and, in filtering through, dissolves out the gold. This improvement renders possible chlorination on a gigantic scale. The economies are: in chemicals, cheaper chlorine and less waste of gas in dealing with large charges; in power, the expensive revolving of the barrels is done away with; in skilled supervision, only the same care and attention is required by a very large vat as was required formerly by each separate small vat; in labor, the calcined ore passes direct to the vats, where it remains until it is discharged as tailings.

In the calcining department the improvements have been in the same direction of increased size of plant. For the oxidized ores large revolving calciners, discharging continuously, are now employed; while for the pyritic ore the general manager has invented a roaster. Metallurgists know that in nothing do ores vary more than in their capacity for resisting oxidation. A roaster which suits admirably a certain ore or the requirements of a certain process may be, and often is, very inefficient when applied to other ores and other processes. The Mount Morgan ore, though carrying on an average only 15% of pyritic minerals, is difficult to roast dead, and, as in other chlorination methods, a very perfect roast is required for good extraction and economy of chlorine. This the Richard shaft furnace seems to effect better than any other. The ore is dry-crushed in ball mills, then roasted in four large shaft furnaces, cooled and passed automatically to the bins. From these it is trucked to the vats, where it is leached. The vats are large, oblong tanks of concrete and cement, 4 feet deep, with a filter bed of gravel and sand at the bottom. The chlorine is generated from manganese dioxide, sulphuric acid and salt, in stills in the ordinary way, then absorbed by water contained in large cement-lined and covered tanks. From these tanks the chlorine water is conveyed in earthenware pipes and applied direct to the calcined ore in the open vats. The gold-bearing solution is then passed through charcoal filters. Every part is designed for large tonnage. The tailings are removed from the vat by a mechanical shovel. If the expectations of its designers are realized, they will show that, for gold ores which require roasting, open-vat chlorination, as practiced at Mount Morgan, is cheaper than cyanide treatment.

Translucent Paper.

There are several methods of rendering paper transparent. Coat white paper with a solution of Irish moss in water, to which a slight quantity of previously dissolved gelatine has been added. It should be applied hot to the paper. When colors are desired they must be transparent; they must be ground in varnish, and a stronger varnish is required than for opaque colors. A fine yellow may be produced by using yellow lake and red sienna. These make a warmer color than the yellow lake alone. If cost is no objection, aurasine may be used. For pale red, madder lakes should be employed, but for darker shades crimson lakes and scarlet cochineal lakes. The vivid geranium lake gives a magnificent shade, which, however, is not at all fast in sunlight. The most translucent blue will always be Berlin blue. For purple, madder purple is the most reliable color, but possesses little gloss. Luminous effects can be obtained with the assistance of aniline colors, but these are only of little permanence in transparencies. Light transparent green is hardly available. Recourse has to be taken to mixing Berlin blue with yellow lake or red sienna. Green chromic oxide may be used if its sober, cool tone has no disturbing influence. Almost all brown coloring bodies give transparent colors, but the most useful are madder lakes and burnt umber. Gray is produced by mixing purple-tone colors with suitable brown, but a gray color hardly ever occurs in transparent prints. Liquid siccative must always be added to the colors, otherwise the drying will occupy too much time. After the drying the paper must be varnished on both sides. For this purpose a well-covering, quickly-drying, colorless, not-too-thick varnish must be used, which is elastic enough not to crack nor to break in bending.—English Mechanic.

An Automatic Pump Governor.

To the Editor:—I noticed in "Concentrates" of November 11th a method of starting and stopping a steam pump in shaft sinking by wires, and it called to my recollection an automatic steam pump which was arranged by my engineer, and which worked most successfully.

In this case it was required to lift the water from an upper level, where at that time very little work was done, and consequently only most occasional observations could be made of the operations, and that, too, by miners unskilled in the mechanical arts.

The arrangement was so simple that it seems incredible that it has not come into more general use where a moderately small quantity of surface water is to be separately handled.

The pump was an ordinary horizontal bed Dow, operated by a steam globe valve. To the wheel of this was attached a crank lever, the other balance being a float, resting on the water in a sump, in which was also placed the suction pipe. As the opening of valve was limited by the crank, there was no danger of the pump running at too high a speed should the sump have more water than would raise the float to its maximum. For weeks at a time the only care the pump required was to see that the oil cups were filled, and this was attended to, once each shift, by one of the miners.

Though I was using three steam pumps, one of them in sinking besides the other necessary engineering work for the hoist and 10 stamp mill, I had only this one engineer; and the operations of the entire plant worked as smoothly as I ever saw it in other mines with a pump man on each shift, in addition to the mechanical head of the department.

W. J. Adams, E. M.

San Francisco, Nov. 17, '99.

The First Patent Issued.

In strong contrast with the present system of the United States Patent Office, where every inducement tempts those with inventive faculty to produce some new and useful device, is that of the issuing of the first patent, concerning which *Iron and Steel* says: To the General Court of Massachusetts belongs the honor of granting the first American patent. This was in 1648, and was then designated as a monopoly. It was confined to the region controlled by Massachusetts, and the one issue apparently included all the inventions of the inventor connected with engines that depended upon water for their motive power. The limit of the monopoly was fourteen years, and the court not only retained power to forbid exportations, but to prevent exorbitant charges upon the public for their use. The patent was issued in this form:

"At a general Courte of Boston the 6th of the 3th Mo. 1648. The cor't consid'inge ye necessity of raising such manifactures of engins of mils to go by water for speedy dispatch of much worke with few hands, and being sufficiently informed of ye ability of ye petition to perform such workes grant his petitioner (yet no Other persen shall set up or use any such new invention, or trade for fourteen yeares without ye licence of him the said Joseph Jenkes) so farr as concernes any such new invention, & so it shall be alwayes in ye powr of this co'te to restrain ye exportation of such manifactures & ye prizes of them to moderation if occasion so require."

This inventor, Jenkes, or Jenks, as it would now be spelled, came from Hammersmith, England, settled in Lynn in 1643, and died in 1683, aged eighty-one. He was a blacksmith and machinist, made the dies for the coining of the "Pine Tree" money, and built the first fire engine in this country; altogether a man of great inventive genius and the ancestor of a large number of descendants. One of his sons removed to Rhode Island, where he built several mills.

Mining Summary.

ALASKA.

The J. S. Kimball Co, a San Francisco shipping concern, has a scheme to take beach sand in ballast from Cape Nome and have it treated for gold in San Francisco The steam schooner Aloha was the first to try it, and carries fifty tons of beach gravel ballast in her hold.

The Alaska-Mexican mine reports for the month ending Nov. 4th 12,881 tons ore crushed, returning $17,808, and 311 tons sulphurets, valued at $7175. Gross yield, $27,339; expenses, $18,928; average of ore, $2.12.

The Alaska United mine reports 24,777 tons ore crushed, yielding $39,546, and 657 tons sulphurets saved, valued at $15,111. Ore averaged $2 40 per ton. Gross yield, $59,564; expenses for month, $37,111.

The beach deposit of gold to the west of Cape Nome is an unsolved problem. By some it is claimed that the gold in the sand has been washed out from the tundra by the waves at high tide and deposited through hundreds of years in the sand. It is found from 2 to 5 feet below the surface in the drift. There are some who claim that the gold is washed in from the sea, and that the real field —the "mother lode"—is to be reached and developed by dredging. The beach to the east of Cape Nome makes no such showing. Copper plate for use in rockers is worth its weight in silver, and one miner who had no copper substituted silver dollars for it, sixty-four of them being required to properly plate his rocker, which, added to its first cost of $20, made it expensive, even for this locality. Labor in the mines this season was worth $8 to $10 a day.

On Nov. 1st communication with the outside world was completely shut off for seven months, and only a few of the people now in the Cape Nome district are fixed with either food or shelter from the severity of the climate, though those who are prepared with houses to live in and sufficient food and fuel may pass the winter comfortably. There are very few so well off, fuel being scarcer than food. Parties of four, six or eight have organized for winter operations by securing a large tent, spreading it on the beach on the ground they propose to work in, and stoves kept going to make the tent comfortable to live and work in.

As far above as Cape Prince of Wales, 235 miles, gold has been found along the creeks in quantities that would pay from $10 to $50 per man per day if panned by an expert.

Claims are offered for sale—a claim being twenty acres—at prices from $50,000 to $150,000. Over 1000 claims, covering 20,000 acres, about thirty square miles of territory, have been recorded, and it is expected that each claim will represent a lawsuit.

Nome gold is darker in color than the gold of the Yukon river country. The current trading price is $16 an ounce. Gold dust and nuggets constitute the bulk of the currency, and go'd scales are as necessary in the stores as the ordinary grocer's scales. Gold dust as a circulating medium is not popular, for coin or paper money commands a premium of 7%.

Winter in the Nome district ordinarily continues from October to June, and a temperature of 50° to 60° below zero is not unusual. On Dec. 21st the sun barely rises above the horizon, and on June 21st it does not disappear entirely from sight during the twenty-four hours.

ARIZONA.

GILA COUNTY.

The Ray Co. is doing a large amount of work. In addition to the development of the mines, the construction of the grade for a railroad from the mines to Kelvin, on the Gila, is in progress. The smelters of the Ray Co. will be located at Kelvin and will have a daily capacity of 800 tons. Machinery and supplies are to be hauled from Red Rock station to the Gila river by a traction engine.

GRAHAM COUNTY.

It is reported that W. J. Parks has struck 3 feet of gray copper ore in his claim on Kelly creek, eight miles from Solomonville. It was found in a large vein of hematite. The ore will be shipped.

MOJAVE COUNTY.

(Special Correspondence). — The Tennessee mine at Chloride is shipping a car of concentrates per day, the values therein being gold, silver and lead.

The Elkhart mine and mill are operating. The shaft is being sunk to the 500 level.

It is expected the railroad, whose present terminus is at Chloride, will be extended to the White Hills, thirty miles farther northward.

Chloride, Ariz., Nov. 16th, '99.

YAVAPAI COUNTY.

The Bauman copper group, east of the old Bowers ranch, on Agua Frio, are to be prospected with diamond drill. There are some good prospects on the property. A shaft sunk several years ago by J. Lawler shows values in copper and silver, and there are small bunches of high-grade copper ores found at several places on the property. The rock formation is schist and limestone intruded by dykes.

K. Barrett, of Castle Creek district, reports that Thomas Farish is working thirty-five men on the Whipsaw properties. The Swallow people are sinking a shaft and drifting 500 feet to cut the ore body in another mine. They have 3 feet of high-grade ore. An electric hoist has been put in at the Copperopolis mine. Across the hill from these the Alger people at the Dr. Jones mine are awaiting the arrival of a hoist.

Prescott *Prospect*: J. Hise has let a contract on the Jackson mine, near Placeritas, for 700 feet of sinking and drifting. He contemplates erecting a 20-stamp mill.

YUMA COUNTY.

As a result of a run of eighteen days the King of Arizona gold mine recently shipped $24,000 in bullion.

CALIFORNIA.

Amador.

The South Eureka mill, near Sutter Creek, has been closed down owing to lack of electric power. Contracts to drift north and south on the 1800 level are to be let.

The Fremont Con. mine, near Amador City, comprising the Gover, Fremont and Loyal Lead, is to be operated more extensively than ever before. The machinery is being rearranged and additions made to the plant. The Gover workings are over 1000 feet deep. There is a large shoot of low-grade gold ore in the lower levels.

A crushing of ore from the Central Eureka ran $100 per ton. On the 1500 level the vein is 30 inches wide and rich in gold. It is thought to be the shoot which extended into the adjoining Badger and Eureka mines.

At the Bunker Hill mine, north of Amador City, preparations are being made to reopen the property, which comprises the Bunker Hill and Mayflower mines. The Mayflower mill was at one time equipped for barrel chlorination by the Mears process. It is the only barrel chlorination plant in California.

Butte.

The Cherokee mine at Cherokee is reported sold to Eastern people. The property comprises 1500 acres, of which 150 acres have been hydraulicked to bedrock. The bank is 500 feet high. On and near bedrock the gravel is cemented and has to be blasted. The Pittsburg men have not yet put up the entire purchase price of the Cherokee mine, but the sale is considered as being a surety. When operations begin it is expected that 200 men will be employed.

Calaveras.

The Fellowcraft mine at San Andreas has been inspected recently by northern California men with a view to resuming operations.

In the Ford mine it is reported that $50 ore has been found on the 100 level in the foot wall. When sinking the north inclined shaft near the 100 level numerous small seams of quartz were found cutting the black slates of the foot wall and these small veins were very rich in gold and tellurium. The shaft passed through the shoot and it was not explored farther at that time.

At the Utica mines, in Angels, the entire plant is in operation by electricity, the installation having been completed on the 15th inst.

El Dorado.

The 10-stamp mill recently bought by the Kimble M. Co. at the Franklin mine at Texas Hill is now in place on the Kimble mine south of Placerville. This property is the Ames ground. The company has also bought ground adjoining the Ames. They have discovered gravel hitherto unknown, from 2 to 5 feet deep. Water power will be used at the mill. Forty men will be employed.

Fresno.

(Special Correspondence).—The more productive portion of the county is at Oil City, in the hills nine miles northwest of Coalinga, forty miles west of Hanford. There are now about fifteen producing wells at Oil City, most of these being the property of the Coalinga Oil Co. and the Home Oil Co, both paying dividends. The Home Oil Co. paid their stockholders a dividend of $175 per share for October. The Coalinga Oil Co. is composed of Chanslor and Canfield, among the earliest successful producers of oil in this district. Previous to the advent of C. A. Canfield, four years ago, desultory work had been done in the Oil City district. Within the past two years Messrs. Chanslor and Canfield have liquidated an indebtedness of $122,000, accumulated mainly by purchase of a former partner's interest in the business, besides expending many thousands of dollars in development, accumulating an immense plant, buildings, etc. The net profits of the company are said to be $1000 per day.

Such results stimulate purchase and development by other companies. About a dozen outfits are sinking wells in various parts of the Oil City district and a dozen more are on the ground ready to begin. The present output of the district is 2000 barrels of crude oil per day. This is conveyed to tanks on the line of the railroad by a pipe line owned by the Union Oil Co., which company is also prosecuting development work on acquired oil lands in the district. The Coalinga Oil Co. have completed a large tank, with pipe line leading thereto, a mile or more below their wells, and it is probable they will extend their pipe line to the railroad. Altogether there is a tankage in the district to the extent of nearly 70,000 barrels, 39,000 of which are the property of the Coalinga Oil Co.

The principal part of the output from the district comes from eight wells, three or four of which are flowing wells. Coalinga No. 7 is probably the largest producer; then comes the Blue Goose, owned by the Home Oil Co. A 25 H. P. gas engine furnishes power to run the pumps at eleven wells, while two or three pumps are run by individual engines. Gas is the only fuel used in the main camp. It is liberated from the oil as the latter is run into old steam boilers, and is drawn under natural pressure by pipes from the upper portion of these boilers.

A serious drawback in the development work at Oil City has been the scarcity of water. As a general thing the wells do not make enough water to assist in drilling. The water must be taken into the drill hole from the surface. A barrel or more of water is required for each 3 feet drilled. The Coalinga Oil Co. have done much to relieve the water demand at Oil City by pumping it from wells which gave a supply of water while boring for oil, and also by forcing water four miles across the hills from a well in an adjoining canyon. The Coalinga Oil Co. sells $1500 worth of water per month to other companies now prosecuting development work. One company is now sinking wells on the plains, and will from there force water through pipes to a point in the hills where work is being prosecuted.

There are a few promising oil wells in the Kreyenhagen district, twenty miles southwest of Coalinga. Considerable attention is being attracted to this district and several outfits are sinking wells there. In the Parkfield district, north of the Kreyenhagen, the Cholame Valley Oil Co. is sinking a well, which is now down 1300 feet and shows some oil and gas. Other outfits are on the ground in this district.

Coalinga is the focal point for oil districts stretching north and south along the Coast Range of mountains. Although some distance from the oil fields, Hanford is the seat of much of the business activity which marks this industry. The newspapers at Hanford devote considerable space to oil literature and gossip, while the investors or magnates make this town their headquarters, congregating mainly at the Hotel Artesia.

Coalinga, Cal., Nov. 20th, '99.

Kern.

The Shamrock oil well at McKittrick is producing fifty barrels daily.

By the decision of the Supreme Court the litigation involving the Rand group of mines at Randsburg has been settled, and the title rests in John Singleton and associates. They were sued by O. B. Stanton to compel them to sell the group to him, he having a contract signed by a part of the owners. The court holds that such a contract can not be enforced.

Mariposa.

Pocket miners are again finding gold on the ridge northeast of Hornitos. The hill is honey-combed with shallow workings and thousands of dollars have been taken from these deposits, but they never seem to become exhausted.

Nevada.

Grass Valley *Telegraph*: Miles Finlan of Butte, Mont, who was here a few weeks ago, has a bond on the Irish-American and other claims adjoining the Massachusetts Hill mine.

Placer.

A strike is reported from the Oro drift mine near Iowa Hill.

Plumas.

J. S. McDonald has charge of the Cooper and the Genesee copper mines, for Messrs. Hill & Bernard, of Carlin, Nevada, and Mr. Warren, of Utah.

The Plumas-Eureka mine, at one time one of the largest producers of California, after a long idleness is again being operated by Passetta & Tresidder, tributers. They employ twenty men, and twenty stamps are crushing ore.

San Bernardino.

Plans for the 40-stamp mill at Gold mountain, east of Holcomb valley, have been approved by the management for the De Lamar properties.

San Diego.

The Roberts mine, near Escondido, has been sold to J. Reid for $9000. A new shaft is being sunk.

The new Grapevine district, near Warner's ranch, on the confines of the Colorado desert, is said to be developing several promising prospects.

A 300-ton cyanide plant will be built at Hedges at a cost of $20,000 to treat the large pile of tailings from the several mines of the Golden Cross group.

The Free Gold M. Co. is now the owner of the mines at Hedges, subject to the indebtedness due the Golden Cross M. Co., and the amount due Jas. Spiers and those who assigned their claims to him. The aggregate of the claims is about $1,000,000. The lawyers have a claim for $275,000 in the U. S. court at Los Angeles.

Santa Barbara.

The Loma Oil Co., of Los Angeles, have secured options on oil lands near Los Olivos, and will begin sinking wells. F. A. Garbutt is the president of the company.

The Alcatraz Co. is reported to have abandoned its operations near Carpenteria. The piping near the Los Conchas asphaltum and oil mines are being taken out. Work at the La Patera mines has been discontinued and all the material and products have been shipped. The men have been moved to the Sisquoc mines, where the company will concentrate its energies.

Shasta.

The purchase of the Mammoth copper mine, on Little Backbone, will include properties that lie along Little Backbone and Squaw creeks. The proposition includes with the Mammoth, the Balaklala, the Friday & Lowdon, and copper claims owned by the Uncle Sam Co., lying between the lower end of the Mammoth group and the Friday & Lowdon. It is also said to include the Uncle Sam gold mine and the smelter site near the mouth of Squaw creek.

In Happy Camp district copper prospects are being taken up by prospectors, and in the Gazelle district new discoveries have been made.

Siskiyou.

At the Morrison-Carlock mines, in Quartz Valley, forty men are employed. The tunnel being run at the old Turk mine of this group will tap the ledge 150 feet below the old works.

The race track property at Yreka has been bought by H. B. Gillis, representing a company. Machinery will be put in and a shaft sunk to bedrock.

W. T. Shurtliff has reopened the Franklin mine on Rattlesnake creek and has rediscovered the vein lost several years ago by former operators.

Trinity.

R. Woodburn, who recently sold the Globe mine, five miles northeast of Detrick, for $25,000, has brought suit to set the sale aside, claiming that undue influence was used. He had previously refused $225,000 for the property.

The French company operating the large hydraulic mines near Junction City are employing a full force and using 3,000 inches of water.

Redding *Free Press*: H. Oliphant of Anderson has discovered a mine twelve miles southwest of Harrison gulch, in a district which has been little prospected. A ledge 40 feet wide has been uncovered, in which high-grade gold sulphurets are scattered.

Tuolumne.

The Little Wonder mine near Jamestown has again been demonstrated the advisability of crosscutting. In a crosscut made last week in that mine a strike of free gold was made in vein previously unknown.

Fraser, Pratt & Dorsey cleaned up $5000 from a pocket in a Jackass hill mine last week.

James Gillis derives an annual income of $4000 to $8000 from lessees operating the Karrington mine on Jackass hill near Tuttletown.

COLORADO.

BOULDER COUNTY.

The Nelson mine at Ward has been sold to the New York M & D. Co., who are also working the Baltimore. A contract has been let to sink the shaft, now down 300 feet, 200 feet deep deeper. There are 1000 feet of drifts in the Nelson.

CLEAR CREEK COUNTY.

In sinking in the Stanley mine, near Idaho Springs, the ore is found to change from lead ore to copper-bearing ore, carrying gold.

The Oro Verde, on Yankee Hill, has been developed the past year to the extent of 375 feet in tunnel and shaft work, and reported to be in ore of good value.

LAKE COUNTY.

A proposition is being agitated to sink another deep shaft in the Leadville "downtown" region, in East Fifth street. The property is covered by a large number of town lots, the owners of which will exchange their title to them for stock in the new co-operative company.

The Greenback mine is now producing a large tonnage of iron sulphides daily from a large body of ore presumed to be a continuation of the Mahala ore shoot, which was extensively exploited two years ago. This development is stimulating the Rialto lessees, who have workings in the vicinity, to resume active operations.

The A. M. W. Company has enlarged and retimbered the Wolftone shaft to water level, and has cut a station at the 700, where the new pumps will be installed to unwater the Maid of Erin and Wolftone. The combination is already making a large production of lead and copper sulphides through the Mab and Adams discovery shafts.

The Leadville City M. Co., is the name of the new corporation organized to operate mines under the city of Leadville, making the second home company in that district. Operations will be commenced east of Harrison avenue, near Fifth street. Each owner of 2500 square feet of land (city lots) will receive 200 shares of stock for the mining right. This company will sink a deep shaft to determine the value of the underlying territory and has no royalties to pay, which with most leasing companies is a serious handicap to their success.

PITKIN COUNTY.

The suit involving the ownership of the Emma mine and the Aspen Mining & Smelting Co. of Aspen, which has been in the courts for ten years, has been settled, whereby W. Wood, an insane inmate of the Topeka, Kan., asylum receives an interest in the Emma mine and the Aspen M. & S. Co., a judgment againt J. B. Wheeler for $56,000, and a large deficiency judgment against the Aspen M. & S. Co, secured by lien on property in Aspen. The value of the judgments is placed at $504,000.

SUMMIT COUNTY.

The Cashier mine has completed a 20-stamp, rapid-drop mill. The process will be free-gold amalgamation and concentration.

The Jessie mill of forty stamps is running, and twenty tons of concentrates are shipped weekly, in addition to bullion obtained from amalgam.

TELLER COUNTY.

The Whip & Glenn lessees of the Lansing are outputting thirty tons a day, and this is to be increased. It has lately been necessary to haul ore from the mine on the night shift. One hundred and forty-three tons were sent out recently in the three shifts.

In the Granite Hill claim of the Granite Hill Co., on Poverty gulch, a shoot 38 feet in length and 3 feet wide has been opened. In the ore body an 8-inch streak assays twelve to sixteen ounces to the ton. Two feet of ore runs three to five ounces to the ton. Another vein carries 4 inches of talc going four ounces to the ton. The main shoot has been opened in two levels. It has been cut in the shaft and 130 feet of stoping ground blocked out. The claim has shipped several thousand dollars' worth of ore. The property is leased to Wiley and associates, who secured the property with the intention of working the dump. Several tons of dump rock returned $40 to the ton. They then decided to prospect the workings, with the above result.

It is reported that Cone & Robinson, owners of the Doctor mine at Cripple Creek, have refused $600,000 for that property.

The Constantine Co. has closed a deal for the Julia A. and Constantine claims on Raven hill, adjoining the Raven and Joe Dandy, for $110,000 cash. The new company is capitalized at $1,500,000.

The cyanide mill at Florence is blocked with ore, in consequence of which the Hoosier mine will be compelled to store its product in the ore bins on the property for three weeks.

H. J. Anstie, lessee, states that drifting is in progress from the 350-foot level. From thirty to fifty tons is the daily output on the property. The average value of 765 tons shipped is $31.60 per ton.

The Isabella mine at Cripple Creek shipped two cars of ore last week which sold at the Globe smelter in Denver for $160,675. The average value was $3414.57 per ton.

It is reported at Victor that $15,000,000 has been offered for the Gold Coin mines, which offer was refused. It was the intention of the people making the offer, it is said, to organize a corporation in Europe on lines similar to the Venture corporation.

The Elkton mine is reported sold for $156,000. The mine is producing about $20,000 per month, which is reduced at the works of the Colorado-Philadelphia Co. at Colorado City.

From the Blickenstaff lease on the Lucky Gus 125 tons of ore was shipped during the month of October, which averaged five ounces gold to the ton.

The several electrical companies of Cripple Creek district have been consolidated and will be operated under one management. The interests consolidated are the Victor Light, Water & Motor Co., the Gold Belt Electric Co., and the Fremont Electric & Power Co. The name of the consolidation is the Gold Belt Con. Electric Co.

The Isabella, after a long period during which no shipments were made, has recommenced shipping ore. It is reported that fifty tons sold for $160,000.

A rich strike is reported on the Beacon mine of the Prince Albert Co., in the O'Hara lease. They have 18 inches of ore rich in gold and sylvanite.

IDAHO.

IDAHO COUNTY.

(Special Correspondence).—Interest in the new discoveries at Marshall lake, south of Salmon river, is unabated. A number of men are working, under direction of J. N. Rice, on the original discovery and showing up good ore.

The Iola mine, at Warren, is being developed under Supt. J. A. Wood. A shaft is being sunk below the adit level and levels run east and west. The mill, run by water power, has been closed for the winter.

The Little Giant mine is still showing up the rich ore that has characterized that property for fifteen years.

Nothing is being done in Thunder mountain country this winter; but several deals are being put through, and development work will be undertaken in the spring.

The dredger at Florence is under construction and will be ready for operation in the spring.

The Hi You is working a small force of men drifting on the 200 level and reported to be in good ore.

J. Coulter, representing the firm of Campbell & Finch, Spokane, Wash., is in Dixie, making arrangements to work on the Ajax claim, recently bought by his firm.

A shaft is being sunk on the Big Bison claim, at head of Crooked river, in Elk City district, and reported in good milling ore.

Young & Turner of Grangeville have bought a large tract of placer ground on Newsome creek. It will be worked next season on a large scale.

The Dewey Group, near Mt. Idaho, shows 20 feet of copper ore, reported to be worth $20 per ton.

Grangeville, Nov. 17th, '99.

KOOTENAY COUNTY.

A strike has been made in the Keep Cool mine in Lakeview camp on Lake Pend d'Oreille. The mine carries a rich pay streak of silver ore, from which many carloads were shipped from surface workings. A break in the vein caused the early owners to believe that the ore had pinched. Spokane men acquired the property and recently the rich pay streak was opened in a raise from No. 2 tunnel. The values are lead $39.52, gold $4.13 and silver $83.16; total, $126.81 per ton.

SHOSHONE COUNTY.

E. J. Clark is preparing to work the Midnight, on which the Morning M. Co. recently cut a rich ore shoot. He has secured a right of way for a tunnel through the Fanny Gremm.

The mill of the Helena-Frisco mine is to be enlarged to meet the additional requirement of the Galena-Gem and Black Bear mines, recently bought by the Helena-Frisco Co. The workings of the Frisco are 400 feet lower than the lowest of the Gem-Galena mine.

The Black Bear is on a parallel lead 1000 feet north of the Frisco. It will be opened by a crosscut from the 1600 level, 1300 feet below the old workings. The Black Bear vein has been drifted 900 feet, showing ore the full width of the tunnel for that distance.

MICHIGAN.

HOUGHTON COUNTY.

The No. 1 shaft of the Isle Royal mine was flooded by reason of unexpectedly breaking into old workings presumed to be 100 feet distant.

MONTANA.

BEAVERHEAD COUNTY.

The new concentrating plant of the Greenwood M. & M. Co., says the Dillon *Tribune*, is completed, but owing to a scarcity of water the plant will not be put in operation until next spring. The Greenwood M. & M. Co. has a lease upon the tailings dump belonging to the Hecla Con. M. Co. D. T. Haskett, of Butte, is president.

SILVER BOW COUNTY.

It is reported that the Colorado Smelter Co., of Butte, has bonded the Senate mines at Copper Camp, five miles southwest of Moose lake, for $125,000. The group comprises the Snowslide, Hillside, Gem, Chance and Senate claims, the latter showing the greatest value.

A matting furnace in the Butte & Boston smelter at Butte exploded on the 16th inst. as a carload of wet concentrates was being charged into it. It did considerable damage and killed one workman.

NEVADA.

WHITE PINE COUNTY.

A bore hole is to be sunk twenty-five miles east of Eureka to prospect for coal. It is said indications are favorable.

NEW MEXICO.

BERNALILLO COUNTY.

The Puzzle group of mines at Bland have been sold to Eastern capitalists. Considerable development has been done.

OREGON.

BAKER COUNTY.

Spokane *Chronicle*: In September, 1898, the Bonanza mine had 20 stamps, Badger 8, California 10, Red Boy 10, North Pole 10, Columbia 10, E. & E. 20, Pyx 5, Belleview 10, Phœnix 5, H. & H. 10; total, 108. Since then the Bonanza has added 20, Red Boy 10, Badger 10, Golden Eagle 3, Great Northern 10; total, 53, making at present 161. There are now in process of erection mills on the Magnolia with 10 stamps; Golconda, roller and stamps equal to 40 stamps; May Queen 10, Little Giant 10, Maiden's Dream 10, Van Anda 20; total, 100. Some of these will be in operation before January 1st, 1900, and all of them by that date, when there will be 261 stamps crushing rock from mines tributary to Sumpter. In addition to this the Cougar is installing a 250-ton cyanide plant, and other properties are experimenting and preparing to treat ore. Near Baker City the Virtue Con. Mines Co. has 20 stamps, Gold Hill 10, Gold Ridge 10, Weatherby-Bonanza 5, Connor Creek 20, French-Flagstaff 10, Cornucopia Mines of Oregon 20, Baisley-Elkhorn 10, Robbins-Elkhorn 10; total, 115. There are a number of new mills in prospective. Among them the Chloride M. Co. 15 stamps, Safety Deposit G M. Co. 10, Tom Paine 10, Twin Springs M. Co. 20, Portland M. Co. 10; total, 65.

LANE COUNTY.

There are now sixty-four stamps crushing quartz in Bohemia district. Bohemia is the general trading point of the district. There the Musick mine is being operated, and fifteen stamps are crushing on full time.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The American M. Co. of Newcastle, Wyo., has begun a tunnel at the base of Ragged Top mountain, to be a mile long and to connect with a 1000-foot shaft from the top. Reduction works are planned and a town named American City has been laid out, to which the Chicago, Burlington & Quincy is building a branch line.

The Baltimore & Deadwood Co., having completed an addition of ten stamps to its mill at the mouth of Blacktail gulch, two miles above Deadwood, has resumed crushing. A large body of ore is opened in the mine.

The Homestake Co. are working on the old Spearfish ditch and flume line in the Upper Spearfish canyon. This water right was located in 1877 and $400,000 expended on it by the Father de Smet Co., and abandoned. The property was bought by the Homestake Co. in 1882 and it is now to be improved, a pipe line of clay tiles laid and the water taken to a pumping station in Spearfish canyon, where it will be elevated 400 feet and thence flow by gravity to the Homestake mines and to Deadwood. It is estimated $1,000,000 will be expended in making the improvement.

UTAH.

Capt. DeLamar will put in an electric plant at Mercur of sufficient capacity to supply his mines there with light and power, and also furnish light to the town.

JUAB COUNTY.

The Centennial-Eureka, after a suspension of ore shipments during several months, is again shipping to the works of the American Smelting & Refining Co., on the contract to deliver 100,000 tons of ore within thirty months.

SALT LAKE COUNTY.

The United States M. Co. of Bingham, it is announced, have decided to build a smelter of 500 tons daily capacity, to be completed within a year. There is said to be 1,000,000 tons of ore blocked out in the consolidated mines. The new contract with the American Smelting & Refining Co. went into effect on the 16th. The old one was unsatisfactory and shipments were suspended.

The United States M. Co. at Bingham is vigorously developing its property under Mgr. Neill. In October 1945 feet of ground was opened. They have tapped the ore bodies in what is called the commercial vein, the ores varying from milling value to twelve ounces silver, $15 gold and 6.8% copper. Through tunnel No. 1, in Old Jordan and Galena territory, the management drove into the ore body 150 feet west of former development in that portion of the ground. In both branches off tunnel No. 2 they have run in massive sulphides that show 2.5% copper. The Drain tunnel was run through the main ore body, which is 110 feet thick, and on the 400 level, where the greatest depth in Jordan and galena ground has been attained, ore was found which averaged forty ounces silver, $2.40 gold, 3.4% copper and 16.8% lead.

In Niagara ground, through the Davidson tunnel, an ore body has been developed which, with the old Utah workings, opens up a block of ground 150x200 feet, containing 50,000 tons of ore.

The Old Telegraph mine has opened an ore body 250 long by 120 wide. A crosscut from the Roman Empire level into this ore body has been run, showing an average of 6% copper, $2.80 gold and 3.9 ounces silver per ton. In No. 2 crosscut off Grecian Bend tunnel, now in 75 feet, the ore averages 8% copper, $2 gold and three ounces silver, with some 150,000 tons exposed.

SUMMIT COUNTY.

Several drain tunnels have been run in Park district in past years, notably those by the Ontario M. Co., and now another large tunnel is to be run to drain all that portion of the district between Thayer's canyon on the north and the Anchor and Daly-West on the south. The project is being exploited by James McGregor, one of the largest mine owners of the district. The tunnel will begin in Nigger hollow and will be run to a point on the Crescent ground 2400 feet below the surface. It will be 10,000 feet long.

TOOELE COUNTY.

Mgr. J. G. Jacobs of the Salt Lake & Mercur Railroad is working on a project to sink a shaft to determine whether the auriferous zones of Mercur are underlaid by the carbonate and sulphide zones of Bingham. It is proposed to sink the shaft in the town of Mercur. It is not known to what depth this trial shaft must be sunk to determine the geological problem.

UINTAH COUNTY.

The Boston purchasers of the gilsonite mines have made another payment.

WAYNE COUNTY.

Miners in the old Bromide mine at Hawksville have sold a portion of their prospect on a basis of $200,000 for the whole. The ore is rich copper sulphide. It was bought by a London company, which had expended a large amount of money in the camp without finding anything of value.

WASHINGTON.

FERRY COUNTY.

A strike of 6 feet of galena is reported from the Harvest silver lead mine, on the south half of the Colville reservation, eighteen miles south of Republic.

The Republic M. Co. have taken over the Jim Blaine mine at Republic. It is the south extension of the Republic mine, and on the same vein.

H. Waisman, of Republic, has bonded the Copper Mountain group, three miles from Bolster and two miles south of the international boundary line on Copper mountain. The group consists of the Copper Queen and No. 9 claims. They are 2000 feet above Meyers creek and may be developed by tunnel. The bond runs from one year from Nov. 15th. The consideration is $60,000. On the Copper Queen there is a shaft 25 feet deep, all in ore. An assay taken across the shaft showed $7.50 in gold, eight ounces silver and 17½% copper.

Spokesman-Review: The old process is to be thrown aside in the Republic mill. A furnace has been erected and ore is being roasted and treated by the straight leaching method. This is experimental and it will be continued until the new mill is ready, and information gained by experiment will be of value in the new plant. The first-class ore will be sacked and shipped to a smelter to enable the company to pay regular dividends.

It is reported a strike of copper-silver-lead ore has been made on Deer creek, near the town of Curlew, in the northeast corner of the Colville reservation, on one of the claims of the Drummers' Development Co.'s property, ten miles southwest of Nelson, B. C., in a crosscut at the 75-foot level, where there is 3 feet of copper-silver-lead ore.

KITTITAS COUNTY.

J. W. Boggs, the Gen. Mgr., says the cyanide plant at Blewett will start up Dec. 1. J. G Rosenberg is Supt.

OKANOGAN COUNTY.

H. D. Brown, chemist of the Canadian Copper Co., gives as a result of fifty-one surface samples, from fourteen locations in the Palmer mountain tunnel group, $16.02 in gold, and from fifteen veins crossed in the tunnel between 100 and 1000 feet, $28 in gold. The Golden Zone claims $30 as their average. The Bull Frog has cyanided eleven tons of ore, the assay value of which was $19.50, and it returned $17 50 in gold. The Okanogan Free Gold Mines Ltd. paid ¼c dividend—$4000—from a run of thirty days through a 10-stamp mill, about 600 tons. It cost $2 per ton to mine and mill. The average mill run from Black Bear and War Eagle, the first year they were operated, was $24, and no concentrates saved.

On the southeast slope of Palmer mountain the Marietta Co. has a group of nine locations covering five parallel veins which are traced 3000 feet on the surface.

SNOHOMISH COUNTY.

It is reported at Seattle that the Monte Cristo mine and the Everett smelter have been sold to a German syndicate for $1,200,000.

STEVENS COUNTY.

The United States Marble Co. is opening the deposits of green onyx, fifty miles west of Spokane, and is installing a plant. The stone is found in large quantities.

WYOMING.

CARBON COUNTY.

The Eureka Co. near Grand Encampment are drifting on the vein preparatory to stoping and are raising enough ore to pay a profit above expenses. They have recently bought the Cliff, Black Eagle and Gray Eagle, on the south fork of the river. There is a deal pending between the Eureka Co. and Boston people whereby the latter will secure control of the Eureka mine.

FOREIGN.

AUSTRALIA.

The gold output of New South Wales for the month of October amounted to £80,100, and for the first ten months of the year to £408,600, showing an increase of £156,100.

The Mining Commissioner at Mount Morgan states that the quantity of ore treated at the mine during the last year was 186,166 tons; 5313 tons of tailings and 35 tons 9 cwts. 3 lbs. of concentrates were also treated, making the total 191,514 tons 9 cwts 3 lbs. The yield of gold from the ore was 161,597 ozs 6 dwts., from the tailings 3462 ozs. 10 dwts., and from the concentrates 2249 ozs., making a total yield of 16,308 ozs. 16 dwts., of a value of £684,486 19s 6d. The average yield per ton of ore was 17 dwts. 8¼ grains. In '97 the amount of ore treated was 127,107 tons, and the yield was 168,623 ozs. 13 dwts. The average yield per ton was 1 oz. 6 dwts. 12¾ grains. The increased production in '98 amounted to 59,059 tons; but the yield of gold was 7036 ozs. 7 dwts. less. The average yield of gold per ton was 9 dwts. The quantity of material treated shows an increase of 64,346 tons 4 cwts. 18 lbs, on last year, while the yield of gold is 2888 ozs. 10 dwts. less, and the total value of the gold is £13,164 11s 9½d less. The decreased yield per ton may be accounted for by the fact that large quantities of the poorer ores were operated on.

The Mount Usher mine shows improved prospects. The ore treated was 1502 tons 13 cwts., tailings 289 tons; total, 1791 tons 13 cwts; the yield of gold was 2214 ozs. 15 dwts. 10 grains from ore and 51 ozs. 10 dwts. from tailings; total, 2266 ozs. 5 dwts. 10 grains; an increase on last year of 850 ozs. 7 dwts. 21 grains. The average yield of gold for the year from ore is 1 oz. 9 dwts. 11¼ grains, as against 1 oz. 3 dwts. 12¾ grains for '97—an increase of 5 dwts. 23 grains.

Prospecting has been done in the vicinity of the Mount Morgan mine during the year, to discover the continuation of the Mount Morgan mines deposits. The Light of Day, Hidden Treasure, Sugar Loaf Extended, Rockhampton Prospectors, Mount Morgan North, Mount Morgan North No. 1 and Mount Morgan Extended mines have all been worked, but thus far without finding anything of value. Six hundred men are employed in the district.

Gold production in Australia for the first eight months of this year aggregated 2,743,081 ounces, an increase over 1898 of 542,864 ounces, valued at $10,000,000.

London *Mining Journal*: Orange reports rich gold and copper discoveries in the district recently. Robinson & Dowton from a claim at Byng obtained 6½ pounds of gold from a bucket of ore taken from the lode at a depth of 30 feet. Sydenham & Griffiths have crushed 200 tons of ore from their mine at Palmer's Bulga and obtained gold valued at $4000.——The boom in gold dredging continues; land is being acquired on all the rivers.——The 120-ton water jacket copper smelter at the Blayney Copper M. & S. Co.'s works at Blayney has started on ore from the Annandale mine.——The Central Broken Hill Silver Mines' Kintore shaft has reached a depth of 670 feet. The lode at this depth is composed of clean sulphides averaging 13.6 ounces silver, 18.9% lead and 22% zinc per ton.——The monthly return prepared by the Department of Mines of New South Wales shows that the yield of gold for August was 46,346 ounces, as compared with 15,640 ounces, the yield for the same month of last year. The total yield for the eight months of the year is 295,683 ounces, which is 98,222 ounces in excess of the yield for the same period of '98.

BRITISH COLUMBIA.

(Special Correspondence).—The Winnipeg mine in Wellington Camp, Yale district, is making a fine showing at the 300-foot level, where a body of copper-gold ore assaying $50 to $70 a ton was cut.

The Dominion Copper Company's properties in Phoenix Camp are being developed on a large scale. Some of the claims, the Brooklyn, Stemwinder, Idaho, Montezuma and Rawhide will begin to ship in a few days. The steel is being laid on the spur line from Eholt, and shipping charges on ore are expected not to exceed $1 a ton. The cost of extraction will be between $1 and $2 a ton, and smelting charges about $4. The ore averages 3 to 4 per cent in copper and $5 a ton in gold. A heavy contract is to be given for machinery, and tenders have been asked for. Financially the Dominion Copper Co. is one of the strongest concerns in Canada.

The Yankee Boy and Yankee Girl claims on Hardy mountain have shipped to the Trail smelter the first consignment of thirty tons. Returns have not been made public. The present workers have a $25,000 bond on the claims, which soon expires.

The Pathfinder, on the North Fork of the Kettle, twelve miles from Columbia, is being developed into a mine. The ore carries both copper and gold, which is richer than the average in these camps, running 4 per cent in copper and $28 in gold.

The Volcanic mine in Brown's Camp is being developed by a 600-foot tunnel, and it may be longer. The iron cap showing on the face of a bluff is a landmark.

The Granby Smelter Co.'s smelter is being built as rapidly as possible. Two hundred men are at work on the smelter, and a large force on the dam a mile above it, on the North Fork. The smelter will have the use of 1200 H. P., derived from a 45-foot head. The capacity will be 500 tons a day at first, but two additional furnaces may be installed before another year.

Trail, B. C., Nov. 15th, '99.

(Special Correspondence). — The Pythian mine continues to make regular shipments of ore to the Hall smelter.

The Gordon mine, on the north side of the South Thompson river, is shipping, the ore being sent to the Trail smelter.

The Glen iron mines at Cherry Creek have resumed operations. J. F. Wells is in charge, and the ore is being sent to the Hall smelter.

The tunnel on the Kimberley is in 237 feet, the last 16 being in solid 5% copper-gold ore.

The following mining experts have been in the camp during the past two weeks, looking for properties for capitalists: Mr. Hughes, representing Messrs. McKenzie & Mann; Mr. Scott, representing English capitalists; Messrs. Bollot Bros., representing Paris cap-

ital; W. M. Brewer, representing a Victoria syndicate; Mr. Bellamy, representing a Nelson company, and Mr. Currie, on behalf of the Scottish Mines Syndicate of British Columbia. Boillot Bros. secured two properties, and the other parties have taken options on several prospects.

The Hill Top, one of the properties recently acquired by Boillet Bros., is showing a ledge of ore 50 feet in width. The ore runs $20 to the ton.

Kamloops, B. C., Nov. 17.

The people of Kalso and the Provincial Government are building a wagon road from Kalso to the new Mansfield district, at the head of the north fork of Kalso creek. The veins carry rich gold ores, and a number of the most important claims are being worked. A 700-foot tunnel has been started to develop the Joker lead.

The completion of the railroad into the Boundary district has occasioned a rush of shippers, the Oro Denoro being the first to send out a shipment. In Providence Camp, the Gold Bug shipped by wagon to Grand Forks and thence to Trail by rail.

The Iron Mask, at Rossland, is developing a large body of ore, all of shipping grade. The shoot is 15 feet wide and averages $30 per ton. Sixty men are employed.

The Dominion Copper Co., owners of six mines in Phœnix Camp, are inviting tenders for machinery. The 5-drill compressor and steam hoist on the Brooklyn is to be transferred to the Rawhide. A 20-drill compressor is to be bought for the Brooklyn and Stemwinder, each of which will have a steam hoist. The Stemwinder hoist is to go to the Idaho. The shaft on the Brooklyn is 250 feet deep, all in ore, except a horse at 60 feet from the surface. The Stemwinder incline shaft followed the ore to the 150 level, when the vein dipped back. The shaft is down 162 feet and a crosscut will be run soon to cut the vein.

The spur line from the Columbia & Western, at Eholt, is graded to the dumps. Trial shipments are to be made to the smelting works at Trail.

The average assay of the Dominion Copper Co.'s mines at Phœnix is 3.5% to 4% of copper and $4 to $5 gold. Coal from the Crow's Nest mines will be used at the hoists, costing $8 a ton delivered. Mgr. F. C. Robbins reports the average of all assays of the Brooklyn-Stemwinder ore at $11.21, allowing 13 cents a pound for the copper contents. He says there are five or six lodes running across Phœnix camp, but that the full width of these lodes is not profitable ore. The Brooklyn and Idaho are upon the same lode, the Stemwinder and Montezuma upon another and the Rawhide on a third. The Brooklyn lode has been crosscut at the surface in several places, also at 150 feet in the Brooklyn shaft, and proved to be 100 feet wide. On the Idaho the same vein is 150 feet wide. The Stemwinder has mineralized croppings 250 feet wide, but there are several faults and dislocations. The two lodes are parallel, and the side lines of the group are not over 200 feet apart. The Rawhide is a mile from the others and has a vein 80 feet wide.

A strike has been made in the Winnipeg mine, in Wellington camp, at the 300-foot level, where, it is reported, 35 feet of ore running $50 to $70 a ton has been opened. There is a large amount of shipping ore on the dump. When the railroad is completed, the Winnipeg, Brandon and Golden Crown, in Wellington camp, the B. C., in Summit camp, and the Pathfinder, in the North Fork, will begin shipping.

The Rossland mines' payroll is now about $130,000 monthly. The Le Roi disburses $33,000, the War Eagle $30,000 and the Center Star $16,000 monthly.

Ore shipments from the Rossland mines last week aggregated 5344 tons, an increase of 86 tons over the output of the camp for the previous week. The Le Roi shipments amounted to 2432 tons; the War Eagle, 1906 tons; the Center Star, 864 tons, and the Iron Mask, 100. The total output of the camp since the first of the year is 155,668 tons.

The first shipment of ore by rail from Greenwood was made on the 18th inst., when the Boundary Creek Mining & Milling Co. shipped two cars of high grade ore from the Gold Bug, in Providence Camp, to the Trail smelter. The cars were decorated with flags.

The Abe Lincoln Mining Company at Rossland will put in a 5-drill air compressor.

COLOMBIA, S. A.

The Colombia Con. M. Co. has been organized in Boston under the laws of West Virginia, with a capital of $1,500,000. The properties of the company are on the Porce river, in Antiochia, United States of Colombia. They consist of an area of thirty-six square miles. The machinery is at La Catada mine and operations will be commenced there. Antiochia is in a mountainous part of South America and two-thirds of all the gold produced in South America is mined in this province.

CUBA.

It is reported that the Ponupo manganese mine on the south coast, near Santiago de Cuba, has been sold to the Carnegie Co. The ore is said to contain 65% manganese oxide.

MEXICO.

The annual report of the Grand Central mine, which was submitted to the company at its recent meeting in London, shows that during the year ending August 31, '99, a net profit of £93,033 1s 8d was realized, to which was added £22,943 14s 5d carried over from the previous year, making a total of £115,976 16s 1d, less £9617 17s 10d expended on improvements. During the year £75,000 were disbursed in dividends, leaving a cash balance of £31,358 18s 3d.

Nogales *Oasis*: La Rufa, the silver mine beyond La Barranca, owned by Prietas and La Colorada men, continues to produce. The dividend to stockholders on November 1st was $1500 per share.——The Kansas City & Sonora M. Co., which owns the Ramona mine at Gabilan, in the Ures district, is putting up a 10-stamp mill.

At La Colorada, near Las Amarillas, the construction of the new cyanide plant is under way for the Minas Prietas Reduction Syndicate, Ltd., of London. At this plant the Siemens-Halske process will be employed. This process depends upon the fact that an electric current liberates tde metalloid in an aurocyanide solution at the positive pole and deposits it at the negative pole. In this operation iron is used for the anode or positive element and sheets of lead for the cathode or negative element. When the weak electric current is turned on Prussian blue is generated at the positive pole from the reaction of the oxide of iron and ferrocyanide, and gold is deposited on the lead sheets in a hard, bright, yellow film. The lead is separated from the gold and reused in the process with small mechanical loss. The company has a contract to work the large tailings dumps at Las Amarillas, and also to treat tailings which come from the mill. The capacity of the plant will be about 400 tons daily, about equally divided between the old dumps and the mill. There will be a separation of the tailings into sands and slimes, and these will be treated separately. C. A. Butters is managing director.

NEW ZEALAND.

A reef containing molybdenite has been discovered in the bed of the Ohio creek, Thames Gold Field. The reef is composed of quartz and black-colored iron pyrites, with a little copper pyrites. In places the mineral forms bunches of iron pyrites, containing in their centers flakes of molybdenite. The outcrop is not rich enough to work for molybdenum, though specimens about 1 inch square have been found in it. Mr. Skey states that he has seen molybdenite in auriferous quartz from the reef in the Moonlight mine, in the Paparoa district. The molybdenite there seems to be associated with the gold, because it is found that where rich seams of molybdenite occur in the reef rich shoots of gold are found.

SOUTH AFRICA.

The twelfth annual report of the Jumpers G. M. Co. was submitted at a recent meeting of the company. Since the first dividend of 5% was declared in November, 1887, the Jumpers has returned £311,500 to shareholders. The last two dividends of 50% and 25%, respectively, were paid in December and July of the present fiscal year. During the year 137,700 tons were crushed, resulting in the following revenue:

		—Per ton milled— Dwts.	
By amalgamation	£166,887	5.7792	24s 2.87d
Cyaniding concentrates.	21,235	0.7339	3s 1.01d
Cyaniding sand	57,778	1.9987	8s 4.70d
Totals	£245,900	8.5118	35s 8.58d

The expenditure on working was:

				Per ton	
Mining	£ 66,293	0	0	9s	7.543d
Hauling and pumping	17,211	18	7	2s	5.999d
Transport	6,623	1	6	0s	11 543d
Milling	30,889	8	3	4s	5.837d
Charges	5,233	9	6	0s	9.121d
Totals	£126,250	17	10	18s	4.043d
Redemption	20,655	0	0	3s	0.000d
	£146,905	17	10	21s	4.043d
Cyaniding	16,114	10	8	2s	4.086d
	£163,020	8	6	23s	8.129d

In the year ended July 31st, 1898, the average recovery was 8.306 dwts. per ton crushed, and during the year under review it amounted to 8.44 dwts. During the year the 100-stamp mill ran 322½ days, crushing 137,700 tons of ore of 2000 lbs. each, or a duty of 4.270 tons per stamp for twenty-four hours. The short run for the year was occasioned by repairs in the mill.

SOUTH AMERICA.

The Playa de Oro M. Co., Ecuador, has raised $100,000 by the issue of bonds, paid off all debt and has now $30,000 for working purposes. The company has issued a circular giving the progress of the company to date. Two hundred and thirty men are at work. There were twenty-seven applicants for the position of placer mining engineer. Thomas Clark of Placerville, Cal., was selected. He and his associates left Panama Oct. 24th for the company's mines.

TASMANIA.

The Mount Lyell is now producing 20,000 tons of ore monthly from the open cuts and underground workings.

The gold output of Tasmania for the quarter ending Oct. 1st amounted to 20,000 ounces, an increase of 9000 ounces over the corresponding period of last year.

At Mount Lyell the winze in No. 5 tunnel is down 120 feet and is producing ore. Nine and sometimes ten furnaces at the reduction works have been in operation. Gray schist carrying bornite and copper pyrites in quartzite is being passed through in No. 2 tunnel of the North Lyell. The shaft of the South Lyell mine is down 564 feet, the last 40 feet being in the ore body, averaging 9.25% copper. Assays of the gray copper ore disseminated through the shaft gives 25% copper and rich in silver.

Mineral Specimens.

Some recent additions to the collections of the California State Mining Bureau are:

Gold quartz showing free gold, from the Rica Terra and Mina Rica claims, Picacho district, San Diego Co., Cal., with the wall and country rock (vitrophyre); P. C. Du Bois, M. E.

Gold quartz and talcose slate, rich in free gold; Yellow Rose of Texas mine, Coffee Creek, Trinity Co., Cal.; G. L. Carr.

Auriferous sand from the sluices of the Kia Ora dredger, operating near Oroville, Butte Co., Cal.; R. H. Postlethwaite, E. M.

Gold quartz with telluride of gold, Gold Bug mine, Coffee Creek; gold quartz from the Bonanza King and Loftus mines; gold-bearing porphyry, Coffee Creek; copper ore, Copper Bottom mine, Cedar Creek, Trinity Co., Cal., all from H. Z. Osborne.

Josephinite, Placer, Oregon; W. H. Hampton.

Gold quartz with visible free gold from the Hazel, Lone Star, Hunter and Dwinell mines, Siskiyou Co., Cal.; Dr. G. W. Dwinell.

Copper ores and matte from "The Copper Mines," Campo Seco, Calaveras Co., Cal.; B. G. Randall.

Roofing slate from the quarry of the Pacific Slate Co., and copper ore carrying gold from the U. Roy mine, Indian Gulch, Mariposa Co., Cal.; S. S. Burge, Mgr.

Stream tin and bedrocks, dike rocks, etc.; Klondike district, B. N. W. Ter.; and arquerite, native amalgam of silver and mercury from Omineca district; J. Sloan Johnson.

Stream tin, two samples, and lode tin, two samples, Vegetable Creek, New South Wales; A Chandler.

Gold quartz, said to assay $122 gold per ton; Circle City, Alaska; M. Fisher.

Gold quartz rich in free gold, three specimens from Bolivia and Chile; C. T. Ward, Jr.

Gold quartz, several specimens; Argonaut mine, Jackson, Cal.; from the company.

Vanadinite, very fine specimen from Silver district, Arizona; Chas. W. Livermore.

Gold quartz, high grade; King Solomon mine, Siskiyou Co., Cal.; F. N. Fletcher.

H. S. DURDEN, Curator.

Industrial Notes.

—The Pacific Coast Telephone Co. has 60,329 subscribers.

—Washington's shingle mills have shut down to keep up prices.

—Arizona is arranging for a mineral display at the Paris Exposition.

—Japan and South Africa are importing coal from the United States.

—Daily 1000 tons of steel plate are used in the manufacture of steel cars.

—An electric railway is projected from Dyea, Alaska, to Lake Bennett.

—The business of Colorado railroads is delayed by a scarcity of steam coal.

—The Buffalo, N. Y., *Express* is printed by electric power from Niagara Falls.

—The Colorado Southern railroad is figuring to get control of the Colorado Midland.

—Libby, Montana, is to have an electric light plant and a system of water works.

—Choteau, Montana, fears a coal shortage because of a miners' strike at Lethbridge.

—The Chicago, Burlington & Quincy R. R. will extend its line westward into Wyoming.

—The American Steel & Wire Co. employs 36,000 men and averages an output of 700 tons daily.

—Rossland, B. C., announces "a pine trust" in the Kootenays, with a general advance in the price of lumber.

—Leadville, Colo., is weekly shipping 1200 tons zinc ore and concentrates to Galveston, Texas, and Belgium.

—Los Angeles, Cal., is to have a merchants' and manufacturers' industrial exposition in February and March, 1900.

—The Mexican Central Railway is building a branch line to Zapotlan, and will extend it to Manzanillo, on the Pacific coast.

—There are thirty-five carloads of heavy mining machinery at Thornton station, N. M., to be hauled to Bland by wagon.

—The Philippine Islands report a profitable investment for American capital in the cultivation of rubber—the ficus elastica.

—The Government vessel Nero is surveying a route for the Pacific cable from San Francisco to the Philippines, via Honolulu.

—The through sleeping-car service between Kansas City and the City of Mexico, over the Atchison and Mexican Central lines, makes a run of 2396 miles.

—Melbourne, Australia, imported 727 tons wire fence in August, '99. Of this 409 tons were from the United States, 300 from Germany, 18 from England.

—On the Midland division of the Consolidated railway, New London, Conn., on the 5th inst., seven and one-quarter miles of standard 100-pound rails were laid in five hours.

—San Francisco will vote on the 27th and 29th prox. on a proposition to bond the city for $9,275,000 to extend the park, build schoolhouses and establish a drainage system.

—Troops by the thousand still weekly leave San Francisco for the Philippines. On one of the Government transports—the Hancock—on the 21st, went $4,000,000 in coin for the U. S. army paymaster at Manila.

—The reconstruction of the electric plant of the Standard Electric Co. of California, which was recently burned near Mokelumne Hill, has commenced at a point on the Mokolumne river four miles above the former site.

—Several of the largest mines of the Parral district, State of Chihuahua, Mexico, are to be equipped with electric light and power plants. The machinery for these improvements has been ordered from the United States.

—The gross earnings of the Southern Pacific Co. for July, August and September, '99, aggregate $16,254,534, an increase of $2,626,-169 over the same period of 1898. Operating expenses were $9,798,628, an increase of $1,-427,394.

—The Cascade, Wash., tunnel will be about three miles in length; at the west end a drift has been made 3300 feet; at the east end is a drift 3500 feet. Laborers are paid $2 a day; drillers, $3.75. A number of the men employed live at Wellington. The company has put in at the west mouth of the tunnel an air compresser, electric lighting plant, bunkhouses and hospital. It will be fully a year and a half before the work is completed and and the old switchback done away with.

—For several years past, until recently, the prices of iron and steel were lower in this country than abroad, and the result was a rapid increase in our exports of machinery and implements. Now the situation is reversed, and it is with difficulty that manufacturers can hold their trade and make a profit.

—The receipts from the sales of public lands in Oregon during the past fiscal year amounted to $148,390, which represents the sale of 540,428 acres. The sales in Washington aggregated $130,423, representing 498,948 acres. In Idaho the sale of 516,536 acres brought $113,696. In Alaska the receipts were $1138.

—Vice-President Mariscal of Mexico, in the course of an article entitled "The Mexico of To-day," relates that for 300 years Mexico has produced one-third of all the silver that was mined. The production at present is more than $60,000,000 per annum. Mexico expects to supply the world with $100,000,000 silver per annum.

Personal.

MARCUS DALY of Montana is ill in New York City.

S. J. JOHNS is Supt. Whitlock mine, Mariposa Co., Cal.

DR. E. H. COOK, of New York City, is in Denver, Colo.

CYRUS MCARTHUR has returned to Denver, Colo., from Mexico.

COLIN TIMMONS has returned from Denver, Colo., to Chloride, Arizona.

F. W. PAGE, Mgr. Blue Gravel G. M. Co., Yreka, Cal., is in San Francisco.

WM. VAN SLOOTEN has returned from Grass Valley, Cal., to New York City.

J. ALLEN has gone to Manila, where he proposes building an electric railway system.

DUNBAR B. SCOTT of Ironwood, Mich., has been appointed Supt. Phœnix mine, Houghton, Mich.

ROSS BROWNE has returned to San Francisco, Cal., from a professional visit to Utah mines.

JAY A. CZIZEK, Idaho's State Mine Inspector, says his State needs better smelting facilities.

C. A. HABERLEIN has been appointed assistant to Gen. Mgr. Hill of the Ray Copper Co. of Arizona.

J. H. HAMMOND is in New York City, en route to Mexico, and expects to visit San Francisco next year.

F. CHAPPELLET, SR., Pres. Eureka Con. Drift M. Co., has returned from Placer Co., Cal., to San Francisco.

J. H. THOMAS now has charge of the Claybank mine, La Porte, Cal., and expects to employ 100 men thereon.

BERT SEABOLDT of Salt Lake City, Utah, has been appointed Mgr. of the gilsonite mines in northeastern Utah.

RICHARD VINCENT has been appointed foreman of the Maryland mine, near Grass Valley, vice Chas. Thomas, resigned.

PROF. DE KALB of the Kingston, Ontario, School of Mines, thinks that that province is greatly in need of trained miners.

A. F. HOLDEN, managing director United States Mining Co., of Bingham, Utah, is in Cleveland, Ohio, to remain some time.

C. H. LINDLEY has returned to San Francisco from Wardner, Idaho, having concluded his work in the Sullivan-Bunker Hill case.

R. DEWITT, who formerly superintended the Van Avery mine at Blue Canyon, Placer Co., Cal., has gone to Stent, in Tuolumne Co.

J. M. DAVIDSON, a U. S. Deputy Mineral Surveyor, has returned from Nome, Alaska, where he has been engaged in civil engineering the past season.

W. C. RALSTON, Pres. California State Miners' Association, has returned to San Francisco from Robinson's Ferry, Cal., and on the 1st prox. goes to Boston, Mass.

JAS. N. MCBRIDE, Pres. La Sal Copper M. Co., Cushin, Colo., says his company made a mistake in building a smelter; that it was a leaching plant that was wanted, which he is now putting in.

J. W. RICHARDS, assayer and chemist for the Aspen Sampler and Smuggler Mining Co., of Aspen, Colo, continues in that capacity, but with laboratory and office at 1754 Champa St., Denver, Colo.

DIMITRI EVANOV, a Russian mining engineer, is in San Francisco, and says that his government expects the throwing open of the Siberian gold placer fields to purchase next February, will advance their exploration and development.

W. E. C. EUSTIS, president, and C. M. Weld, director of the Melones Con. Mining Co. of Boston, accompanied by G. W. Grayson and W. C. Ralston of San Francisco, Cal., have been inspecting the property of the company at Carson Hill, Calaveras county, Cal.

M. BENARD, who was recently paid $10,000 for plans and designs for buildings at Berkeley, Cal., for the California State University, arrives in San Francisco from Paris this week to confer with the regents of that institution. The proposed buildings are estimated to cost $20,000,000.

A. N. KITTLESON of Stoughton, Wis., recorder of Cape Nome district, is down from that summer resort, and considers the region very rich. He believes that its output will already reach $3,000,000, one-half of which is from the beaches and the other half from the inflowing creeks. The beaches have been prospected and found to pay for forty miles

above and below Nome City, and he thinks that the whole section, from Norton bay to Cape Prince of Wales, a distance of 250 miles, contains gold.

NIKOLA TESLA, who has been experimenting with wireless telegraphy at Colorado Springs, Colo., has returned to New York City. He claims to have perfected a machine by which he can send wireless messages to Paris. His claims are a perpetual delight to the Sunday newspapers.

THEO. RIXON, one of the Government party engaged in a geological survey of the Olympia, Wash, forest reserve, says that no mineral deposits of consequence were found in the reserve and that there is comparatively little timber of any value included within its limits. Three-fourths of the reserve has been surveyed.

GOV. GAGE of California has appointed Prof. W. L. Watts to continue the investigation of the oil-yielding formations of California and Dr. Stephen Bowers of Los Angeles to examine the mineral resources of the State. These appointments have been made in accordance with a law passed by the last California Legislature, placing the appointing power of the field assistant of the State Mining Bureau in the hands of the Governor and appropriating $20,000 for the purpose of carrying on the work.

Commercial Paragraphs.

THE Great Western Pneumatic Tool Co. are opening machine and tool works at 1759-63 Blake St., Denver, Colo.

THE New York Air Compressor Co. has organized under the laws of New Jersey; capital stock, $100,000. It is intended to manufacture air compressing machinery at Arlington, N. J. The New York offices of the company are at 120 Liberty St.

THE Mine & Smelter Supply Co. has fitted up shops in Denver, where the Wilfley concentrators are being manufactured under the personal supervision of Mr. Wilfley, the inventor. White, Rogers & Co., 306 Pine St., San Francisco, are the Pacific coast representatives.

THE Weber Gasoline Engine Co., Kansas City, Mo., has an order for engines aggregating 450 H. P., subdivided in units of 50, 40 and 30 H. P. engines, to operate on No. 2 F. H. distillate, for the Ray Mines, Ltd., Arizona. Another order for a 30 H. P. engine was completed and shipped to the Norwegian Copper Works, Birtavarre, Kaafjord, Lygenfjord, Island of Tromso.

THE San Francisco Novelty & Plating Works, established in 1865, is in the thirty-fifth year of a successful business, which has increased from a moderate beginning until now it has a large and complete plant for the manufacture and replating of silver-plated copper plates for saving gold in quartz and placer mining. Great importance is justly attached to the advantage of silver-plated copper plates, ready for immediate use and always presenting a clean, smooth surface to instantly catch and retain the gold. Verdigris will not form on well-plated silver-plated plates, but will on plain copper ones, thereby losing considerable gold. These plates will save more than sufficient gold to pay for the cost of plating. Owing to the great demand for silver-plated copper plates for the Cape Nome district the San Francisco Novelty & Plating Works has been obliged to increase its force, and is now prepared to fill all mining orders at shortest notice. Wherever their plates are used they are well liked, and the demand is increasing. This company have sent their mining plates nearly all over the world, many plates having been shipped to China, New Zealand, Central and South America, Honolulu, Mexico, Alaska and all over the Pacific coast. This corporation also manufactures gas and electric light fixtures, grill work, elevator enclosures, vault gates, artistic iron and brass work of all description, and carries on gold, silver, copper, nickel and brass plating in all its branches. By strict attention to business and courteous treatment it has gained universal respect and patronage. A visit to their works, northwest corner First and Mission streets, San Francisco, Cal., will convince anyone of the great amount of work they turn out each month. Any information desired regarding contracts for the furnishing of silver-plated mining plates, or any other work in their line, will be readily furnished.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING NOVEMBER 14, 1899.

636,742.—BANDAGE—J. N. Armstrong, Soldiers' Home, Cal.
636,944.—WAGON COUPLING—O. L. Beckett, Orting, Wash.
636,747.—FLUME—J. A. Blake, Redlands, Cal.
637,077.—HYDRANT—C. L. Burkhart, Dayton, Wash.
636,753.—CULTIVATOR—D. G. Burkhart, Dayton, Wash.
637,081.—CUPEL—A. C. Calkins, Los Angeles, Cal.
636,754.—THRASHER—E. Campbell, Dayton, Wash.
636,765.—CUFF SUPPORTER—P. E. Daniels, Oakland, Cal.
636,786.—INHALER—L. M. Francis, Phœnix, A. T.
636,972.—RULE—J. H. Franklin, S. F.
636,788.—GOPHER TRAP—F. W. French, Lakeside, Cal.
637,202.—SPEED CHANGING MECHANISM—J. C. des Granges, Los Angeles, Cal.
636,983.—PLANE—C. E. Hanson, S. F.
637,204.—BALL BEARING—F. W. Heath, Tacoma, Wash.
637,205.—BALL BEARING—F. W. Heath, Tacoma, Wash.
637,206.—BALL BEARING—F. W. Heath, Tacoma, Wash.
636,989.—QUICK BREAK ELECTRIC SWITCH—R. B. Hewson, S. F.
636,992.—MAIL BOX TIME INDICATOR—Hoagland & Richardson, Oakland, Cal.
636,993.—MAIL BOX TIME INDICATOR—Hoagland & Richardson, Oakland, Cal.
636,995.—GRAVEL WASHER—Horr & Gibbons, Jackson, Cal.
636,910.—ELECTRIC ALARM—R. R. May, San Jose, Cal.
636,920.—WEIGHING SCOOP—B. McKiernan, Stockton, Cal.
636,843.—PLUMB LEVEL—J. E. Ramsey, Oakesdale, Wash.
637,036.—POLE SUPPORT—M Schichtl, North Yakima, Wash.
637,169.—SNAG HOOK—H Slotterback, Los Angeles, Cal.
637,181.—PROPELLER—A. Sweetland, Los Angeles, Cal.
31,826.—DESIGN—B. Schmalitz, Diamond, Cal.
31,819.—DESIGN—Shipman & Morcom, Baker City, Or.

Diplomas Awarded to Van Der Naillen's Engineering School Students.

SAN FRANCISCO, CAL., Nov. 11, 1899.

The A. Van der Naillen School of Engineering, 933 Market street—GENTLEMEN: I take pleasure in informing you that diplomas have been awarded to the following students at your school for their drawings exhibited in your exhibit at the recent Mechanics' Fair:

To the A. Van der Nailen School of Engineering students for working models of engine and boiler: Guy A. Dunne, for Keith motor; H. C. Adair, for Corliss engine; F. A. Gawthorne, topographical map; Fred G. Kellett, 40-stamp mill; Joseph Levensaler, dynamo commutator. To the students for working model of electrical trolley car: George von Boden, American locomotive; A. Gawthorne, underground mining. Yours respectfully,

JOSEPH M. CUMMING,
Secretary Mechanics' Institute.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MAIL BOX TIME INDICATOR.—E. M. Hoagland and D. S. Richardson of Oakland, Cal., Nos. 636,992. 636,993. Dated Nov. 14, 1899 Assignors to the Montague Indicator and Letter Box Co., San Francisco, Cal. The object of this invention is to provide a means for giving important information to the public in a clear and concise manner, also to act as a detector and check and furnish a box-testing system by which the movements and faithfulness of postal employees can be ascertained. It consists of a main chamber for mail matter, an independent chamber or chambers in front of said main chamber, a front chamber having a transverse open slot through its front. Rollers are journaled in the upper and lower portions of this chamber, and an endless belt, consisting of chains and slots or sections bearing dates of collection thereon, are caused to travel across this slot. The door, which is opened for the purpose of collecting the mail from the box, is connected with mechanism which advances this chain belt in such a manner that a new section of the belt will be exposed before the slot by each opening and closing of the door, and this section indicates the time of the next collection, also the outgoing mail by which the letters will be carried away. Devices are arranged for showing the collections for holidays and Sundays, which differ in number from ordinary week days, and means for preventing the movement of the belt during such dates.

QUICK BREAK ELECTRIC SWITCHES.—Robert B. Hewson, San Francisco, Cal. No. 636,989. Dated Nov. 14, 1899. Assignor of one-half interest to Austin Kanzee, of same place. The object of this invention is to make and break the electric circuit in which it is placed by a sudden or snap movement for the purpose of reducing sparking and consequent injury to the contacts. The invention consists of a lever mounted upon an insulated base having one end connected with one of the terminals and the other movable between compressing plates which are connected with the other terminal, the connection consisting of a sliding cylinder movable in a tube, with which the second terminal is connected, and having a spring connection by which, when the contact is broken by the withdrawal of the lever from between the plates, the parts are moved in opposite directions with a sudden movement.

SWIVEL PLANE SUPPORT AND HANDLE.—Carl E. Hanson, San Francisco, Cal. No. 636,983. Dated Nov. 14, 1899. This invention relates to a device for suspending a plane within an operating handle, so as to give it a universal movement with relation to its support. It is particularly adapted for planing floors and the like. The plane has socket pieces fixed at each end in a longitudinal axis, and an enclosing frame has fixed pins adapted to enter the sockets, so that the plane may pivot transversely thereon. To the sides of this frame the forked end of a handle is fulcrumed so that the handle may be moved up and down with relation to the frame and the plane, the two movements thus provided forming a universal movement, which will allow the plane to be pushed over the surface and maintain its own parallelism regardless of the irregularity of movement of the handle.

RULE.—J. H. Franklin, San Francisco, Cal. No. 636,972. Dated Nov. 14, 1899. In this invention a marking device is attached to the end of the rule, so that when the rule is repeatedly moved as in measuring considerable lengths, the end of each measurement is marked without the use of a pencil or other marking device. This marker consists of an elastic plate fixed to one end of the rule, having its end bent to lie in the plane of the end of the rule and projecting slightly beyond. The edge being made sufficiently sharp to make a mark at the termination of each measurement so that in repeated measurements in a line, the total will be more accurately ascertained than when an exterior marking device is used.

CLAY OR GRAVEL WASHING MACHINES.—W. B. Horr and C. H Gibbons, Jackson, Cal. No. 636,995 Dated Nov. 14, 1899. This apparatus is designed for washing clay or gravel which contains valuable or precious metals, and separating the latter from the clay or gravel. It consists of an inclined cylinder composed of longitudinal interspaced bars and having one end made conical, and of imperforate material. A neck forms a prolongation of this conical end and is formed of parallel interspaced bars which serve as a final screen for any material which passes over the imperforated portion. In conjunction with this cylinder is employed an inclined segmental trough having an end and an extension conforming to the cylinder and its discharge end. The trough has a transversely curved and gated depression near the junction of the imperforate section with the main body.

Recently Declared Mining Dividends.

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National Lead Co., New York, quarterly 1¾%; payable Dec. 15.

Boston-Philadelphia Zinc & Lead Co., Missouri, monthly 1%; Nov. 20.

Osceola M. Co. Co., Michigan, semi-annual dividend, $3 per share, $279,000; payable Dec. 15.

Homestake M. Co., South Dakota, regular 25 cents, extra 25 cents, per share, $105,000; payable Nov. 25.

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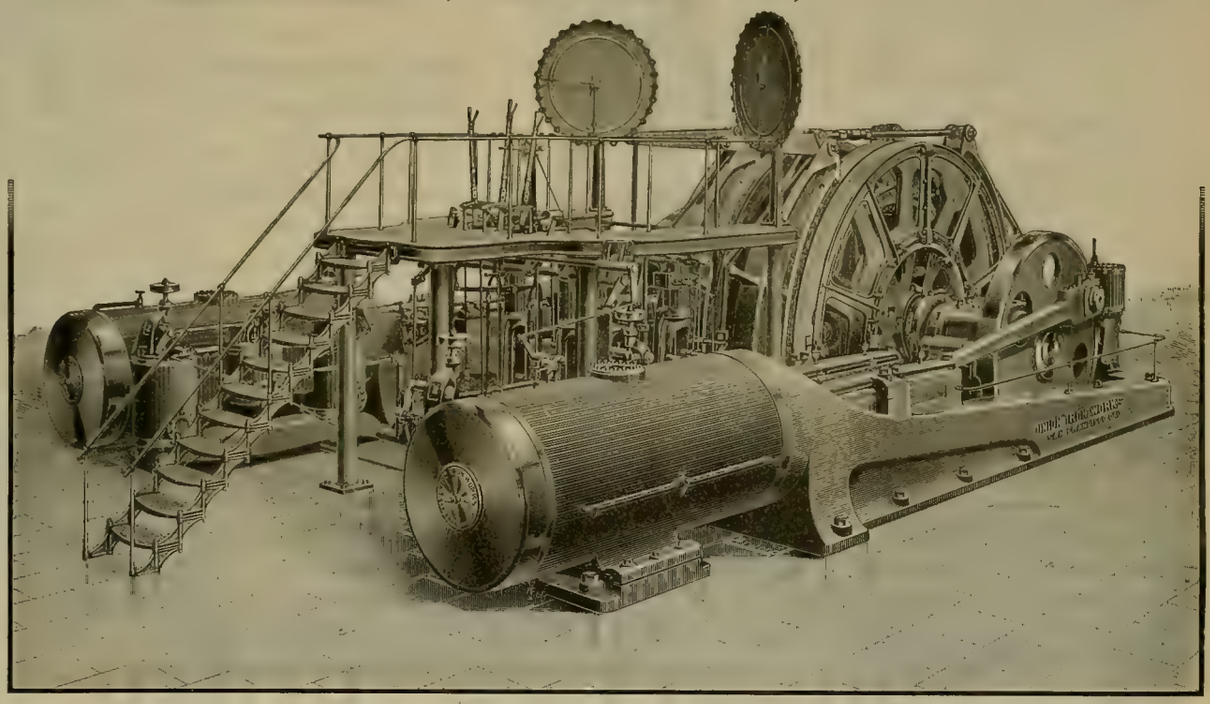
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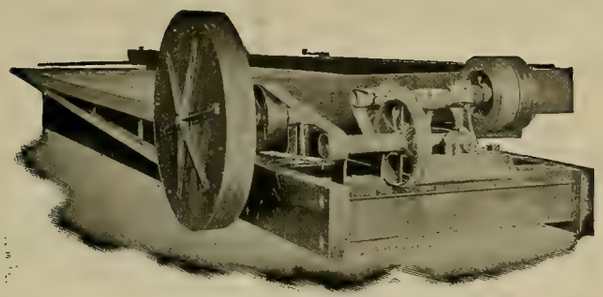
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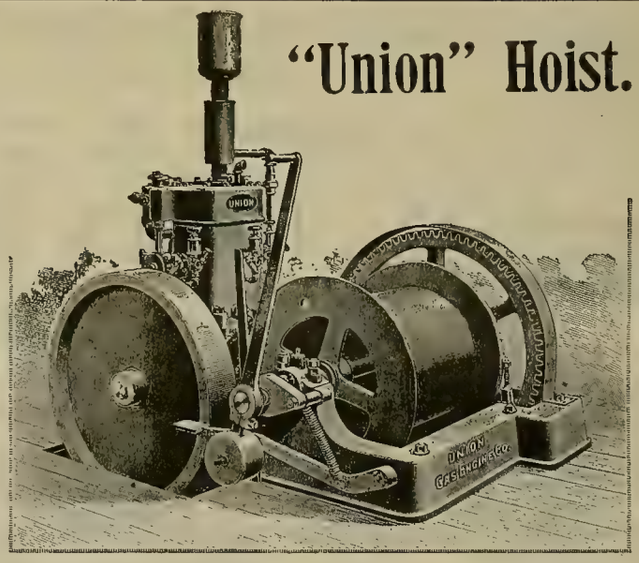
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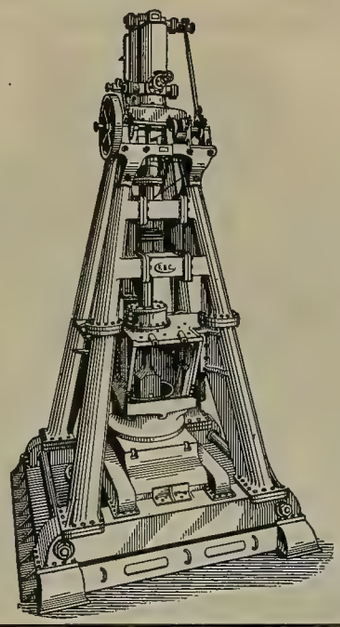
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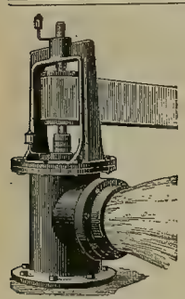
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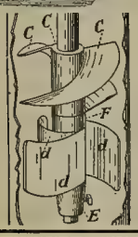
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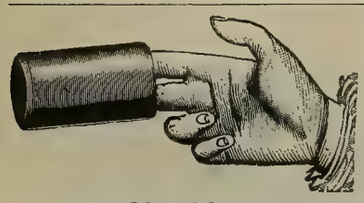
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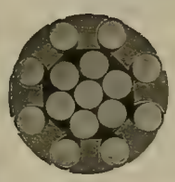
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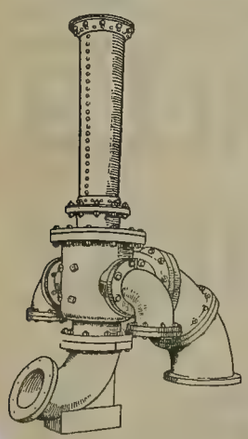
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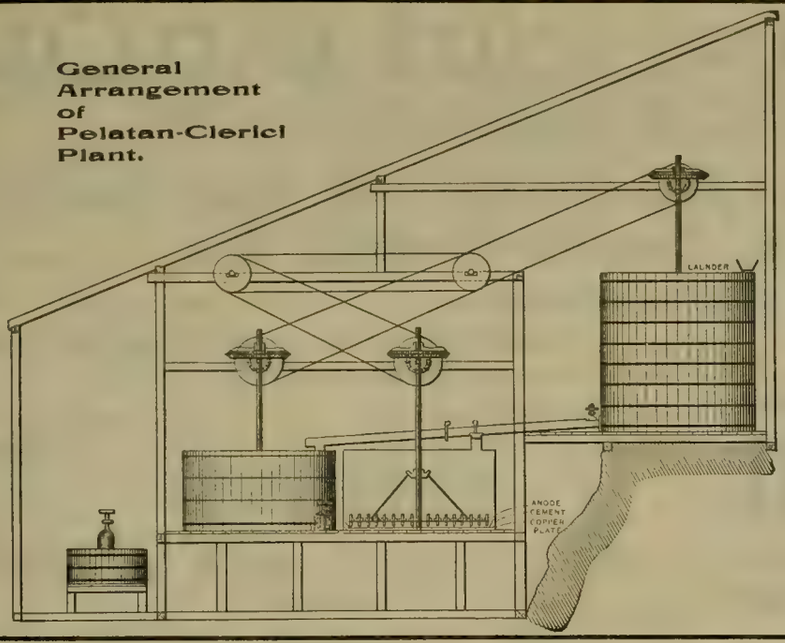
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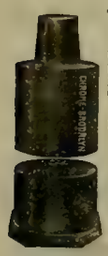
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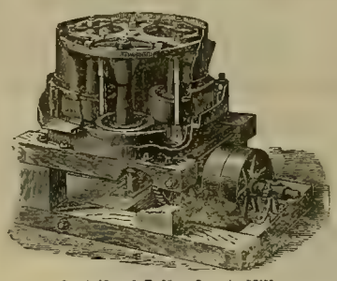
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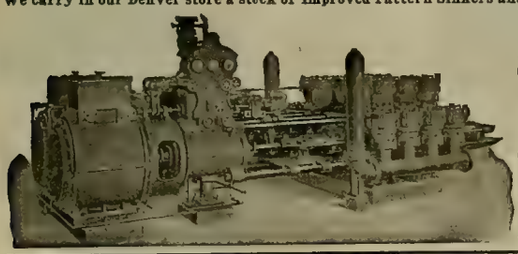
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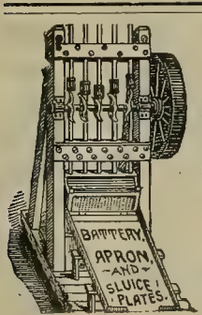
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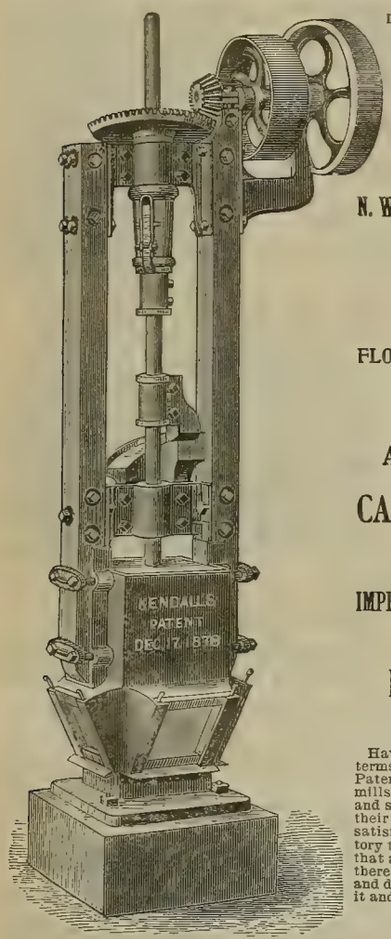
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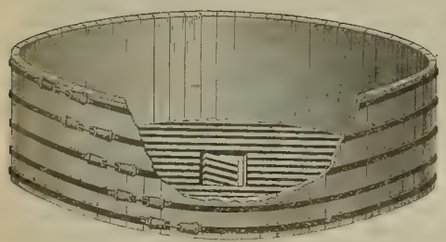
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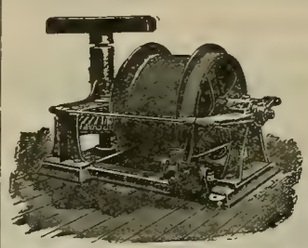
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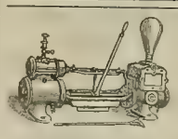
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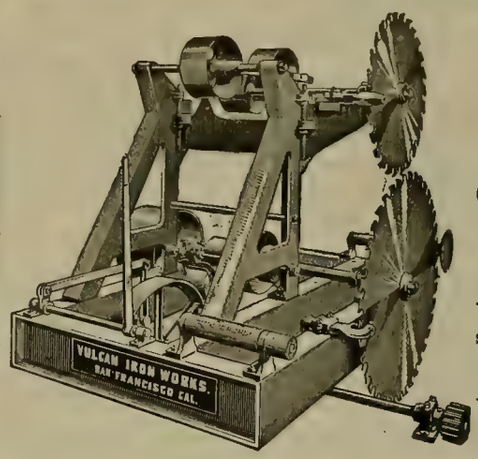
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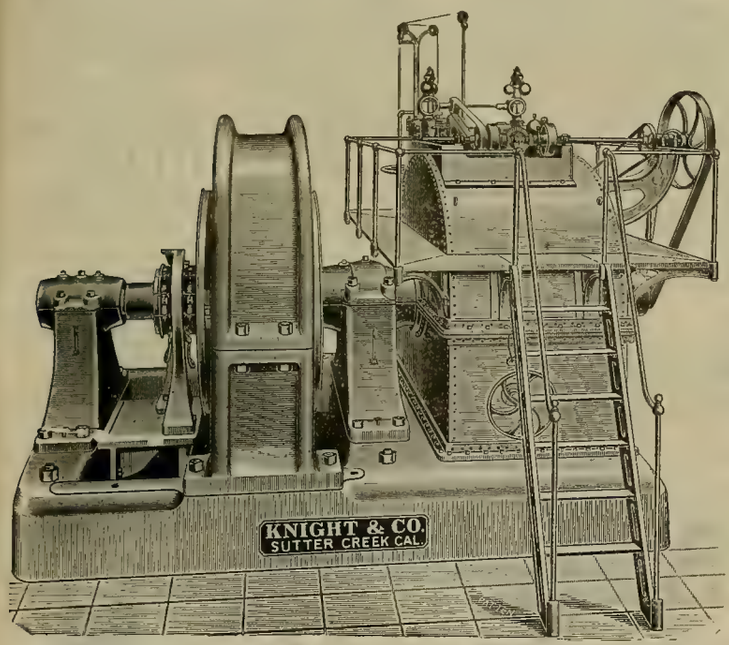
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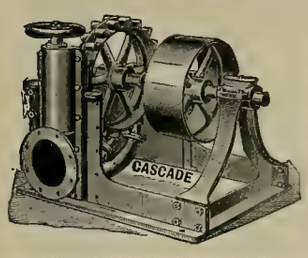
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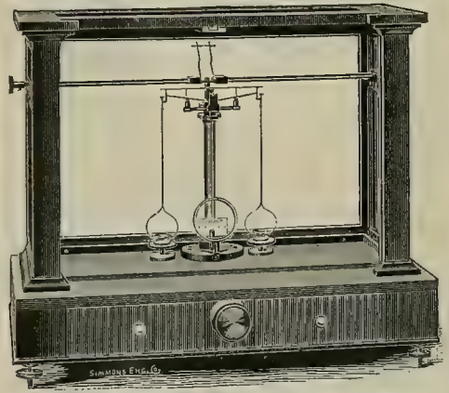
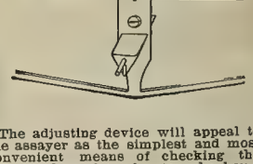
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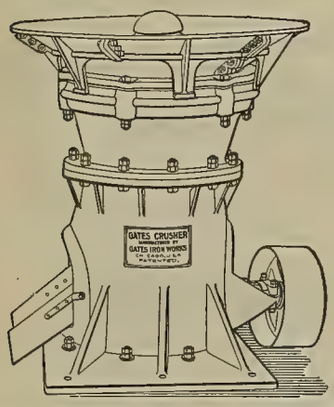
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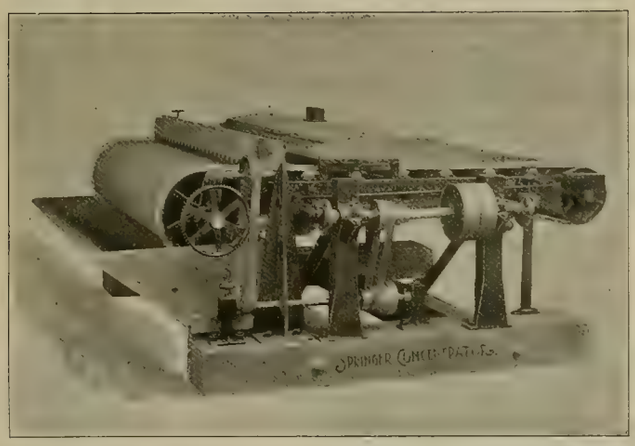
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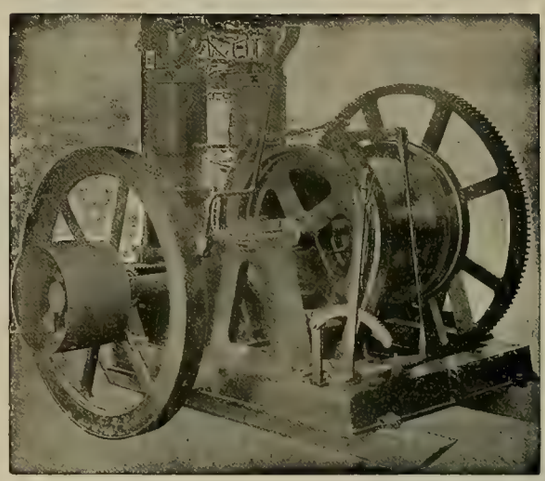
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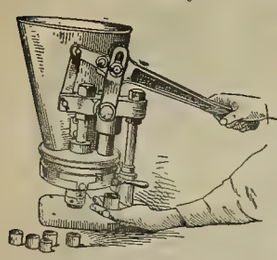
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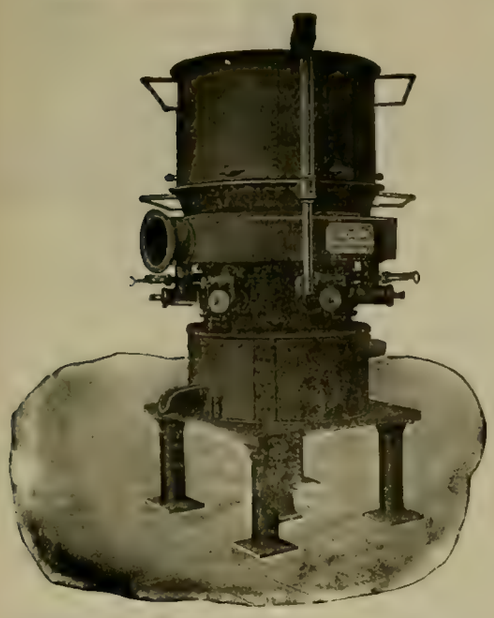
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(SEE PAGE 621.)

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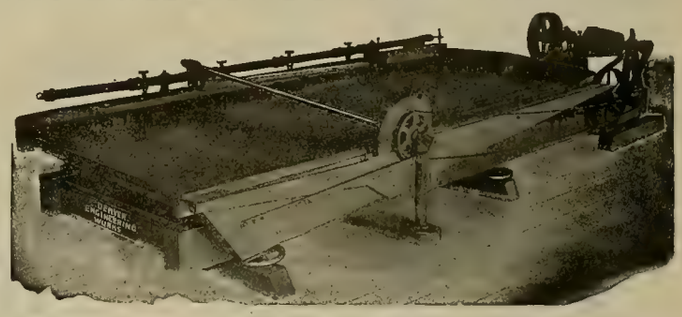
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Market Reports.

SAN FRANCISCO, Nov. 23, 1899.

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LEAD.—New York reports steady, $4.60 bid, $4.65 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6½c.

COPPER.—New York reports Lake at $17 @17.25; brokers' price, $17.25. Local—Mill copper plates, 23¾c.

The total production of United States mines since January 1, '99, is 219,413 tons, comparing with 201,643 tons for the corresponding period of '98.

The Marquette *Mining Journal* says the recent drop of 1¾ cents per pound in the selling price of Lake copper means a lessening of the annual profits of the Calumet & Hecla mine to the amount of about $1,350,000. The loss is not a serious one, however, for the Calumet & Hecla, even with its profits thus grievously curtailed, will remain the most profitable mine in the world, earning profits each year seven times as great as the total amount of money required in developing the mine. The best mines of the Lake district are making copper around 7 to 8 cents per pound, which, with copper selling at 17 cents per pound, means a profit of 9 to 10 cents per pound, or more than 100%. Copper at 15 cents or better is high, and there seems every reason to believe that 15 cents or more will be obtained for several years to come.

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STEEL.—11¾@20c per pound.

TIN.—Dull, $28 bid and $28.25 asked; pig, 36@39c per lb.

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No change has taken place in the price of quicksilver within the past week, the market remaining quiet. That the price will be lower very soon is not anticipated. The indications are rather that it will go still higher.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Very weak; $4.40 bid, $4.50 asked. The zinc ore market is demoralized, the efforts of the Missouri-Kansas Zinc Miners' Association to maintain prices having proved futile. The downward tendency of metal prices has had its effect on the ore market, and zinc ore has declined $5 to $8 a ton within the past two weeks. The top price paid for high zinc ore was $35 a ton in the bins, but a great deal of high-grade ore brought $34 a ton or less. The prices paid were below the association's schedule, which puts high-grade ore at $40. Many large mine operators refused to sell at the prices offered, thinking that the present conditions will be soon remedied and ore prices advance again. The scarcity of coal and the low prices paid for zinc ore have caused a few of the leading mines and many of the smaller ones to shut down indefinitely. The miners threaten to build a large co-operative smelter and zinc rolling mill.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13¾c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11¾c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ℔ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¾ @6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¾@ 2¾c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ℔ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¾c; 6s, 14 oz., 7¾c; 6s, 12 oz., 5¾c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¾c, 6s, 14 oz., 8¾c; 6s, 12 oz., 7¾c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 50
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite.	12 50
Scotch	8 00	Rock Springs	7 50

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 61c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19½c; Astral, 19½c; Star, 23½c; Eocene, 21½c; Extra Star, 23½c; Elaine, 24½c; Water White, bulk, in tanks, 13½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 59c; cs., 64c; No. 1 bbl., 49c; cs., 54c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 23, 1899.

9:30 A. M. SESSION.

500 Ophir	97c	100 Challar	21c
500	99c	400 Crown Point	21c
200 Mexican	48c	200 Belcher	29c
200	45c	50 Confidence	84c
400 Gould & Curry	16c	400 Sierra Nevada	38c
200 Best & Belcher	37c	150	37c
100	36c	300 Union Con	33c
300 Con. Cal. & Va.	$1 45	200 Caledonia	55c
350	$1 40	200 Andes	13c
100 Savage	15c		

2:30 P. M. SESSION.

100 Ophir	99c	400 Challar	21c
200 Mexican	46c	300 Hale & Norc's	40c
300	45c	200 Belcher	29c
100 Best & Belcher	37c	100 Union Con	33c
100	38c	400 Andes	13c
500 Con. Cal. & Va.	$1 40	50 Standard	$2 85
200 Savage	16c		

Metallurgical Chemist and Assayer open for position after December. Three years' Scotch college training and four years' practical experience of cyanide work, assaying, etc., in Spanish America. Speaks Spanish. Good references. Address METALLURGY, care Mining and Scientific Press.

WANTED—For Eastern syndicate, developed and paying gold mine; no limit as to price. **FOR SALE**—Hydraulic properties and developed and undeveloped quartz mines in promising mining localities. Purchaser may deal with owner direct. W. F. ARAM, room 40, 8th floor Mills Bldg., S. F.

WANTED.—A STAMP MILL MILLWRIGHT.
Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. H. Secombe, in the Landecker Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine tributary to Webber Creek; from Jos. J. Hoffman and T. M. Browne, in the Paragon Mine, at Bath, Placer Co., to deposit tailings in Volcano Canyon; and from G. W. Coates and E. S. Randall, in the Pebble Hill Placer Mine, near Smith's Flat, El Dorado Co., to deposit tailings in Little Chunk Canyon, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 4, 1899, at 1:30 P. M.

Group of Gold and Silver Mines for Sale.
For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

Mines for Sale.
A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

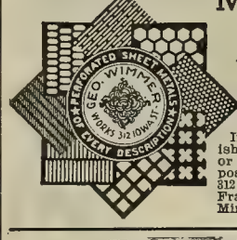
TO ASSAYERS.
A fine set of assay scales with pulp balances, all in good order, will be sold for $125.00, if applied for soon. The outfit consists of one Troemner's No. 5 balance, of latest pattern, with aluminum beam and agate bearings, original cost $175.00; also, one Becker's pulp balance, No. 18, with 8-inch beam and weights, costing $26.00. Both said balances mounted in glass case with sliding doors. Further particulars by addressing Box 4, San Andreas, Cal.

FOR SALE CHEAP.
80 H. P. CORLISS ENGINE;
TWO STEEL BOILERS, 50 H. P. EACH;
HEATER AND STEAM PUMP.
All in first-class condition.
THE VISALIA MILLING CO.,
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FOR SALE.
Gold Properties in Various Stages of Development.
Single claims and groups. One large ledge, low grade, free milling. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.
Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.


—EASTERN PRICES BEATEN.—
SAN FRANCISCO Pioneer Screen Works,
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices.
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
—MINING SCREENS A SPECIALTY.—
221 and 223 First Street, San Francisco, Cal.

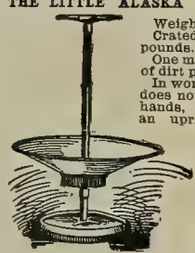


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A SPECIALTY.
Diagonal Slot,
Straight "
Burred "
Round Holes.
In American planished or Russian iron or steel for all purposes. GEO. WIMMER, 312 Iowa Street, San Francisco. Telephone Mint 1332.


QUARTZ SCREENS
A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S. F.


REDUCES OIL BILLS
Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.
THE BURT MFG. CO.
AKRON, OHIO.
Largest Manufacturers of Oil Filters in the World.
Send for Catalogue 38.

"CRACK PROOF"
PURE RUBBER BOOTS
Are the CHEAPEST because
They Are the Most Durable.
Beware of Imitations.
GOLD SEAL, BADGER AND PIONEER Belting, Packing and Hose.
RUBBER FACTORY IN SAN FRANCISCO.
Valves, Gaskets, Etc., Made to Order.
GOODYEAR RUBBER CO.
R. H. PEASE, Vice-Pres't and Manager,
Nos. 573, 575, 577, 579 MARKET ST., San Francisco.
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THE LITTLE ALASKA GOLD WASHER.

Weighs only 7½ pounds. Crated for shipment, 11 pounds.
One man can wash 5 tons of dirt per day.
In working, the operator does not have to wet his hands, and can stand in an upright, natural position, and does not have to hold the weight of the dirt in his arms. Requires very little water and saves more gold than any other washer. Send for Circular.
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For HYDRAULIC POWER and IRRIGATION.
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.
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Estimates given on Electrical plants or wiring of any description.
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Relaying Rails
For Mines and Street Railways.
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STEEL RELAYING RAILS and LOCOMOTIVES
AT REDUCED PRICES!
Correspondence solicited.
C. J. TALLON,
308 Market Street, San Francisco, Cal.

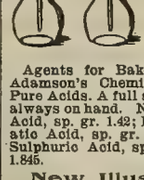
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Marquette, Mich., U. S. A.
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The Most Powerful Made!
Send for Illustrated Catalogue.
A. BARNES, Mgr., 16-18 Zoe St., San Francisco.

The State Ore Sampling Co.
DENVER, COLO.
We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction. Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.
BAILY & MONNIG, Managers.

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For Sale in Lots to Suit.
REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

Established 1852. Incorporated 1895.
John Taylor & Co.,
63 First Street, San Francisco, Cal.
Manufacturers and Importers of
Assayers' Material,

FURNACES, SCALES, BALANCES, WEIGHTS, ETC.
ALSO, MINE AND MILL SUPPLIES, CHEMICALS AND CHEMICAL APPARATUS.
Agents for Baker & Adamson's Chemically Pure Acids. A full stock always on hand. Nitric Acid, sp. gr. 1.42; Muriatic Acid, sp. gr. 1.20; Sulphuric Acid, sp. gr. 1.845.

New Illustrated Catalogue on Application.



Two Styles: STAR and U.S. Made in Brass Also. ★

STAR PATTERN for Heavy Pressure.
U. S. PATTERN for Ordinary Pressure.

We warrant them for all service where a quick, reliable action is required.
It will pay you to investigate.
Full particulars from any jobbing supply house, or direct from the mauufacturers.

THE WM. POWELL CO., CINCINNATI, O.

Quicksilver

——FOR SALE BY——

The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET,
SAN FRANCISCO.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, THE GRASS VALLEY WATER COMPANY. Dept. No. 2. No. 70,052.

Notice is hereby given that said corporation, THE GRASS VALLEY WATER COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

Notice of Application for Dissolution.

In the Superior Court of the City and County of San Francisco, State of California.

In the matter of the application for the dissolution of the corporation named, NORTH STAR MINING COMPANY. Dept. No. 2. No. 70,053.

Notice is hereby given that said corporation, NORTH STAR MINING COMPANY, on October 17th, 1899, made a voluntary application for dissolution, in writing, to said Court;

That said Court thereupon on said 17th day of October, 1899, made an order directing that said application be filed with the Clerk of said Court, and that said Clerk give thirty-five (35) days' notice of the application by publication in the newspaper named, "Mining and Scientific Press," the same being a newspaper published in said City and County, and that this notice is now given, and will be published according to said order in said newspaper, "Mining and Scientific Press," during the period of thirty-five (35) days from and after the 20th day of October, 1899, the first publication being made on Saturday, October 21st, 1899.

Given under my hand and the seal of the Superior Court of the City and County of San Francisco, State of California, this 17th day of October, 1899.

W. A. DEANE,
County Clerk.
[SEAL] By E. M. THOMPSON,
Deputy Clerk.

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24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

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DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

Assessment Notices.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of November, 1899, an assessment (No. 117) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on THURSDAY, the 7th day of December, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of December, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

E. L. PARKER, Secretary.

Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of November, 1899, an assessment (No. 4) of Ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of December, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 3d day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary.

Office—213 Jackson St., San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 14) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 10) of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—632 Sacramento street, San Francisco, California.

DELINQUENT SALE NOTICE.

CALIFORNIA BORAX COMPANY. — Location of principal place of business, San Francisco, California; location of works, San Bernardino County, California.

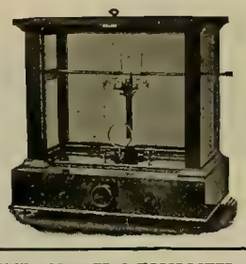
Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 18th day of September, 1899, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Jno. L. Bradbury, Trustee	75	100	$200 00
S. L. Harris, Trustee.....	45	50	100 00

And in accordance with law, and an order from the Board of Directors, made on the 13th day of September, 1899, so many shares of each parcel of such stock as may be necessary will be sold at public auction, at the office of the company, No. 310 Pine street, room 36, San Francisco, California, on TUESDAY, the 28th day of November, 1899, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. W. PEW, Secretary.

Office—No. 310 Pine street, room 36, San Francisco, California.



SMITH & THOMPSON,
Manufacturers of Fine
ASSAY BALANCES.
Write for Catalogue.
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Denver, Col.

THE ROESSLER & HASSLACHER CHEMICAL CO.,
100 William Street, New York.

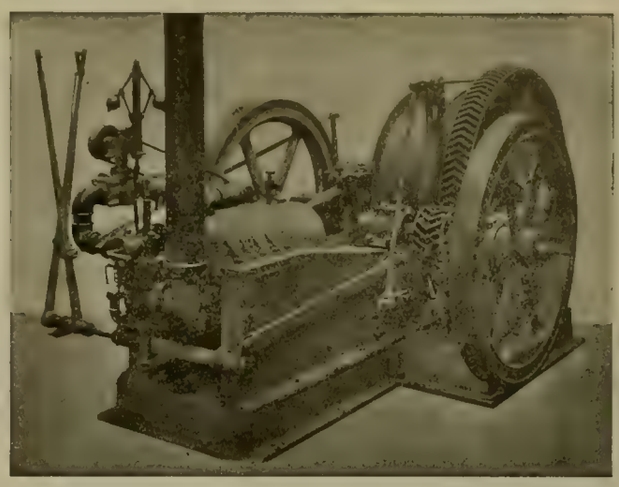
THE ROESSLER & HASSLACHER CHEMICAL COMPANY CHEMISTS NEW YORK

CYANIDE

Peroxide of Sodium
Hyposulphite of Soda
Chloride of Lime
Sulphide of Iron

And other Chemicals for Mining Purposes.

HERCULES HOISTS Are Sold the World Over..



Hercules Gasoline Hoist--Speed 385 Ft.; Load 2500 Lbs.
HERCULES GAS ENGINE WORKS,.....305 MARKET STREET, SAN FRANCISCO, CAL.

DON'T SAVE PENNIES AND WASTE DOLLARS



in the purchase of a Gasoline and Oil Engine and Hoist. Buy the best—the Weber—and get results. Full particulars on request.

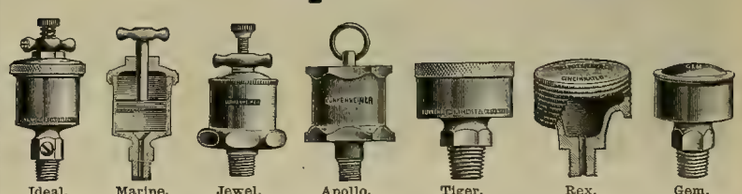
Weber Gas & Gasoline Engine Co.,
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Kansas City, Mo.

The Lunkenheimer Brass and Iron Specialties For STEAM, WATER, GAS, AIR, OILS, etc.

Comprising an endless variety of Valves, Whistles, Lubricators, Oil and Grease Cups, etc., are unsurpassed where thorough, reliable service is the first requisite. A trial order demonstrates their fitness and invariably results in their adoption. Have you need for such goods? If so, specify "LUNKENHEIMER" make. Write for catalogue.

The Lunkenheimer Company BRANCHES, NEW YORK, LONDON. GENERAL OFFICES AND FACTORIES, Cincinnati, U. S. A.

DO YOU USE GREASE?



Ideal. Marine. Jewel. Apollo. Tiger. Rex. Gem.

Lunkenheimer's cups will feed it. Endorsed by millions of satisfied users. In stock by dealers everywhere. Specify Lunkenheimer's and get the best.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

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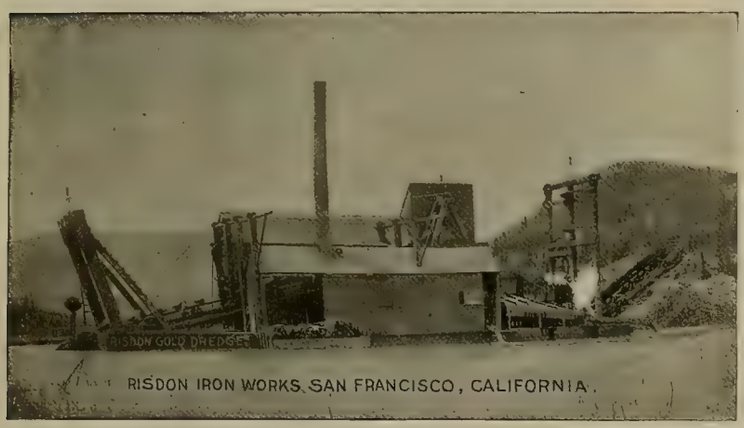
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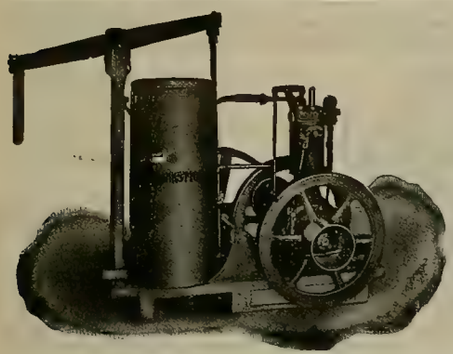
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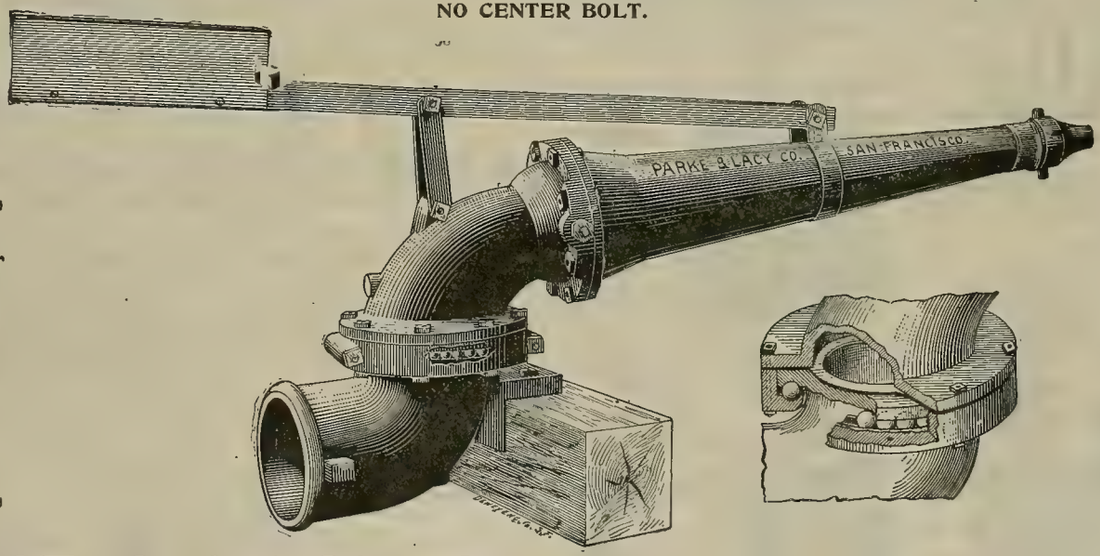
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No. 2056.—VOLUME LXXIX. Number 23. SAN FRANCISCO. SATURDAY, DECEMBER 2, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Newest Ideas in Automobiles.

Since the advent of the automobile this paper has given the latest accurate illustrated accounts of this innovation in transit, as a matter of interest to the mining and scientific world, and herewith shows the newest ideas in the "horseless carriage" line. Additional interest attaches to the automobiles depicted herewith, as, in addition to steam, electricity, gas engine and compressed air, another motive power enters the field, and in the machines illustrated on this page the Auto-Acetylene Co. of New York City claim to have a motor that works successfully.

Of this motor one of the officers of the company says: "It has carried one of our wagons over the road for 6300 miles with but one accident, and the motor to-day is to all appearances as perfect as it was the first month it was in use. All we claim for our automobile is that it works successfully. We do not claim we have the only thing in existence, but we do say that we have one that is provided with a motor, carburetor and steering apparatus that meet all the requirements, and the machine as an automobile is capable of going every day up and down the ordinary grades at a speed suitable for such navigation, without fear of a breakdown at every cross road. The motor runs almost as noiselessly as an electric motor, there is no odor, no danger of explosions, and the operator is not compelled to take out a license as an expert engineer in order to be allowed to manipulate our automobile, nor must he be an expert electrician. A child ten years of age can be taught to operate our wagon in a few hours' time, and it is as easy to start or stop as anything of the kind possibly can be."



FIG. 1.—AN AUTOMOBILE FOR PROSPECTORS.

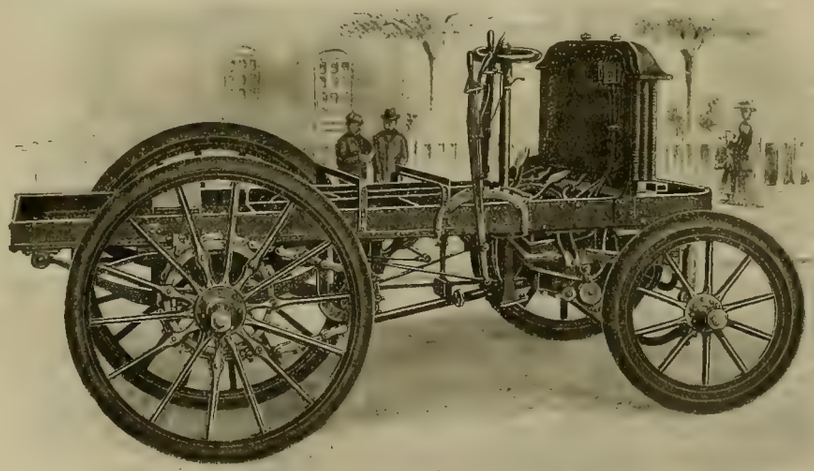


FIG. 2.—RUNNING GEAR FOR AUTOMOBILE TRUCK.

American ingenuity finds full field for exercise in producing new types of automobiles, and practical use will demonstrate which is best deserving of commendation. Fig. 1 depicts what its makers call a "prospectors' automobile," and this will be of most interest to our readers. The one illustrated is intended for use at Mojave, Cal., a wagon weighing 5400 pounds, the motor one of 23 H. P., with a speed when fully loaded of three miles an hour. The idea of the manufacturers is that the "desert express" automobile shall be a little mining camp on wheels, to travel 200 or 300 miles with an ordinary supply of hydrocarbon for the motor, to carry tools, provisions, an ore crusher, an assay furnace, a sleeping bunk, a tent, water, gasoline, etc., and enable the prospector to entirely dispense with the patient and long-suffering burro.

The idea is a progressive one, and, as such idea, deserves commendation, but many objections exist, probably not calculated on by the New York projectors of this aid to the prospector, and which are sufficiently manifest to make detail unnecessary. Were everything in connection with the concern to work all right, the miner or prospector who had the price of such an outfit might find it under certain circumstances a comfortable and profitable investment, but a breakdown on the Mojave desert is a very different proposition from one within a few blocks or miles of a machine shop or supply depot. Like laboratory processes that work all right in a room with every fine appliance at hand, but which are not so satisfactory when commercially applied at the mill or smelter, so a four-wheeler, as designed, that works all right on smooth paved streets may be badly placed for the rough and ready needs of the prospector. Still, the germ of a commendable scheme exists in the device illustrated, and if the New York men can produce such a vehicle that will insure easier and more economical transit to the prospector and miner they will deserve commendation and widespread success. There are no insuperable obstacles to such possible result.

Fig. 2 shows the heavy running gear of one of the Auto-Acetylene Co.'s large, heavy automobiles. Like the "Mojave desert express," it has rubber-tired wheels, which, probably, in rough use would be discarded for an iron wide tire. Fig. 3 shows a carriage for family or touring purposes, a roomy, comfortable conveyance, weighing 700 pounds, burning ordinary gasoline and capable of a speed of twenty-five miles per hour.

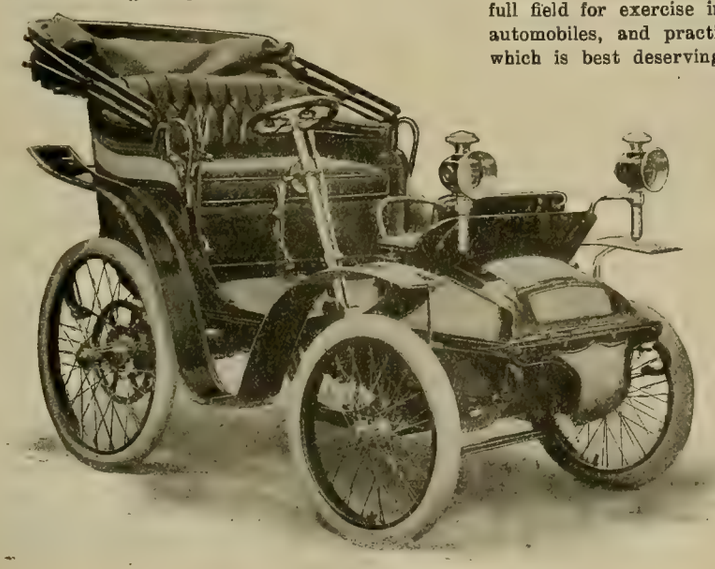


FIG. 3.—THE LATEST HORSELESS CARRIAGE.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—An Automobile for Prospectors; Running Gear for Automobile Truck; The Latest Horseless Carriage, 629. Portion of the San Rafael Mountains, Santa Barbara Co., Cal.; Cross-Section San Rafael Mountains, Santa Barbara Co.; Subsidence La Brea Creek, 632. Stope Carried to Surface, New Almaden Mine, Santa Clara County, Cal.; The Furnaces at New Almaden, Santa Clara Co., 636. Latest Mining and Metallurgical Patents; A New Type of Desk Telephone, 637.

EDITORIAL.—Newest Ideas in Automobiles, 629. Assessable vs. Non Assessable Stock; Platinum in Northern Arizona; Large Deal of the Amalgamated Copper Co.; Miscellaneous, 630.

MINING SUMMARY.—638-639-640.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 654.

MISCELLANEOUS.—Concentrates, 631. Phenomena Attending the Accumulations of Bitumen, 632. Motive Power for Mines, 633. Indicator Veins; Mining Conditions at Globe, Arizona, 634. A Non-Technical Account of Wireless Telegraphy; Experiments with Liquid Air; A Magnetic Concentrating Plant; The Twenty Largest Steamers, 635. Does the Presence of Organic Matter Cause Loss of Gold in Cyaniding? Why Quicksilver is Up, 636. Latest Mining and Metallurgical Patents; A New Type of Desk Telephone; Gas Driven Electric Plant; The Greatest Transmission Plant, 637. Industrial Notes; Personal; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents, 640. California Wide Tire Law; Recently Declared Mining Dividends; Commercial Paragraphs, 654.

An effort is being made by German capitalists to consolidate the nitrate interests of Chile. The mines are valued at $80,000,000. The present output is about 3,000,000 tons annually.

A large deal in Calumet & Hecla copper having been closed whereby that company agrees to deliver 17,000,000 pounds of its product at 17 cents, and the company being out of the market for the time being, it is predicted by metal statisticians that the price of copper will advance.

The miners and mine owners of the Slocan region of British Columbia have at last patched up a truce and the unions have been authorized to supply full crews to several of the mines of that district. For several months past only a few men have been given employment in keeping water out of the workings, looking after timbering, etc., in anticipation of an end of the labor trouble.

The General Commissioner of the United States Land Office at Washington has ruled that affidavits setting forth the mineral character of odd sections in the area of railroad grants will no longer be received for filing by the receivers of land offices, unless such affidavits constitute the initial step in a contest. The Commissioner says: "The very first rule of practice provides that contests may be initiated against any entry, filing or other claim to the public land. There must be something to protest, therefore, before proceedings can be instituted."

That there is great interest being taken in the mineral resources of the Philippines is evident, but those who have in consideration a trip to the South Seas for the purpose of investigating in that direction should remember that knowledge of the resources of the interior of those islands is of the most limited kind. The war has been carried on along and near the coast where there are no mines, and the interior is a terra incognita as yet. The rugged mountainous country in which the mineral deposits would be found, if any of value exist, is the home of savage tribes, and it will be unsafe for small parties to venture into that wilderness for a long time to come. When the war now in progress in the Philippines is at an end investigations will probably be made by Americans now there, many of whom are from the mining regions of the United States. If reports at such time are of a favorable character it will then be time enough to go.

Assessable vs. Non-Assessable Stock.

There appears to be a never-ending discussion as to the relative merits of assessable vs. non-assessable mining shares. Mining companies have been very successfully operated under each, and many have failed under each method of raising money to carry on business. There are advantages in both assessable and non-assessable stocks and disadvantages in either. In California all corporate stock is assessable and any promise on the part of directors to not levy assessments would not be recognized in the courts, if it were later determined to make such levy. There are a few corporations in California organized under the laws of other States the stocks of which are non-assessable. The great fortunes made in Comstock mining stocks, all of which are assessable, has resulted in the people of the Pacific slope being educated to the assessment plan, and there are those who profess to believe that stock issued on the non-assessable basis is prima facie evidence of intent to defraud.

Colorado offers abundant evidence to prove that the non-assessable stock plan, when properly and honestly handled, results as satisfactorily as the assessable stock basis, disproving the statement that a mine can not be successfully opened, equipped and operated on the non-assessable plan. When stock is assessable money needed to equip and explore the mine or for any other purpose, is raised by an assessment of a stated amount per share. This plan can be continued indefinitely, as long in fact as the shareholders will put up, and authenticated instances are on record where several millions of dollars have been paid in by stockholders of a mining company under the assessment plan, and not a single dollar ever disbursed in the form of dividends, but, on the other hand, the stock of some of the largest, best managed and best paying mines in the United States are assessable.

When money is required the board of directors formally levy an assessment, advertise it and otherwise advise stockholders of the fact. In the event of failure to pay the assessment the delinquent stock may be sold to pay said assessment overdue, or such portion thereof as may be necessary to raise the money. By this method means may be secured at any time.

Under the non-assessable scheme the capital stock is usually divided into a large number of shares and a liberal percentage—30 to 60 per cent—placed in the treasury for sale, money being raised by this means to carry on the business of the company. In the event of failure to sell the stock, or if all the treasury stock be sold and the money expended before the mine is self-supporting, then the company's resources for raising funds are at an end, unless a voluntary subscription be made pro rata by stockholders to continue operations, and failure to do this has more than once closed down what later proved to be a valuable property. However, under ordinary circumstances, the amount of money provided for by the sale of treasury stock in non-assessable companies is usually sufficiently large to demonstrate the value of the mine—be it good or bad, and the probability is that where the sum provided for by sale of stock in non-assessable companies fails to place the property on paying basis, if it were operated under the assessment plan the mine would be closed down before an equal amount had been paid in, by reason of failure of stockholders to respond to the call of the directors for more money, which emphasizes the fact that the chief element of success in mining is a good mine.

There are at present in the mining field men who, without qualification by either education or experience, are "reporting on mines," and signing E. M. or M. E. after their names. In most cases a report from such source, upon falling into the hands of a mining engineer, is at once detected by its absurd use of technical and scientific terms, and not infrequently by poor orthography and worse grammar. The chief evil of these reports is usually that they do not recite facts and are calculated to mislead those unfamiliar with the subject of mining. Private letters often accompany these reports of pseudo-experts, endorsing them in the highest terms, thereby making the person writing such letter a party to the fraudulent transaction. Not long since one of these would-be "E. M.'s" addressed a letter to a San Francisco mining engineer, asking endorsement in the form of a letter which would state that he was an experienced and competent mining engineer and metallurgist, explaining that by doing so he (the bogus expert) would be enabled to "earn a good fee." As he was only known to be an expert "tonsorial artist," the letter was not written. Unfortunately, this is not a single instance of this kind.

It has lately been reported that platinum had been discovered in northern Arizona near Cataract canyon. While this may be a fact there is some doubt about it and the statement may be taken with more than the usual allowance. The formation about that portion of Arizona consists chiefly of limestones, shales and sandstones, and thus far platinum has never been found in a similar formation elsewhere. Down in and near the bottom of the canyon of the Colorado river, a few miles from this reported strike, in the Cambrian and Algonkian or crystalline rocks, with their numerous dykes and injected sheets of eruptive rock, the announcement of the discovery of gold, silver, copper, lead and zinc, and even platinum might be believed, but little faith attaches to reports of such discoveries of precious or rare metals in the unaltered Carboniferous and Jura-trias of that plateau. Another recent discovery announced from that region is to the effect that a bed of sandstone 600 feet in thickness was found to be gold-bearing, and that owing to the coarseness of the gold it was found difficult to arrive at its correct average value per ton. It is almost needless to say that nothing of the kind exists there.

Within the past few months almost every deal for copper property has been announced as in the interest of the Amalgamated Copper Company. While that organization may be interested directly or indirectly in some of these deals it is not in all of them. When the Santa Rita mines in New Mexico were sold several months ago it was reported that the Amalgamated Company were the buyers. It has now developed that such is not the case. Another absurd report is now afloat to the effect that W. A. Clark is at the head of a syndicate that will buy control of all the copper mining companies in the country. A moment's thought will determine the improbability of any person or syndicate consummating such a transaction. The present price of stocks in the leading copper mines of the United States, taking no note of the large number of smaller mines, places the aggregate value of the leading mines at over $350,000,000. This sum would be swelled very materially by the addition of the numerous smaller but still valuable and producing mines—to at least $450,000,000. Such a combination of copper interests as is suggested is not likely to materialize.

No field presents a broader range for inventive genius than electricity. But a few years ago electricity was little known and but trivial application was made of the subtle force which to-day is seen everywhere. Step by step it has gone onward, each new success inspiring the tireless workers to new and greater endeavor. In more than one city of the United States fortunes were sunk in the earliest electric railways, which were unsuccessful. Now this means of applying power to city railways is all but universal. The first transmission plants were disappointing and far more expensive than the installment of similar capacity under like conditions at the present time. Forty thousand volts are now to be transmitted over ninety miles, and it is not unlikely that not only the amount of power but also the distance over which it may be transmitted will soon be greatly increased. What may come of experiments in wireless telegraphy can only be surmised.

At this season of the year the claim jumper is examining the public records and is on the lookout for valuable claims upon which the assessment work has not been done, therefore it behooves claim owners to make haste and take advantage of the few remaining days of 1899 to complete their assessment work on claims thought to be valuable enough to warrant the expense.

Concentrates.

ELECTROLYTIC COPPER has recently sold as low as 16¼ cents.

AT Dawson, N. W. T., the gold royalty to Nov. 1st amounted to $730,680.

WET CRUSHING has superseded dry crushing in the cyanide works at a number of places.

NORTH CAROLINA is credited with having produced about $20,000,000 in gold from her mines.

SOME of the ancient river channels of California have paid several hundred dollars per running foot.

THE difference is in the locality; the Kootenai district is in Idaho; the Kootenay district is in British Columbia.

IN '66 both gun cotton and nitroglycerine were tried experimentally at the Hoosac tunnel—the latter with great success.

THERE is a traditional story to the effect that rock blasting with powder was first introduced in 1130 in the mines at Rammelsberg.

IN South Africa the treatment of slimes by the cyanide process requires from eight to ten tons of liquid to treat one ton of slimes.

THE first ore shipped from any Aspen, Colorado, mine came from the Chloride mine in the spring of 1881. The freight charge was 6 cents per pound.

IN eastern Maine are a number of copper mines which have long been idle. They are now to be reopened. In the same vicinity are silver and mica mines.

METALLIC MANGANESE is of rare occurrence, although the oxides of the metal are important commercially. The ore is used chiefly in the manufacture of ferro-manganese.

AS EARLY as 1085 the Greeks are credited with making and employing explosive compounds, and firearms were said to have been first used in a sea fight occurring in 1098.

THE Alaska-Treadwell mine of Alaska pays dividends amounting to about $1000 daily. The Homestake mine of South Dakota pays $3500 daily in dividends. Both are low grade.

IN some veins where the dip varies, frequently giving the walls of the vein a waving form, enrichments are often found on the flattened part of the vein. These are called floors.

THE new shaft on the Tamarack copper mine, Lake Superior, is down 3800 feet and will reach the conglomerate at about 4500. The Red Jacket shaft of the Calumet & Hecla mine is about 500 feet deeper than this.

THE principal ore deposits of Ouray county, in the San Juan country, Colorado, are either in the eruptive rocks of Tertiary age or in the sedimentary beds underlying them. The eruptive rocks are chiefly andesites.

GALVANIZED IRON TANKS have been successfully employed in the cyanide process in El Dorado county, Cal. A description of this plant and its operation appeared in the issue of the MINING AND SCIENTIFIC PRESS of Oct. 28th, '99.

THE name Cerro de Pasco is of Spanish origin, meaning Hill of Pasco, the latter being evidently a proper name, the meaning of which is obscure, but evidently having no connection with the word pasqual. Cerro alone means hill.

A MIXTURE of corundum and magnetite (emery) occurs in irregular pockets in marble in numerous localities in Asia Minor. These deposits have been extensively worked. Some of the deposits are 200 feet in width and 300 in length.

RECENT experiments have shown that by careful roasting many of the rebellious ores of Meadow Lake, Cal., are made to yield from 70% to 95% of their assay value, though there are some ores which can not be worked at a profit by this method.

SOME eruptive rocks, such as quartz-porphyry, rhyolite, etc., and also some limestone and quartz, when struck with a hammer or with another rock, emit a peculiar fetid odor. Quartz possessing this peculiarity seldom contains gold in paying quantity.

THERE are several kinds of "day." For general purposes a "day" may be considered as the interval between two successive passages of the sun across the meridian—the time which elapses after the sun is exactly in the south before it again is seen in that position.

IF chloridized ore is brought into rapid contact with a suitable volume of solution of sodium hyposulphite in motion, the silver chloride quickly dissolves. It is thought that it is the volume of the solution more than its concentrated state that produces this result.

THE next meeting of the Lake Superior Mining Institute will be at Iron Mountain, Mich., beginning February 6, 1900. The leading topics suggested for the meeting are: "Improvements in Mining Methods and Equipments," "Reduction of Costs," "Keeping Cost Accounts."

THE tailings of the Montana Limited (Drum Lummond) mine at Marysville, Montana, are said to be the most refractory of any ever subjected to the cyanide treatment. They contain sulphides and carbonates of copper, ruby silver, arsenical polybasite and tetrahedrite, and are also low grade.

THE Nevada State Legislature granted a franchise to the Sutro Tunnel Co. in February, '65. Work was commenced on October 19th, '69, and connection was made with a shaft from the Savage mine July 8th, '78. The total distance from the mouth of the tunnel to the Comstock vein was 20,016 feet.

THE ore bodies in the Red Mountain district in Ouray county, Colorado, occur as shoots or chimneys in the andesite, along lines of fracture, and are of great depth and with a varying dip. These ore bodies upon exploitation proved very erratic and were not found confined to any particular horizon or plane.

AN aneroid barometer is a mechanical arrangement of great delicacy, used for the purpose of measuring the pressure of the atmosphere. By its use the relative altitude of different places may be determined. A large number of readings should be taken of any particular place and the mean reading accepted as the correct one, for the reason that atmospheric conditions change frequently, the daily variation amounting to considerable. The word aneroid means without flow or fluid (without mercury).

WHERE the floor of a drift is too soft to support the posts of a timber set, sills should be laid on the floor, the posts being placed upon them. A drain may be provided, if there is a large amount of water to be carried away, by elevating the track upon sprags extending from post to post. The sprags may rest upon short legs.

IN the operation of the cyanide process where the material treated contains sand and slimes great difficulty has been found in getting a uniform distribution of the material in the leaching tanks. There is a constant disposition on the part of the slimes to segregate into floors or layers, which is detrimental to the progress of the work.

THE expansive force of freezing water in rocks is equal to the weight of a column of ice a mile high of the same base area—about 150 tons to the square foot. One centimeter of water at 0° C. occupies 1.0908 cm. in the form of ice at 0° C. It is this expansion of about one-tenth that disintegrates rock when the water confined in the interstices solidifies.

BUT twenty-nine days remain in which to do unfinished assessment work for '99 on unpatented mining claims. Claim owners are out in force this month, saving their locations by energetic work long delayed. While thus engaged it should be remembered that two assessments can now be performed—the first $100 worth in 1899 and the second $100 worth in 1900.

IN the early history of mining the ancient miners used frequently to wave blankets or sheets in a vigorous manner to drive out foul air or gases. The same thing is still not infrequently done. Rapidly lowering and raising the bucket in a shaft will sometimes displace foul gas by the creation of a current of air. Showering water down a shaft also sometimes has a similar effect.

THE rights secured by the location of mining claims pursuant to the provisions of statute and the land office regulations are property rights, and are recognized and protected as such. Such property may, without infringing the title of the United States, be sold, transferred, mortgaged and inherited, prior to patent. Mining claims are not subject to the wife's dower.

WHEN excavating a cut for the commencement of a tunnel the cut should be carried into the hill a sufficient distance to give solid rock overhead at the mouth of the tunnel. Failure to do this results in the caving of the mouths of many tunnels within a year of their commencement, which entails additional expense. If snow drifts into the cut timber sets may be put in the cut and the whole lagged and covered.

THE typical Mexican smelting furnace, called horno castellano, is a shaft in an adobe wall lined with stone, which will stand a high degree of heat. It is approximately square. It has a single tuyere, and the furnace is about 5.5 feet in height from the mouth to the tap hole. The bottom of the furnace has a slant forward. A shallow basin is scooped out in the earth in front of the tap hole, into which the molten metal is run.

AS lands which are essentially mineral in character can not be the subject of appropriation under the homestead laws, but may be appropriated under the mining laws, an entry within the limits of a homestead claim, for the purpose of initiating a mining right, may be made at any time prior to the issuance of the final certificate to the homestead claimant, if such entry be made in good faith and without force or violence.

THE law requires $100 worth of work or improvement annually done for each unpatented claim. Where several claims lie in a group assessment may all be done on one claim, if the work so performed is for the benefit of all claims, but the notice of labor having been performed posted on the mine should state this fact, and a notice should be posted on each claim of the group, making a similar statement and setting forth where the assessment work has been done.

THE Canadian Parliament at Ottawa has passed an order in council providing that those who prospected for hydraulic mining leases in Yukon prior to December 3rd, '98, may make application for the same without competition on showing that they had prospected the same prior to the issue of the regulations on December 3rd, '98, when they were really not in position to know what action they should take. Under the present regulations application should have been made as well as prospecting done before December 3rd, '98.

THE fine distinction of law in high places is again finely exemplified by a decision of the Washington State Supreme Court on November 21st, discharging an "innocent" man charged with salting a mine at Bucoda, Wash., the evidence sufficiently showing that there was not enough mineral in the land so salted to constitute said tract mineral land, thus leaving unrestricted similar operations on the part of any one careful to discriminate between mineral land and land not likely to be so adjudged by Washington supreme jurists.

THE metal obtained from the Lake Superior mines is not "pure copper." The percentage of ingot copper varies somewhat. Following is a statement showing the percentage at the various mines:

Mine.	Per cent. ingot in mineral.	Mine.	Per cent. ingot in mineral.
Atlantic	75.009	Osceola	84.083
Calumet & Hecla	70.000	Quincy	79.489
Central	69.900	Tamarack	67.421
Franklin	81.107	Wolverine	87.681

THE district of Ballarat, Victoria, Australia, comprises two narrow belts running north and south. The eastern belt is worked for a distance of eight miles, that on the west for five miles. The formation consists chiefly of sandstones and shales. The veins are often accompanied by thin beds of dark carbonaceous shales called (locally) indicators. They are conformable with the inclosing slates and sandstones and stand almost vertical. These bands of shale are usually heavily charged with pyrite and arsenopyrite, the sulphide mineral sometimes becoming massive and replacing the shale completely.

THE general principle upon which dry-blowing placer machines are constructed is that of a box containing a series of slanting shaking screens of different mesh. The material is sorted in this manner and arrested by riffles, the finer stuff being blown away by the puffs of wind intermittently forced from a bellows attached to the machine. In Western Australia many of the dry washers are without bellows, the box being provided with supports or legs made of slender sticks. Two men are required to operate the machine, one to shake it, the other to shovel in the dirt. A strong wind, which usually prevails on the gold field, blows away the fine material.

THE gilsonite found near Fort Duchesne, on the Uintah reservation, Utah, is very brittle, breaks with a conchoidal fracture and is easily powdered. It fuses at a low red heat and burns with a brilliant flame. It is plastic when warm, and on cooling presents a smooth, lustrous surface, and is brittle; color, black, streak and powder dark brown; soluble in carbon bisulphide and in benzol; partially soluble in oil of turpentine and in ether; slightly soluble in naphtha and very slightly in alcohol. It occurs in several localities of that neighborhood. Some of it is impure from a mixture of sand.

WHERE it is desired to locate a tunnel claim under the United States laws the mouth or entrance of the tunnel may be on patented land, if said land be owned by the tunnel locator; or, if not, with the consent of the owner; or it may be located on an unpatented claim owned by others if consent be obtained. Then, if the greater portion of the projected line of the tunnel be on the public domain, the tunnel locator will obtain all the rights and privileges which arise under the tunnel location law; but the tunnel cannot be driven through any claim previously located without the consent of the owner of such claim. All agreements in matters of this kind should be in writing and witnessed and placed on record.

It was many years after their discovery that the telluride ores of the Black Hills of South Dakota were recognized as such and a suitable method of treatment applied, but prior to success in that direction large fortunes were spent in machinery and unsuccessful experimentation with various processes. In most of these some form of amalgamation was the basis of operations, and in more than one case not only were the gold and silver contained in the ore treated lost, but also the quicksilver, passing out on the surface of the tailings, so finely divided by sickening as to float. The tailings should have been impounded, but were not. Had they been they would have offered a rich reward to the successful cyanide workers of to-day.

WHERE the locator of a claim allows his title to lapse by reason of nonperformance of assessment work and the claim is taken up by another, all improvements made thereon and upon the claim at the time the second locator has perfected his location becomes the property of the second locator—any State laws to the contrary notwithstanding. The original locator has the right to remove any and all improvements while the claim is still in his possession; loses this right when his successor has taken up the forfeited location and perfected his location of the claim. Fixtures, including such improvements as engines, boilers, hoists, mills, or any other things of this character annexed to the soil for mining, become part of the freehold, and as such pass to the relocator.

IT has been suggested that the veins of California's gold belt are the result of accumulations upon an ancient beach similar to that at Cape Nome, Alaska. Such is not the case. The gold veins of California bear not the slightest resemblance to conglomerate or other fragmental deposits like those found on the Witwatersrand, S. A., or in the Black Hills on the Gustin belt. The veins of California are fissures cutting indiscriminately through sedimentary and eruptive rocks alike, and cut the slates usually in dip and also sometimes in strike. They possess none of those features which so clearly distinguish beach deposits. The ancient river channels approach more nearly to the conglomerates of the beach deposit, but they are distinctly river and not shore deposits.

THE proprietor of a vein or lode claim or mine, or the owner of a quartz mill or reduction works, may locate five acres of non-mineral land as a mill site. A notice should be posted thereon, which must contain the name of the locator or locators, the name of the vein or quartz lode or mine of which he is the proprietor or the quartz mill or reduction works of which he is the owner, the date of the location, the number of feet or acres claimed, a description of the claim by such references to a natural object or permanent monument as shall identify the claim or mill site, and by marking the boundaries in the same manner as provided for the marking of the boundaries of a placer claim. A mill site must not exceed five acres in area. The mill site may or need not be contiguous to the lode claim or claims for whose benefit the mill site is located. In applying for patent to mill site the mining claim and mill-site claim may be included in a single location. A square tract of five acres measures about 466 feet on each side.

OF tunnel locations, "Lindley on Mines" says: "Tunnel locations, or tunnel sites, as they are sometimes called, occupy a unique position in practical mining upon the public domain. They were not unknown during the period antedating the enactment of congressional mining laws. The discovery of a new mineral belt frequently gave birth to local rules upon the subject of tunnels, and it was by no means an uncommon occurrence for tunnel locations to be made on the four slopes of a mountain, their projected lines running into the hill from every conceivable point of the compass, and at different elevations above the mountain's base, from 100 to several thousand feet. Strife or litigation between surface locators and tunnel proprietors rarely, if ever, arose, for the simple reason that, according to the popular view, priority of discovery, whether from the surface or in the tunnel, established a priority of right." The Federal law enacted May 10th, '72, provides: "Where a tunnel is run for the development of a vein, or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within 3000 feet from the face (meaning entrance) of such tunnel on the line thereof not previously known to exist, discovered in such tunnel, to the same extent as if discovered on the surface; and locations on the line of such tunnel of veins, or lodes, not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel."

Phenomena Attending the Accumulations of Bitumen.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, State Mineralogist of California.

The phenomena described in the succeeding pages are connected with the accumulations of bitumen as observed in California. All of these phenomena are generally found in one formation and so frequently together and in conjunction with bituminous deposits that it must be considered that one is the result of or is closely connected with the other, especially when it is known that one can produce or is the indirect effect of the other.

These phenomena would not be important in prospecting for a primary or stationary mineral deposit, but will be of great assistance in the discovery of a derived and migratory fluid such as petroleum oil.

When their influence, relation and position in regard to bitumens or bituminous deposits are determined and more generally understood, they will materially assist in the discovery and development of such deposits.

Red shales, earth subsidences, mineral and hot springs, leached shales and sandstones, silicified shales and sandstones, and accumulations of bitumen accompany one another and are traceable to metamorphic action.

Normal Shale.—This is an impure hydrous silicate of alumina. It contains about 20% alumina, about 70% silica, and in variable and small amount protoxide and carbonate of iron, lime, soda, magnesia, potash and other minerals, and organic substances.

It contains fossils in greater or less number, color usually dirty white to brown, but sometimes of other colors. It gives out an earthy odor when breathed upon, and is readily scratched with the finger nail. When wet with water it can be kneaded into a plastic mass. It is clay consolidated by pressure, and is capable of being split into thin layers along the original laminæ of deposition. When exposed to atmospheric influences it rapidly disintegrates.

Normal Sandstones.—When first deposited by water these consist of incoherent grains of silica of different fineness. The grains are more or less rounded by attrition, the result of their transport by water. They may contain fragments of other rocks, and they may contain in small quantities lime, magnesia, potash, soda, a number of other minerals and organic substances.

After deposition, the cohesion of the grains may be effected by pressure alone. They may contain fossils in greater or less number. Sandstones are of many colors.

Both shale and sandstone at the time of their deposition may be cemented by ferric, calcareous, siliceous or other material; but this cementation usually occurs subsequent to their deposition, when fresh or mineral waters commence to circulate through them.

Alterations in the shale and sandstone, effected by fresh and mineral waters, heat and in other ways, will be described hereafter.

The accompanying sketch and sections (Figs. 1 and 2) show a portion of the San Rafael mountains, situated in the northern end of Santa Barbara county, State of California.

The territory shown on the map includes an anticline with a northwest and southeast strike and having a metamorphic core. The unaltered rocks of the anticline consist of alternating beds of sandstones and shale, and the metamorphic rocks principally of cherts, jaspers and serpentines.

The metamorphic rocks shown in the diagram



FIG 1.

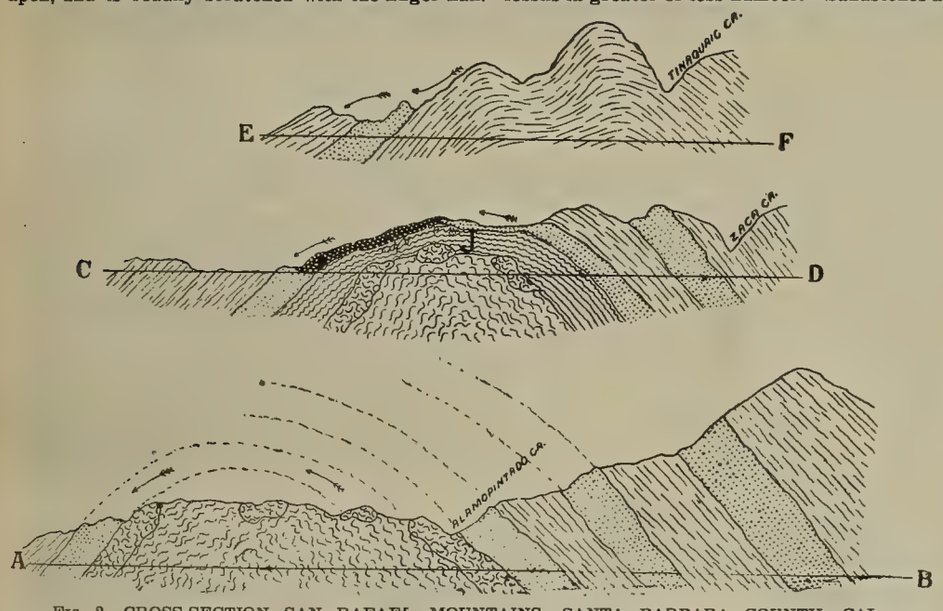


FIG. 2.—CROSS SECTION SAN RAFAEL MOUNTAINS, SANTA BARBARA COUNTY, CAL.



SUBSIDENCE LA BREA CREEK.

and sections once formed a portion of the unaltered shales and sandstones now forming these mountains. The unaltered strata have afforded casts of marine shells considered by Dr. Merriam as Pliocene.

The broken, bent, distorted and warped condition of these metamorphic rocks has been attributed to the movement of the mass after metamorphism has taken place.

The broken condition and intricate jumble of these altered shales and sandstones could not have occurred subsequent to their metamorphism. The chief cause of the disturbance of these rocks occurred before they were metamorphosed, owing to the contraction of the sandstone and shale. When burned to a jasper, the overlying rocks of Nature's kiln were continually falling and subsiding.

The face of a bluff of shale or sandstone in which subsidence is taking place is much different in appearance to the face of a bluff composed of these rocks which are being thrust upwards, or which are subjected to lateral pressure.

In subsidences of shale and sandstone numerous cavities are formed which are arched above, the rock having fallen from beneath the arch. When these arches break the cavities are filled with loose material.

These arched cavities do not occur in formations which are being uplifted. In subsidences, cracks in the rocks which approach horizontality are widened and the rocks fault on the cracks. These cracks are not widened in an upward thrust.

Subsidences are not faults; they usually form a centrocline and the depression is always greater at the center than at the periphery; many of the depressions are bowl-shaped and are called "ollas" by the Spaniards. Many of these depressions now form the beds of lakes. In the same area these subsidences are repeated many times. The entire area does not subside at the same time, and it is, therefore, greatly broken and crushed; nor does the movement take place at one time, but may continue for years.

By the time these shales and sandstones come in contact with metamorphic heat they are badly broken and contorted, owing to the action of subsidence, and they are further warped and twisted by the heat of metamorphism.

At a depth of 500 to 1000 feet the subsidence due to coal workings amount to about 50% of the thickness excavated; sometimes these subsidences continue during four years. The contraction in a formation composed of equal volumes of shales and sandstones when burned to a porcelanite is about one-tenth of its original volume. A formation burned to a depth of 1000 feet would give a subsidence on the surface of 100 feet in depth, or taking the amount of subsidence as is shown in coal workings, would give a subsidence of 50 feet in depth.

The red shales and porcelanites described in a former article by the author nearly always accompany these subsidences. If the interspaces existing in these red shales were filled with soluble silica they would become jaspers of many colors.

The presence of comminuted red shale in the oils at Summerland, Santa Barbara county, Cal., and the striking of red shales at the same place at a depth of 1000 feet, show that these shales exist at great depths.

Scattered throughout Santa Barbara county are over 1000 acres which have undergone subsidence, and some of which are still subsiding. The amount of depression is from 20 to 60 feet, with an average of 40 feet, and there may be many more acres which have undergone subsidence which have escaped observation, or which are or were not visible on the surface, or, if visible, all signs of the same have been obliterated.

Near the north line of the Sisquoc rancho on La Brea creek, Santa Barbara county, the bluff on the west side of the creek is over 300 feet high and over a mile long, and covers an area exceeding 300 acres. The entire bluff is badly broken and contorted and shows evidences of subsiding.

Chemical heat reddens and bakes and vitrifies the shales at the bottom of the bluff. The surrounding shales are blackened with carbonaceous matter. Fig. 3 shows the southern end of the bluff. Surrounding this subsidence are hundreds of acres of shales which have been silicified.

In the vicinity of nearly all these subsidences burned and leached shales and sandstones are found.

The breaking and contortion of the metamorphic rocks have been attributed to the dynamic force exerted in the uplifting and plication of the mountains. While this force is responsible for this broken and contorted state in part, the greater part must have been affected by subsidence and the warping of the rocks by the heat of metamorphism.

The curvature in the altered rocks is too acute and in the wrong direction, and the fragments of the rocks bent too small to have been made by the uplifting of the rocks.

Attending the uplifting and the metamorphism of mountains there must have been subsidences of the superincumbent unaltered rocks to fill the space caused by the contraction of the rocks through the action of heat.

The breaking and division of the unaltered rocks lying above and adjoining the places where metamorphic action is in progress facilitates metamorphic changes. It is like the placing of broken coals upon a fire, the interspaces between the pieces permitting the circulation of gases, minerals and heat.

(To be Continued.)

Motive Power for Mines.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by A. E. CHODZKO.

There is no occasion for entering into a detailed description of the mechanical arrangement of the plants, which will vary more or less in each case.

In a general way, and referring more particularly to moderate size installations, already supplied with hoisting, milling and pumping outfits, the oil engines will be so located as to belt with the countershafts at present connected to the water wheels or electric motors, clutches being provided whereby communication can be established or interrupted between the oil engine and the work.

With the possible exception of lengthening a shaft, and of putting up a clutch, a couple of bearings and a set of tight and loose pulleys, this arrangement will not disturb the existing machinery; the oil engine itself can be used without alteration, and such as it is, sold, the motor intended for the hoist being of the marine reversing type, if it is desired to run both ways, and if not, being, like all the rest of the motors, an ordinary engine for stationary work. The cost of creating emergency power is thus reduced to a minimum, all the component elements being standard articles.

The number of oil engines to be used will be determined by the relative location of the various portions of the plant. In a general way, it is safe to say that the mill should have an independent motor, as it must be kept in activity regardless of the fluctuations of power in the other departments.

But not unfrequently the same motor will do for operating the hoist and the air compressor, more particularly so if water is bailed out on the night shift, and if the rock drills are used for stoping, because then the various natures of work can be so arranged as to come in succession, or at least so as not to overlap one another to an inconvenient extent.

The motors should not be multiplied without necessity; at the same time, in no ordinary circumstances will it be advisable to throw all the work on a single engine with disconnective attachments, because first this would frequently work at part load, which is not economical, and then, it would be repeating the objectionable features of a single source of power, which have previously caused the suggestion of an emergency plant.

The installation will be complemented by one or more oil tanks connected to each motor by piping: unless the oil has to be hauled from a long distance and over bad roads, thus making the regularity of supply during the stormy season a matter of uncertainty, one or two weeks' supply should be sufficient for all practical purposes. The danger of fire, which is an important factor with gasoline, becomes quite secondary in the case of crude oil.

If, as previously hinted at, arrangements can be made for pumping the oil from the nearest railroad station or from some other convenient point, a small pumping station must be established at the point of supply, consisting of a direct acting pump operated by steam, or of a pump of proper description, according to the lift, and actuated by belt from an oil motor. The cost of such a plant, even for a considerable power developed at the mines, is quite moderate, and that of its operation will appear further on, when numerical examples will be considered.

As to the cost of the pipe line, only general remarks can be offered, as local convenience and conditions will have to guide in the details. A small size pipe, say 2½ inches, will carry 11,000 gallons of oil in twenty-four hours at a distance of fifteen miles, which would suffice for an aggregate H. P. of 4600.

In the mining sections of California, where very severe cold is seldom of long duration, the fluidity of crude oil will not be affected to any troublesome degree, and even should its viscosity increase noticeably, this could be corrected by the temporary admixture of a moderate amount of some lighter oil.

The pipe line need not be buried deeper than necessary to protect it against injury from falling rocks, or from the contact of passing vehicles or animals, and since the pipes are light and their screwed joints easy to make, laying a line of this kind should be a rapid and comparatively inexpensive work, and if properly done, the cost of maintenance of the same will be small.

If each mine owner had to build his own pipe line, there is, of course, a limit of distance in each particular case, beyond which he would find the undertaking an inadvisable investment, its convenience and economy of operation notwithstanding.

But we are here considering the case of a number of power consumers drawing from the same water or electric supply; and it naturally occurs that association may be the right step in the contemplated construction of an oil-pumping outfit; or else, if objections exist on the ground of joint ownership, private enterprise, acting as contractor for the conveyance of oil to several mines, might offer a solution of the problem.

In some mining regions the railroad passes at a sufficient proximity from the mines to make the individual establishment of an oil-pumping outfit accessible to a number of them; so that the foregoing remarks are about as much as can be said in a general way.

Coming now to consider the case of a deep shaft, where the hoisting speed is greater, the loads heavier and where a greater elasticity of movement is more desirable than in a smaller mine, it has been previously suggested that connection to or disconnection from a constantly moving motor did not present the guarantee of perfect control of the load possessed by a double-acting pressure engine, and that the proper arrangement consisted in interposing, so to say, compressed air between the oil engine and the drum of the hoist.

In other words, the oil engine should actuate an air compressor, discharging into a receiver, from which a compressed air hoist would draw its motive power.

This seems to introduce into the proposed plant an element of complication and of consequent greater cost; and so it does, in so far as the first cost of the installation is concerned. All that can be said about it is that special requirements call for special appliances, and for a correspondingly increased outlay. It will be shown, however, that this necessary evil is compensated for by a still higher degree of safety in the hoisting plant; and the operating expenses differ but little from those consistent with the direct driving of the hoist by an oil engine.

In this case air compressor and air motor are in close proximity; hence, no loss of efficiency is incurred by pipe friction; and, besides, the necessary reheating of the air used in the motor is effected at no expense by the exhaust gases of the oil engine actuating the compressor.

A similar arrangement has been in operation at a mine in Calaveras county, Cal., since 1898, but there the prime mover is an electric motor, operating an air compressor, and the reheater is a steam boiler, which, when acting in the former capacity, is only under moderate fire, to sufficiently evaporate what water is carried away by the compressed air, which is both heated and saturated in its direct contact with the water in the boiler.

Should anything happen to the electric motor, the piping has been so arranged that the air engine of the hoist can be quickly transformed into a steam engine; the only thing to do in that case is to push the fire under the reheater, acting now as a regular steam boiler, so that the increased elasticity of action due to the use of an air hoist is here combined with the advantage of having an emergency plant.

This installation is said to be very successful, and, under the existing local conditions, more economical to operate than when the electric motor was directly attached to the hoist, and it can appropriately be quoted in the present case, because, like the oil engine, the electric motor must be run at practically constant speed, having, however, this relative advantage that it can be started and stopped without difficulty.

At the time of the recent fire mentioned at the beginning of this article, the mine in question was enabled to continue operations without interruption.

Should an air hoist be operated by means of an oil engine, with a similar system of reheating, the boiler would be heated by passing the exhaust gases from that engine through the flues, the compressed air receiving, if necessary, a preliminary heating in the cylinders' jacket, and, in that case, the degree of safety would be two-fold, as regards the regular motive power of the mine, there being a joint emergency plant with the oil engine, and another with steam, for the hoist alone. There seems to be no question, therefore, regarding the satisfactory working of this arrangement, the economical conditions being still more favorable than in the case mentioned.

Several questions now arise, as, for instance, whether a special compressor should be attached to the hoist, or if the same machine should supply compressed air to it and to the other services of the mine, as well.

Again, what would be more desirable for the hoist—the ordinary system of compression or of the double-pipe arrangement, which in a case like this, would retain its advantages, while its defects would be much attenuated; also, whether dry reheated air should be preferred to saturated air?

The treatment of these and other points would unduly extend the scope of the present essay, whose main object was to call attention to some practical means of warding off the consequences of a failure in the motive power of a mine from natural or accidental causes.

(To be Continued.)

Indicator Veins.

The subject of "Indicator" or companion veins is an interesting one and there is little literature on the subject, but that these occur is a well-established fact. A correspondent of the London *Mining Journal* of a recent date gives the following interesting description of what he designates an "Indicator" vein:

One of the leading quartz veins of the Ballarat group extending in one direction toward Buningyong and in the opposite trend toward Creswick, has the singular—almost phenomenal—characteristic accompaniment of a small parallel vein of about 4 or 5 inches in width, known as the 'Indicator' vein. The main vein is 8 or 10 feet wide and carries a fairly remunerative percentage of gold, but the small vein above referred to—encased in a black slate—is a miniature 'Bonanza.' It is unique in formation and unrivalled as a gold producer. During the twin development between Ballarat and Buningyong, a distance of nine miles, the dwarfed Comstock has evolved a problem unsolved in auriferous deposits. It has often shown a matrix of wholly precious metal, the silica being displaced by entire gold, no vestige of the gangue initial matter being left. I well remember, about thirty years ago, seeing a pendant of pure gold in egg-sized lumps, united by a thin, wire-like chain of about 4 feet long, and of the value of £1500, taken from a depth of 250 feet on the 'Indicator' lode. What are called 'bunches' of gold are frequent, and it is difficult to tell when they take their departure. The uniformity of the lamellar structure of the enclosing black slate has only to be seen once to be ever remembered after. The distance of the two veins one from the other is no more than about 30 or 40 yards. In the first stage of quartz mining in Ballarat for gold, a mine known as the Black Horse Company was the pioneer mine. I have observed the same two veins on the north or Creswick side of Ballarat, but no development was being prosecuted. A large portion of the Ballarat group of veins is hidden from view by surface-covered basalt.

In San Bernardino county, Cal., in the Lava Beds district, thirty-six miles easterly from Daggett, occurs an interesting instance of companion veins. In this case the two veins are wholly unlike in structure, in character of the minerals and in value. But one of these veins is developed to any great extent. The formation in this portion of the district is a typical quartz-porphyry. In this a fissure has occurred of considerable longitudinal extent. It is a single, simple fissure, remarkably straight in strike and dipping nearly vertical. On the hanging wall side of this fissure, at irregular intervals, occur zones of crushed quartz-porphyry, which have become the repository for minerals derived from solutions rising along the fissure from great depth.

The largest of these deposits of ore has been exposed by a large open cut, a shaft and several crosscuts. In this ore body the original porphyritic structure is still clearly distinguishable in those portions of the deposit lying along its outer edges, the ore passing over by gradual transition to normal county rock. In the heart of the ore deposit and near the fissure the rock has been completely altered, however, the result being a more or less complete change in its mineral and physical condition. The porphyry is found silicified to a hard quartzose or jaspery rock and the feldspars have become kaolinized. Where are found the most complete crushing and pulverization of the normal rock, there may be observed its greatest alteration, with the formation of the largest amount of ore. In the brecciated portions of the mass the ore occurs as incrustations on the angular fragments of rock, and filling more or less completely the interstitial spaces, and to some extent the ore is found penetrating the rock fragments themselves as impregnations.

The normal deposition of the ore was in the form of sulphides, chiefly of iron, lead and copper, with gold and silver. The secondary minerals resulting from the oxidation of the sulphides are chiefly interesting for the variety in which they are found. In a single piece of this ore, not more than twenty pounds in weight, may be seen hematite, limonite, magnetite, malachite, azurite, chrysocolla, cerussite, wulfenite, manganese oxide, chloride of silver, quartz, kaolin, calcite and gold.

Along the fissure plane the line of demarcation is very plain, but on the opposite side of the deposit the metallic oxides gradually become less noticeable and a bleached grayish-white rock passes over to the normal quartz porphyry. The ore does not penetrate the foot wall. This ore body is 200 feet long and about 30 feet wide at its widest place, thinning out irregularly toward the ends and also apparently downward, being a typical illustration of the chambered vein of Dr. G. F. Becker, this surface deposit being what he designates as the cap chamber.

The principal value of the ore is in gold, and this occurs from a trace to several thousand dollars per ton. One cannot distinguish by the physical appearance of this peculiar ore between a piece almost destitute of gold and one rich in the metal, unless the gold can be seen, which is rarely the case.

On the south side of the ore deposits occurring along the fissure, and of which that above described is a type of all, lies a small companion vein—a fissure from a seam to 2 feet in width and extending over the barren desert hills for several thousand feet. It is but a few feet distant from the series of ore deposits above mentioned, in the same country rock and surrounded by the same conditions apparently, but is distinctly different. The gangue is quartz of granular texture and having a peculiar pearly luster resembling much the appearance of some varieties of gray lead carbonate, though this mineral is found very sparingly in the vein. Accompanying the quartz are found in minor quantities calcite and black oxide of manganese. Malachite occurs as an incrustation in the seams of the ore. Assays from this vein taken at various places show values in gold ranging from $50 to over $200 per ton, yet, strange to say, this vein has never received more than casual attention, no effort ever having been made to develop it.

The wide difference in the character of these veins so closely situated in the same rock formation seems to furnish additional evidence that the minerals contained in these deposits were not derived from the wall rocks themselves, but came from below, being carried upward in solution in the waters flowing along the fissures in which the deposits occur.

W. H. S.

Mining Conditions at Globe, Arizona.

TO THE EDITOR:—Globe mining district presents one of the peculiarities which have been noticed from time to time since the earliest history of mining, in this, namely: It was started in 1873 as a silver mining camp and was a producer of that metal before Leadville was known or Aspen was dreamt of, and has developed since into one of the best known and steadiest producers of copper in the country.

Strange to say, too, the first mining locations made were those of the Globe and Globe Ledge claims, now a part of the property of the Old Dominion Copper Co., the largest producer in the district. The transition from silver to copper was gradual and the district has not suffered by the change.

The district was organized in 1875 and the principal silver discoveries were made in the following year, when the mines at Richmond Basin—the McMillen and others—brought the aggregate of silver produced to upwards of $2,000,000. The first copper ore smelted was in 1877, by Venardsell & Garrish, in an adobe furnace at Wheatfields, twelve miles north of Globe, the ore being from the Hoosier mine, the result being forty tons of copper. The Hoosier is now the principal mine of the United Globe Mining Co., commonly known as the Buffalo and owned by Phelps, Dodge & Co. of New York, who are also the owners of the Copper Queen at Bisbee. Copper mining here was at first slow, owing to the wagon haul of 140 miles to Wilcox, and profit would have been impossible had it not been for the rich ores and simple process of smelting.

This property, which came into the possession of its present owners in 1891, has been a constant, although somewhat erratic, producer ever since. The present furnaces were frozen four weeks ago, resulting in the discharge of 200 men. Material for the construction of new, improved furnaces of a capacity of 250 tons per day is en route from the Colorado Iron Works at Denver, and it is expected everything will be in running order by the first of January, 1900, with from 200 to 300 men at work in and about the mine and smelter.

I am informed that there is a body of ore 46 feet wide on the 500 level, consisting of oxide, carbonate and sulphide of copper, and that the 600-foot level looks even better. E. H. Cook is the general manager and superintendent.

The Old Dominion Co. operated a small furnace in 1881 at Bloody Tanks, seven miles west of Globe, but the venture was a failure. The company's present furnace was started in 1882 on ore from the Globe mine, when there was no development other than a 20-foot hole and a tunnel, and the smelter has never since been shut down for want of ore, and every shaft and other opening is in better ore to-day than ever before in its history. The Bigelow–Lewissohn syndicate of New York have owned the property since June, 1895, during which time it has been managed by S. A. Parnall, under whose direction the main shaft has been enlarged from two to three compartments and carried down from the eighth level (430 feet) to the twelfth level, 850 feet below the surface. In ground supposed to have been worked out new ore bodies have been found, and there is at present ore enough in sight to keep the property running at its present capacity for years. In this case, as in many others, deep workings have proven that Arizona mines go down.

Owing to water, work below the eighth level has been impeded, but a new compound condensing pump of a capacity of 500 gallons per minute has been installed, and it is said the shaft will be continued to a depth of 2000 feet. A wire cable tramway conveys the ore to the smelter.

The success of the above-described properties, the advance in the price of copper, together with the advent of the Gila Valley, Globe & Northern Railroad, naturally stimulated the search for other copper ore bodies, and resulted in the opening of the Black Warrior, eight miles west of Globe. An inspection of this property showed that it had been opened in many places by tunnels and shafts to a depth of 300 feet, and there are ore bodies in sight variously estimated at from 175,000 to 195,000 tons of 8% ore. It is a silicious sulphide ore. Considerable ore was shipped from this property in 1897 and 1898, when the conclusion was reached that a large saving could be made by the erection of a plant upon the property for the reduction of this particular class of ore. To this end arrangements were made with the Colorado Iron Works, at Denver, Colo., for the erection of a leaching plant—the second of the kind in the Territory—which has recently been completed under the personal direction of S. W. Traylor. A successful test of the plant, which cost about $50,000, has been made; but the works are shut down at present, pending the sinking of a well for additional water—which they will have no difficulty in getting—and the lining of the pumps and tanks with lead, instead of asphaltum, arrangements for which have been made.

The furnace of this plant is a reverberatory, 9x16 feet, lined with firebrick. Above the refining furnace is the leaching plant. First is the boiler house with two 50 H. P. marine boilers, condensers, feed pumps and air receiver; next is the engine room, with a 100 H. P. Corliss engine and a compound air compressor capable of compressing air up to 150 pounds to the square inch.

On the side hill above, the ores come in cars from the mines, is dumped into a bin from which it goes to a large Blake rock crusher, thence to another bin and from there through a set of rolls, weighing seventeen tons. From these the ore is raised with an endless belt elevator to a revolving screen, then through another set of high-speed rolls weighing 16,000 pounds. The ore is again elevated to revolving screens and is carried by a horizontal endless chain conveyor to any one of the tanks. These are twelve in number, holding twelve tons of ore each; they are all suspended on trunnions with worm-screw gearing, so that they can be dumped when the pulp has been leached.

After the copper is in solution it is conveyed to a solution tank and drawn into precipitating tanks, in which revolve large copper drums, containing scrap iron to precipitate the copper. From this the precipitates are taken to the refining furnace.

The tailings from 10% ore, after leaching, resemble barren, coarse sand and assays less than 1% copper. Mr. Fleming claims that by this process copper can be made for 6½ cents per pound. The capacity of the plant is 100 tons of ore per day, which, it is said, can be mined and delivered to the plant at a cost of $1 per ton.

Just beyond the Black Warrior Copper Co. property, the Donnellan Copper Co. are developing a group of claims owned by a Philadelphia syndicate. H. A. Fry and J. Wright, members of the syndicate, are now visiting the property. D. F. Morgan of Minneapolis and J. T. Donnellan of Globe are opening a property on Mineral creek, near the Ray Co.'s mines. The payrolls of the companies, when running to their full capacity, amount to about $75,000 per month.

Several of Globe's citizens are developing copper prospects in the "Strip," twelve miles south of San Carlos. Among them are Mr. Jones, Gen. Supt. of the G. V. G. & N. R. R., who is interested in the Copper Bell; W. M. Williams, Dr. T. S. Collins and others.

Capt. W. J. Nicholson, Indian Agent at San Carlos, is on his way to Chicago to close up two sales of properties on the "Strip." One, the Olympia group, in which J. Lillie and M. Flaherty are his associates, has been sold for $30,000; the other, the Amazon group, in Hawk canyon, consisting of nine claims, brought $50,000. The purchasers are Detroit people, said to be interested in the Calumet & Hecla mine.

K. R. CASPER.

Globe, Ariz., Nov. 20th, '99.

IN the issue of the 11th ult., on page 550, in the illustrated article on "belt conveyors," the cut "Fig. 5" was inverted.

A Non-Technical Account of Wireless Telegraphy.

The fundamental principle on which space telegraphy—"wireless telegraphy"—rests was first noted and mentioned by an American—Prof. Jos. Henry of Washington, D. C., in 1842. He was experimenting with an old-fashioned electrical machine—one of the revolving-glass-plate sort which makes sparks. He was passing the sparks from this machine through a long iron wire shaped into a coil. He observed that every time a spark jumped there was marked evidence of electrical action in another coil some distance away. He placed this second coil in the basement of the building, three stories below the room where he was at work, and even at that distance the action in the second coil was "strong enough to magnetize needles." This was wireless communication on a 30-foot scale.

It is obvious that, if one phenomenon at A invariably produces another phenomenon at B, there must be some communication between A and B. It is impossible to conceive of one action influencing another action without some sort of connection. The connection may be roundabout, complicated or invisible; but it exists somewhere, or the second action could not occur.

Henry, therefore, knew that there was something which connected the two coils in his laboratory, or at least that there was something which they had in sympathetic communion. He called this something "an electrical plenum." Modern scientists call it "the ether." They mean the same thing. To name a thing, however, is not necessarily to understand it. Although one knows that the ether exists, and can prove its existence in various ways, none know else about it. There are some theories concerning it, one of which may be the truth; but, so far as accurate knowledge goes, the ether is at present one of the deepest secrets of nature. However, as it is through this ether that wireless telegrams are sent, it is necessary for the purpose of explanation to attempt to give some idea of it, or rather some idea of what it is believed to be. Suppose one imagines all space filled with a marvelous sort of jelly—a jelly invisible, imponderable, intangible and continuous—without a rift or break or crack in it anywhere, and further imagines this jelly to be of such a fine texture that it can and does penetrate between the very atoms of matter; that the atoms float in the jelly like a handful of currants in a real jelly, or like a handful of fine shot in a pot of semi-liquid tar. Then to still further imagine this unimaginable jelly to be so delicately elastic that a blow to it anywhere will shake it, not exactly in jelly fashion, but in "waves," one will have as good an idea of "ether" as most people have.

It is this "shaking" of the ether when it is disturbed that is here of chief concern, and of this there is no doubt nor question. A shock to it in any spot starts waves in it, something like the waves made in a smooth sheet of water by the dropping of a stone. These ether waves can be started in various ways; but, once started, they travel in a straight line in all directions from the point of shock, and always at the same speed—186,000 miles to the second. It is commonly said of them that matter is transparent to them—that is, that they will pass through all substances as light passes through glass. This is not strictly true. The electrically started waves now being considered may be deflected, and perhaps actually stopped, by some forms and conditions of matter; but such things as house walls, trees, water and hills do not seem to affect them at all. If the reader will remember the ether as an absolutely continuous jelly, he will understand why this is so. Extending as it does through all substances as well as through all space, a wall in the way of a wave will no more prevent its progress than the canvas wall of a tent will keep out noise. The ether wave passes through a wall as easily as a sound wave of air comes through the canvas.

These waves are really waves—actually, as it is believed, undulatory motion in the ether. Since Henry's discovery, and especially since the investigations made by Prof. Hertz of the University of Bonn (in whose honor they are usually called Hertzian waves), it has been known that they can be started in the ether, to put it rather crudely, by the passage of an electric spark under certain conditions. The jumping of an electric spark gives, as it were, a blow to the ether, which starts it trembling. Nobody knows why this is so, as yet, any more than anybody knows why your watch or knife will fall to the ground if you let go of them. To say "laws of gravitation" does not explain anything—it only names it. So, although scientists have theories of "stresses in the ether," caused by electrical charges, to account for the waves they can not tell yet why the stresses, any more than they can tell why the attraction of bodies.

Leaving the "why of it" to explain when it can be so explained, let us consider the simple fact. Electrical disturbances, like the passage of the spark, do give a blow to the ether, and that blow makes waves, and those waves will travel at the exact speed of light, nobody knows how far. Space telegraphy is performed simply by making these blows upon the ether and reading at the distant point the waves that come from them.

It has been found to be easy to give the blows by means of electric sparks; but how shall one read the invisible waves? An Italian—Calzecchi—supplied this answer. He discovered the principle of what has been named the "coherer," and a strange and utterly unexplained principle it is. The "coherer," simply described, is a little glass tube in which are two wires—two "terminals"—that is, the two ends of a broken electric circuit are brought together in this tube; closely, but not in contact. The space between them is filled with very finely divided silver and nickel filings—mere metal dust.

When one pushes a button to ring an electric bell, he simply presses together two pieces of metal, and thereby completes what was a broken electrical circuit. It is one of the characteristics of an electric current that it can not travel at all unless it can travel all the way around and back to where it started. That is a circuit. On the way it will pass through a bell or a lamp or a telephone or wherever it is given a path and do whatever work it has the strength to do. But if there is the slightest break in the metal path over which it travels, it stops altogether. A push button is such a break until pressed. So is a telegraph key. When pressed, the ends of the break are brought together and the bell rings or the telegraph sounder raps its message.

What has this to do with the coherer we were talking about? This, and it is the principle that has made wireless telegraphy possible: The two wires in the tube are the two ends of a broken circuit from an ordinary battery through an ordinary telegraph instrument. If they were brought together, the instrument would click out a dot or a dash, according to the length of time they were held together. But they are not together; they are separated by a very small space, and that space is filled with this fine metal dust, which is too hard a road for the current to travel with effect. But—and here is the key to the whole thing—whenever one of these Hertzian waves encounters the coherer in its flight, it appears to weld the dust together into a homogeneous metal conductor for the instant that it is passing. During that instant the current can pass with ease, and it is the same as if the two terminals were brought together. The current crosses from one wire to the other, the circuit is complete and the telegraph instrument sounds. When the wave has passed, the dust, at a tap on the tube, resumes its normal condition. It is just as if the coherer were a telegraph key and the ether wave the invisible finger that pressed it.

Marconi took all these principles, improved on their practical workings and added a discovery of his own. The combination is the practical Marconi system of to-day. Marconi found that the coherer would work better if it were exhausted of air. He also made the important discovery that the higher in the air he could make the blow to the ether, the farther its waves would travel with force. Nobody understands why this is so either, but it is a fact.

The Marconi sending device consists of a battery and an induction coil to make sparks with, fitted with a telegraph key to control their making. When this key is pressed, sparks fly. From one of the points between which the sparks pass, a wire runs up to a metal ball on the top of a mast. The pressing of the key in the room below makes a long or short succession of sparks from the induction coil. These result in a long or short succession of ether waves, which travel in all directions from the metal ball. In their progress they pass through the coherer at the receiving station perhaps fifty miles away, and occasion, according to their length, the record of a dot or a dash in the telegraph instrument.

The difficulty in the way of an extensive use of the present system may be understood when it is remembered that the ether waves travel with equal ease in all directions. Every coherer within the working radius of the sending station will respond to all waves: and if a number of messages were being sent at once from different stations, the confusion can be imagined. But Marconi is at work on a method of concentrating, or at least directing, the waves by means of a metal reflector, precisely as a light ray is directed by a mirror.

The speed of the sending is about the same as on an ordinary land line—fifteen to eighteen words a minute. The distance to which messages can successfully be sent is as yet under 150 miles, but the possibilities of the principles involved have no limits.

Experiments With Liquid Air.

At the annual meeting of the Austro-Hungarian Gas & Water Trade Experts, held at Vienna, Prof. Von Lang, Privy Councilor, demonstrated experiments with liquid air. The liquid air was stored in an open receptacle with double walls, the rim of which was covered with ice, in consequence of the difference in temperature. The double walls form a space free of air, as an effective guard against drawing on heat from outside to enable the air to be kept liquid for a lengthened period. The experiments were begun by filtering the liquid air first, and then the professor proved, by immersing a burning chip of wood, which burnt with a vivid flame, the prevalence of a considerable amount of oxygen. This is explained by the nitrogen evaporating quicker than the oxygen, which is found in liquid air to form 35% to 40%, while in the atmosphere it only forms 21% of the air. Poured into a basin of water, pieces of ice exceptionally cold are formed. If these pieces are picked up by the hand, or if the hand is only for a second dipped into liquid air, a sore is caused similar to that of a burn. If an India rubber tube is immersed in a receptacle with liquid air, it becomes at once as hard as stone, while flowers that were immersed got instantly so hard as to require a hammer to break them to pieces. Quicksilver fumes settled like a mirror on the inner walls of the tube when treated with liquid air.

The further experiments demonstrated the freezing, *i. e.*, liquefaction of pure alcohol, carbonic acid gas and acetylene gas, by conducting these through a tube into small glasses filled with liquid air. Acetylene snow burned with a beautiful yellow flame. A lead saucer containing liquid air, when struck with a hammer, produced a clear, melodious sound like that of a bell. The explosive powers of liquid air were demonstrated by igniting cotton wool and powdered charcoal saturated with liquid air, which flared up with great suddenness.—American Manufacturer.

A Magnetic Concentrating Plant.

The magnetic concentrator that has been used since January, 1898, at the Monteponi mine, in Sardinia, consists essentially of a fixed horseshoe electric magnet, placed with its poles downward. Below the poles is an endless rubber belt, a foot wide, at a distance that may be varied at will. A hopper feeds on to the belt a thin layer of the material to be treated, which is carried forward by this belt at a velocity of 1½ feet a second. In order to collect the portion attracted by the magnet, a second endless belt moves horizontally in a direction at right angles to the first, close to the poles of the magnet. The magnetic plant at Monteponi treats in twenty-four hours twenty-four tons of material, previously submitting to a reducing roasting. The material consists of silicate of zinc more or less ferriferous, limonite and zinciferous dolomite, materials of almost identical specific gravity. In the raw state the material contains on an average 22% of zinc, a percentage which is brought up to 30 by roasting. The magnetic concentrator extracts about a third of iron ore, assaying 10% of zinc, while the remaining product is brought up to 40% of zinc. By treating this product in hydraulic jiggers the lime and magnesia from the dolomite are removed, and the final product—oxide of zinc—contains 48% of zinc.

The Twenty Largest Steamers.

Following is a list of the twenty ocean steamers of more than 11,000 tons gross register:

Names.	Builders.	Owners.	Gross tonnage.	Length between perpendiculars, feet.
Oceanic	Harland & Wolff	White Star Line	17,274	685.7
Deutschland	Stettin Vulcan Co	Hamburg-American Line	15,500	657.8
Kaiser Wilhelm der Grosse	Stettin Vulcan Co	Nord Deutscher Line	14,349	637.4
Ivernia	Swan & Hunter	Cunard Line	13,900	580
Not yet named	Clydebank	Cunard Line	13,900	580
Patricia	Stettin Vulcan Co	Hamburg-American Line	13,000	560
Lacania	Fairfield Co	Cunard Line	12,952	601
Campania	Fairfield Co	Cunard Line	12,950	601
Pennsylvania	Harland and Wolff	Hamburg-American Line	12,891	560
Graf Waldersee	Blohm & Voss	Hamburg-American Line	12,830	560
Pretoria	Blohm & Voss	Hamburg-American Line	12,800	560
Cymric	Harland & Wolff	White Star Line	12,647	585.5
Grosser Kurfurst	Schichau	Nord Deutscher Line	12,500	584.3
Kaiser Friedrich	Schichau	Hamburg-American Line	12,480	581.5
Medic	Harland & Wolff	White Star Line	11,985	550.2
St. Louis	Cramp	American Line	11,629	535.5
St. Paul	Cramp	American Line	11,629	535.5
New England	Harland & Wolff	B. & N. A. St. Nav. Co	11,394	550.3
Afric	Harland & Wolff	White Star Line	11,188	550.2
Belgia	Harland & Wolff	Hamburg-American Line	11,100	500.3

Does the Presence of Organic Matter Cause Loss of Gold in Cyaniding?

Written for the MINING AND SCIENTIFIC PRESS by MATT W. ALDERSON.

In the MINING AND SCIENTIFIC PRESS for October 29, 1898, appeared an article by the writer, entitled, "Loss of Gold in Cyaniding by Volatilization." I was careful in wording the article, believing that the views advanced might provoke criticism. Instead, one or more persons seem to have expressed opinions coinciding with those set forth by myself. I have met persons whose experiences had been similar to my own, but who have not cared to make them public. The only exception that I have noticed was the following (MINING AND SCIENTIFIC PRESS, January 14, 1899), which may or may not have had reference to my contribution:

A Negative Opinion.

TO THE EDITOR:—Some time ago you had an article under the heading "Does Gold Volatilize?" I say no. If I may, I would suggest to the party who wrote the article to screen out all organic matter from his ore after becoming wet and assay same. I think he will be surprised, and can easily see where the gold went. T. K. CODE.
Steeple Rock, N. M.

I aim to accept a difference of opinion in a kindly spirit and am willing to follow out any thought suggested with actual work, and acknowledge myself in error if it can be proven that I am.

In the earlier works on cyaniding considerable of the discrepancy (when such occurred) between the extraction by the use of cyanide and the actual recovery was believed to be due to absorption of solution by wooden vats. There is weight of authority at the present time to prove that this supposed cause of loss is not borne out by facts. Bosqui, in his "Practical Notes on the Cyanide Process," page 127, says:

"Losses due to absorption have probably been much exaggerated. Such losses may occur in two ways: (a) By the mere retention in the wood of a certain amount of solution, varying between 20% and 40% of the weight of the wood; (b) by a series of absorptions, followed by evaporations, leaving behind each time a residue of gold—a state of affairs which may be assumed to obtain in leaching vats, which are drying while being charged, and in solution tanks, in which the height of the liquid is constantly changing. In the first case it is obvious that even if a large leaching vat retains in its staves and bottom so much as two tons of solution, it cannot absorb any serious amount of gold, unless the solutions be extremely rich. It would appear that the loss might be considerable if we assume the second theory to be the correct one. A series of tests carried out by the writer on the basis of these two theories of absorption showed that the second was hardly better than the first in accounting for any considerable loss."

When removing the vats used at the Grubstake mill, after the tailings there had been treated, I made a number of assays of the staves of the agitators and gold solution vats and found that the amount of gold they contained did not exceed in value the richest solutions with which the staves had been in contact. At Iron Rod a post which had stood all summer in a gold solution vat was assayed and found to be worth $6 a ton in gold. At the Mohegan mill, when checking work there, the insides of the vat staves were assayed and in no instance did they carry to exceed $4 a ton in gold. In the face of these experiences I confess I was not inclined to give the criticism of Mr. Code much weight. Nevertheless, I concluded the proper thing to do was to give him the benefit of the doubt, to investigate conscientiously and ascertain positively whether or not he was correct.

In running tailings from one yard at the Schmidt & John's mill at Silver Star, Mont., there was always a large amount of organic matter, such as roots of grass, willows, etc. Generally these are removed from the surface of the vat at the commencement of agitation. For experimental purposes they were allowed to remain during agitation, and agitation was continued for longer periods than usual, in some instances for forty-eight hours. Samples from different vats were then removed, dried and assayed. The amount of gold found was from $6 to $8 per ton, practically the same amount as was contained in the solution in which the material had been soaking.

In writing my previous article I had hoped that the relation of my experiences and observations would lead to investigation by others. I was not anxious for further work in that line myself, but it has seemed to have been necessary. I think I can demonstrate positively that the loss referred to is not caused by the presence of organic matter. But I have not carried my investigations to that point where I am prepared to say just what does cause it. Later I will give results of a number of experiments, and it is possible that investigations in progress may lead to some definite conclusion.

The writer is aware that the presence of charcoal floating in solution might account for a considerable loss of gold from such solution; as mentioned heretofore he met with loss in certain vats at Southern Cross from charcoal in tailings which had been run on ground covered with the charred remains of trees, and charcoal is known to be a good precipitant for gold. Tests made with it in Montana in the laboratory were invariably accompanied by good results, and the writer knows of its being used exclusively and satisfactorily for precipitating purposes by the El Paso chlorination plant at Florence, Colo. But aside from this, the conclusion is irresistible that the presence of organic matter does not account for certain losses of gold in cyaniding; such substances may take up gold to the value of the solution in which they may be placed, but not in excess of this, and they are not, and cannot be, in any case a cause of any considerable loss.

MINING, although depending for its greatest success on science, is still an extremely practical business which requires the best judgment and extended practical experience.



STOPE CARRIED TO SURFACE, NEW ALMADEN MINE, SANTA CLARA COUNTY, CAL.

Why Quicksilver is Up.

Quicksilver is higher to-day than in many years, being $10 per flask above the highest point reached in 1898. In 1874–75, when the great mines of the Comstock lode were using tons of the fluid metal, the price reached its highest notch, being $118.75. Although the successful and extensive introduction of the cyanide and chlorination processes has curtailed the use of quicksilver in metallurgical operations to a great extent, still the unusual activity in mining all over the world has kept up a constant and increasing demand for the metal in milling and placer mining, and its consumption in the arts is rather on the increase than otherwise. The great quicksilver mines of California continue to produce, but in much smaller quantities than formerly. However, the rising price of the metal, which has been going on for months, has stimulated production somewhat in the larger mines, and has also resulted in the reopening of old mines, some of which have been closed for years, and also in the discovery and opening of new mines. Within the past ten days a mine near Cloverdale, in Sonoma county, Cal., has made the first shipment of quicksilver produced in twenty years, and other mines, long idle, are about to resume production.

Commercially speaking, the quicksilver mining industry began in 1850. From that time to the close of 1898 there were produced 1,801,568 flasks, an average of 38,800 per year. The production lastyear was 31,092 flasks, and was the largest in the last ten years, being a notable recovery from the declining tendency in 1896 and 1897.

About a dozen mines are being worked in this State at present. The output for 1898 came principally from eight of these, as follows:

	Flasks.
Napa Con.	6,850
New Almaden	5,875
New Idria	5,000
Altoona	4,032
Ætna	3,450
Great Eastern	1,704
Great Western	1,150
Redington	1,012
Various	2,019
Total	31,092



THE FURNACES AT NEW ALMADEN, SANTA CLARA COUNTY, CAL.

The New Almaden is in Santa Clara county, Cal., but most of the other mines are north of San Francisco. So far the New Almaden has been the largest producer, though of late years it has been less prominent because of partial exhaustion of ore deposits. In 1865 the New Almaden yielded 47,194 flasks, the largest quantity produced in a single year by any mine in this country. At present there are only five of these mines on a dividend paying basis. The Quicksilver Co. of New York, owners of the New Almaden property, paid a dividend of 50 cents per share on the preferred stock last May, the first in some time. The last quarterly dividends

(paid October 2) were 30 cents for New Idria, 30 cents for Napa, 15 cents for Ætna and 10 cents for Boston. These companies should pay at least as much as the above for the current quarter ending December 31. Each of the above companies has its capital divided into 100,000 shares of the par value of $5 for Ætna and New Idria, $7 for Napa and $10 for Boston. The investment returns are 6⅔% on Boston, 9.60% on New Idria, 12% on Napa and 14% on Ætna.

A New Type of Desk Telephone.

Herewith is illustrated a new type of desk telephone adapted to connect with various different styles of interior and exchange services. The terminal block to which the line wires and conducting cord are attached also contains the induction coil, thus removed from possible injury, and the absence of which enables the desk part of the instrument to



NEW TYPE OF DESK TELEPHONE.

be made in the neat and simple style depicted. The spring for the hook is flat instead of being of the usual spiral form, an innovation which will occasion greater strength to the apparatus. The transmitter is so attached that only two screws need be loosened to remove it from the standard, the terminals for the leading-in cords are on an insulated block in the base, and take the form of binding posts, rendering it unnecessary to unsolder any connections when renewing the cord. The instrument is made by the Connecticut Telephone and Electric Company of Meriden, Ct.

Gas Driven Electric Plant.

An interesting feature of the public service of Zurich and the neighborhood is the power plant at Oerliken, which furnishes current for the street railway lines. The installation at present includes one gas generator of 200 H. P. and two of 100 H. P. The generators burn Belgian anthracite from the Liege district. The gas is washed and passes through coke scrubbers and sawdust. No smell of tar is noticed, and no trouble seems to arise in the gas engines which, like the generators, come from the Maschinenfabrik Deutz. The three engines of 125 H. P. drive, each, a compound four-pole continuous-current generator for 550 volts, at 180 revolutions. A battery of 280 Tudor cells is connected in parallel to the dynamos. The regulating cells are changed by a motor-generator. Conspicuous on the switchboard is an automatic cell switch for cutting out the discharged cells. This apparatus comprises two heavy selenoids and appears to be used during night time only, hand regulation being adopted for the day service.

The guidebook furnishes the following information regarding this station, which belongs to the Zurich-Oerliken-Seebach system: Coal consumed per effective horse power of the gas engines, 0.65 kilogramme (1.4 pound); each train makes 161 kilometers (100 miles) per day; the line having a length of five miles and a rolling stock of twenty cars, of which, as a rule, only ten are running. With 3.2 passengers per car kilometer, the income is 43 centimes per car kilometer, and the cost amounts to 34.4 centimes.

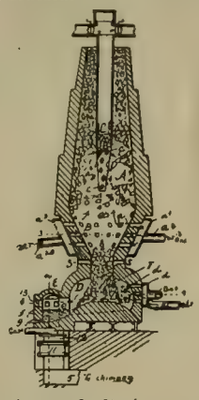
DURING 1899 American manufacturers will have exported over $100,000,000 worth of iron and steel, which is $20,000,000 in excess of the sales of any previous year.

Latest Mining and Metallurgical Patents.

Patents Issued Nov. 21, 1899.

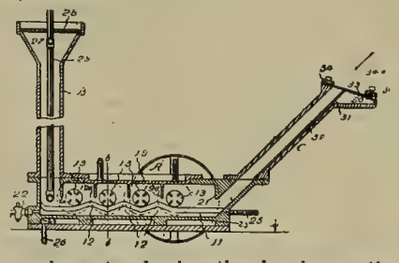
Specially Reported for the MINING AND SCIENTIFIC PRESS.

GAS BLAST FURNACE.—No. 637,432; D. Tschernoff, St. Petersburg, Russia.



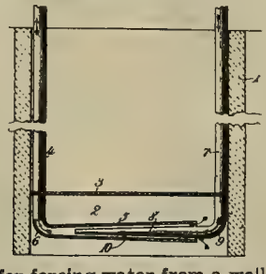
A furnace having a shaft *A*, a contracted zone *B* with openings *a* therein, means for introducing hot gas to contracted zone, a pipe *C* in shaft having openings for the escape of gases, pipe *C* extending to the top of the shaft and having a suitable outlet, an enlarged hearth below the concentrated zone, onto which material descends from the shaft, inlets for air and gas to enlarged hearth, a side hearth slightly lower than the enlarged hearth and connected therewith by a passage, whereby melted metal from the enlarged hearth will pass to the side hearth. A furnace having a shaft *A* with openings *a* near the base of the shaft, a chamber on the exterior over openings, a pipe *P* from the upper part of the chamber to the interior of the shaft, toward the top thereof, and a perforated pipe *C* in the shaft, An enlarged hearth below shaft, means for introducing air and gas into the shaft at zone *B*, means for introducing air and gas to the enlarged hearth, a side hearth *E* communicating with the enlarged hearth below the shaft, there being regenerating passages for admitting air and gas to the hearth *E*, and exhaust regenerating passage from side hearth.

AMALGAMATOR.—No. 637,482; L. C. Park, Vancouver, Canada.



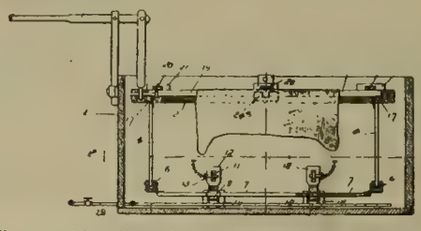
An amalgamator having the chamber sections *A*, *B* and *C* arranged so that water will gravitate therethrough, in combination with a longitudinal groove 11 arranged along the center of bottom of chamber *A*, the bottom of chamber on the opposite sides of the groove 11 being sloping upwardly from the groove to the side walls of chamber, and ribs 12 placed on the opposite sloping sections of the bottom at intervals and at right angles to the groove with their approaching ends terminating at the opposite edges of such groove; in an amalgamator having chambers *A*, *B* and *C*, vertical, horizontal and sloping, in combination with agitators consisting of groups of blades 13 fixed into solid end pieces 13^a, recesses 13^b in such solid end pieces, and detachable spindles 14 and 15 having their inner ends of angular form let into said recesses 13^b, the chambers *A*, *B* and the chamber *C* with the flared outlet 30 in combination with a depressable plate 33, secured at one side beneath a bar 34 and arranged to be depressed by the bolt 34^a on the opposite side.

A DEVICE FOR FORCING WATER OUT OF WELLS.—No. 637,694; A. Baca, Fayetteville, Tex.



A device for forcing water from a well comprising a plate secured in well above the water level thereof in a manner to afford an airtight compartment in the lower part of well, a pipe extending through plate and having a large horizontal portion submerged in the water of the well, and a second pipe extending through plate and having a reduced horizontal portion projecting into the enlarged part of first-named pipe in a manner to afford an annular space between the two and adapted to have an elastic fluid forced therethrough.

AGITATOR FOR LIMING VATS.—No. 637,685; E. Vockler, Wheeling, W. Va.



The combination of a vat, a rocking frame supported therein, two sets of pivoted agitator paddles supported in the receptacle, one set being near each end of the receptacle, the paddles thereof extending inward beyond the center of the receptacle and terminating near the pivots of the paddles of the other set, the paddles of the two sets interlacing between the pivots of the two sets, and a link connecting each set to the adjacent end of the rocking frame; a link hinged to and depending from each end bar of the rocking frame, vertically-moving cross bars pivotally hung to the lower end of links, paddles hinged to each of bars and extending inward therefrom, a fulcrum bar for each set of paddles, a retaining device for each set of paddles, the paddles of the two sets interlacing between the two fulcrum bars. The combination of a vat, two horizontal sets of agitator paddles therein, one set being pivotally supported at each side of the center of the vat, the paddles thereof extending inward and being pivotally supported about midway their ends, the paddles of each set alternating with and extending beyond the free ends of the paddles of the other set and means for rocking paddles on their pivotal point.

The Greatest Transmission Plant.

A Michigan company proposes to carry a current of 40,000 volts 90 miles, to Allegan, Kalamazoo, Battle Creek and Jackson, the last named of which is 90 miles from the dam. In the plant of the Southern California Power Company, built to carry electricity to the city of Los Angeles from a dam in the Santa Ana river above Redlands, a current of 33,000 volts is carried 81 miles.

The Kalamazoo Electric Company was organized two years ago for the purpose of converting the power of the Kalamazoo river into electrical energy and transmitting it to the surrounding towns. A dam has been built that will give a head of 32 feet, it being operated now at 19 feet. The lines to Kalamazoo, over 20 miles away, and to Allegan, nearly five miles from the dam, have been completed and are in operation, at present at a pressure of 25,300 volts. The voltage will be increased to 40,000 when the line to Jackson is completed, so that the talk about snatching the laurels from southern California may be premature.

The dam is provided with all modern improvements. There are eight turbines of the Leffel horizontal pattern, aggregating 3000 H. P. The generator is a three-phase alternating current dynamo of an improved type. Its voltage on full load is 2300, and its rated capacity in amperes on each phase is 377. Its rated horse-power is 2500, but the electrical ratings would indicate more power than that, and in the tests the machine showed up well under a load of 2700 H. P.

There are three mammoth transformers, 4 feet in diameter and 9 feet high. The current enters them at a pressure of 2300 volts and leaves them at a pressure of 25,300 volts. The pressure of this secondary current is eleven times as great as that of the current entering the transformers, but the quantity of current or number of amperes is only one-eleventh as great, and it can therefore be carried over the long lines on a much smaller wire than could a larger amount of current at a low pressure. This is the object of all transformer systems.

The transformers are of two kinds. The step-up transformer is one in which a large current of electricity of comparatively small difference of potential is converted into a small current of comparatively great difference of potential. The step-down transformer is one in which a small current of comparatively great difference of potential is converted into a large current of comparatively small difference of potential.

The long distance transmission of electricity through the conservation of power in mountain streams has cheapened greatly the cost of electrical energy to the consumer. The field in this direction will doubtless be extended considerably with the storage of water in the mountain districts, primarily for irrigation purposes, under National or State auspices.—Electricity.

Mining Summary.

ALASKA.

C. D. Lane of California is reported to be going into placer mining at Cape Nome on an extensive plan. He is this week credited with having placed an order for a pump and four miles of 18-inch pipe to cost $500,000. When asked if any of the other claim owners in the district contemplated building pumping stations to facilitate the working of their claims, Mr. Lane said: "It is a speculation at the best, and as soon as the pump is in working order, which will be within a year, they can really get as much use of the water as I can. As soon as I became convinced that it was necessary for the practical working of my claims to the best advantage, I left the country and placed the order for the pump. It will be in working order in a year, and until then the claims will have to be worked with the rude rockers now in use."

ARIZONA.

COCHISE COUNTY.

It is reported the Copper Queen Co. at Bisbee will close down their works in December to put in more extensive machinery and to increase their smelting capacity.

MOJAVE COUNTY.

The Yucca Cyanide, Mining & Milling Co. of Cedar district are receiving a plant of machinery which is being taken to the San Francisco mine, which has been a shipper of high-grade gold ore.

Stockton Hill and Cerbat, long in obscurity and idleness, are now among the most active mining camps in the county. The veins are fissures, continuous and high grade.

YAVAPAI COUNTY.

(Special Correspondence).—The new gasoline hoist for the Richenbar mine has arrived. G. W. Middleton, Mgr., expects to have it in operation in two weeks. Clarence King has been making an examination of the New York gulch gold properties. The G. E. M. gold mine is reported about to change hands. It is owned by Greenwood, Elliott & Miller, who are operating it with a steam stamp mill, it is said, profitably. The ore is crushed to twenty mesh. About $5 per ton is caught on the plates. The tailings are cyanided. It is claimed that by this combination 89% of the assay value is recovered.

Mayer, Ariz., Nov. 25th, '99.

The Senator mine, at the head of Hassayampa creek, is running its mill to fullest capacity. Development of the mine is progressing below the 600 level. This property and the copper mines at Copper Basin, eleven miles southwest of Prescott, are owned by Phelps, Dodge & Co. of New York.

J. S. Jones is to start up the Little Jessie mine in Chaparral district. It was formerly successfully worked by Frank M. Wright under lease. Mr. Jones is working the Union mine, one of the Jessie group.

It is reported that over 300 prospectors are in the neighborhood of Cataract canyon, 100 miles north of Prescott, in the alleged platinum fields. Exaggerated reports come from there to the effect that the beds are inexhaustible, the ore worth $300 per ton, and other similar extravagances. Conservative men doubt the existence of platinum there at all.

Prescott *Prospect*: J. W. Burrage of Montana, representing the Butte & Boston M. Co., has an option on thirty-two copper claims in the Black Rock district and is sinking a shaft on the Hanlan claims. The shaft is 200 feet in a body of rich copper ore. He has a large force doing assessment work on the other claims.——Carlisle & Co. have stopped work on their property, in Buck Horn gulch, which they bonded some time ago to a French syndicate, but expect to resume work in a short time. A steam hoist is being put in place on the property.——S. Powell is working the San Francisco group near the river. He will make a test run of 300 tons through the Lyons mill, which is near the mine.

CALIFORNIA.

Amador.

At the Zeila mill thirty-five of the stamps are crushing Zeila ore and five are working on Central Eureka rock.

Amador *Ledger*: Watkins & Co. have bonded a gravel mine near Pine Grove and operations have commenced under the direction of R. A. Watkins. The mine was formerly worked at a profit until there came a landslide too heavy for the owners to handle with the limited means at their disposal. Two pipe lines have been laid, one from the north and one from the south. The machinery for a 25 H. P. derrick has been ordered. In the mine is a large amount of cement gravel worth $4.50 per ton, and next season a 10-stamp mill will be installed to crush this. It is claimed that this cement can be worked at a cost of $1.25 per ton. The mine is 1¼ miles northeast of Pine Grove, at the head of Santa Clara gulch.

Calaveras.

The Sieffer property, at Stockton ridge, Mokelumne Hill, has been taken by a company which will reopen the long abandoned mine. In early days the Stockton Ridge and Corral Flat channels were very rich. It is claimed the early miners did not reach the channel, but were able only to recover gold from the rim rocks, and to determine this the new company will reopen the ground.

At the Big Bonanza mine, south of Angels, sinking is going on. At 300 feet rich ore was struck, some of which will go $2000 to the ton. The ledge will average 50 feet in width. The shaft is being sunk on the east vein. It is the intention of the company to erect a mill when the shaft has been sunk another 100 feet.

At the Gwin mine sixty stamps are dropping, the rains having sufficiently increased the water supply.

The Utica Co. have started the electric power at the Madison mill. The Stickle and Utica mills are to be similarly operated.

The long adit at the Melones Con. mine, near Robinson's Ferry, is progressing slowly, as the heading is passing through a reef of very hard ground. The estimated cost of the last week's work is about $20 per foot. The tunnel is perfectly straight and runs west of north; but as the formation swings from side to side, changes in the formation are not of infrequent occurrence. Crosscuts made from this tunnel will cut the numerous veins, large and small, in Carson hill, nearly 1000 feet from the surface.

El Dorado.

W. F. Lupold ground out $400 with an arrastra at his mine near Fairplay in thirty days, recently. The vein is 18 inches wide. He works without assistance.

In the Blue Gouge mine the discovery of a 6-foot vein of good ore in one of the lower tunnels is reported. The new milling plant is completed.

The Van mine, north of Georgetown, is to be reopened. It is now flooded. It may be found necessary to sink a new shaft.

Fresno.

From McKittrick, McKenzie & Griffith reported an oil strike in a well sunk 900 feet, northwest quarter, section 20, near Buena Vista. The casing of the well is 9⅝ inches, and when the drill entered oil-bearing sand the oil flowed 4 feet over the casing.

Inyo.

The discovery of a rich copper vein is reported near Death valley. The vein is 8 feet wide and is traceable over 10,000 feet.

Kern.

The Pioneer mine, near Johannesburg, has been sold by J. J. Miller to R. F. Harrison and others of Ballarat. A 10-stamp mill at Garlock has also been bought and will be moved to the mine.

An abandoned oil well on the El Dorado claim is reported flowing again, after a long period of unproductiveness.

Los Angeles.

In the case of B. Chandler against the State of California regarding the claim of Chandler to the southwest quarter of section 24, township 2 south, range 11 west, as mineral land, the Secretary of the Interior has decided that in order to prove that the land is valuable as petroleum-producing land, a well must be bored. Surface indications of petroleum are not to count as evidence of oil in paying quantities.

Mono.

The report of the Standard mine for the week ending Nov. 18th shows: Number feet drifts, 38; number feet drift cuts, 24; number feet raises, 41; number stopes worked, 21; number tons ore milled, 357; tailings assay, $9.72; concentrate assay, $210.30; number men employed, 112.

Mariposa.

A strike in the Mary Harrison mine of the Merced Co., two miles south of Coulterville, is reported. The Maxwell mill site has been bought and it is now reported the company will install a large electric plant. The property, it is said, has earned money every month this year except one, when the development work consumed more money that the mill took out, working on the old stock pile from the mines, but the prospects are that the Merced can be made a dividend paying mine. At present the company is taking out the ore above the 700 level blocked out some time ago. The shaft will be sunk 400 feet deeper. The company is now in control of the ditch. It has laid in its winter supplies at the mine and has left in its treasury $230,000.

Placer.

(Special Correspondence).—The head gangway of the Big Dipper mine, near Iowa Hill, broke into the works of the Morning Star mine Nov. 10th, 750 feet north of the main works of the Big Dipper mine. The distance from the mouth of the Big Dipper tunnel to the mouth of the Morning Star tunnel is 10,000 feet. The fact that the works of the Big Dipper and Morning Star mines are now connected, as well as thorough prospecting in northerly and easterly directions by the Morning Star M. Co. and the Big Dipper M. Co., proves conclusively that these two mines are operating in the same channel. Careful and extended observation also proves that this channel flowed in a general northerly direction—that is, from the mouth of the Big Dipper tunnel toward the mouth of the Morning Star tunnel.

The channel comes from the direction of the Forest Hill divide, possibly being the channel upon which the Paragon, Mayflower, Baltimore and Dardanelles mines operated, crosses Shirttail canyon and enters the Iowa Hill divide, from New York canyon, at the old Vaughn hydraulic claim at Wisconsin hill. From this point to the lines of the Big Dipper mine the channel has been laid bare by the hydraulic process and can be plainly followed. Its course is here about northwest for 2500 feet, thence easterly to the Big Dipper mine, 2500 feet, which it enters, turning to the north and preserving a general northerly course for 5500 feet to the line of the Morning Star mine, where it changes its course to the west, and preserves a westerly course to the mouth of the Morning Star tunnel, a distance of 4500 feet. At this point the channel crosses Indian canyon, where it is eroded, and passes under the town of Iowa Hill, turning to the north, and thence across the canyon of the North Fork of the American river, by which it has been eroded, to Gold Run and Dutch Flat. From the point of entrance at Indian canyon to the point of emergence into the North Fork canyon, a distance of about 4000 feet, the channel has been hydraulicked with the exception of a small strip upon which stands the town of Iowa Hill. The gross product of this channel, from the point of its entrance into the Iowa Hill divide to its point of emergence therefrom, has been about $7,000,000, or over $350 per running foot, for from 18,000 to 20,000 feet of the channel.

Shirttail, New York, Indian and North Fork canyons were very rich at the places where these canyons cut away the ancient channel.

Iowa Hill, Nov. 25th, '99.

The hanging wall ledge and the foot wall ledge of La Trinidad mine are being connected with a crosscut 700 feet in on the tunnel. The mine is in Sailor canyon, near the American river. It has a 10-stamp mill. J. R. Brokenshire is Supt.

J. J. Hoffman and T. M. Browne have applied to the California Debris Commission to mine by the hydraulic process at the Paragon gravel mine, Bath, to deposit tailings in Volcano canyon. The old hydraulic pit at the Paragon mine is supposed to be rich. It was extensively worked before hydraulicking was enjoined. It is on the same channel as the Mayflower and Dardanelles mines. This important channel enters the Forest Hill divide at Bath, flowing in a northeasterly direction, then sweeping around to the westward into the Mayflower, to the Dardanelles, where it is exposed in a hydraulic pit nearly half a mile long. Here it turns back under the divide, running directly north toward Yankee Jim's, but is lost under the divide, being cut out by a later channel. The Paragon and Mayflower workings are connected and are over five miles in length.

In the Hidden Treasure mine, at Sunny South, the rich Dam channel has been cut 5000 feet in on the main tunnel. It is 32 feet lower than the upper channel. The gravel is blue, the deposit 6 feet in depth and very rich, going as high as $5 to the car. A hoisting and pumping plant will be required. A drift will be run up the channel to develop it. The Hidden Treasure Co. employs 180 men. The mine has been paying monthly dividends the past five months. Harold T. Power is Supt.

Plumas.

Quincy *Independent*: F. Mandeville of Willow Ranch has washed a diamond from the volcanic sands and gravels in the vicinity of Nelson Point. The gem was discovered near the tail end of a sluice box in which a quantity of gravel had been washed. Mr. Lord, a jeweler, pronounced it to be a diamond. It is of irregular form, its greatest diameter being about one-fourth of an inch.

San Diego.

The Ranchita mine at Banner was recently sold at public auction by the Sheriff. The mine, with a lot of other property owned by Cave Couts, had been ordered sold by the court to satisfy a judgment for $8,300 obtained by C. A. Schrader against Mr. Couts.

The tunnel at the Kentuck S. mine at Banner has opened up rich ore, some of it running $200 a ton. The mine is owned by L. N. Bailey. The tunnel was run in from the foot of the mountain to the vein, over 800 feet.

The Encinitas Copper Mining & Smelting Co., recently incorporated, contemplate building a smelting plant on the line of the railroad, near Oceanside. The mine is four and a half miles from San Marcos.

The Alabada, near Banner, is working two eight-hour shifts.

It is reported that the Helvetia mine, near Julian, has been stocked and will be reopened.

The Owens mine, at Julian, has changed hands again, says the Ramona *Sentinel*. Denis Clark has bought out J. M. Risher of Pasadena. J. N. Large of San Diego is superintendent. A good chute of ore is reported at the 200-foot level; also at the 250-foot level.

Shasta.

(Special Correspondence).—F. G. King last week secured a bond for nineteen months on the Oun group of twenty claims near Copley for $45,000.

A new vein of fair grade ore was cut last week in the Capital mine, near Shasta, in a 350-foot tunnel.

Near French Gulch twenty-five leasers are operating the Washington mine and the output is said to be $30,000 a month. The ore is shipped to Selby's and to Keswick.

Redding, Nov. 27th, '99.

J. J. Kelley has made a strike of a 16-inch vein of rich ore in the Bulwer mine in French Gulch district. On the adjoining claim Driscoll & Chambers have a 6-inch vein of high-grade rock.

D. McCarthy is negotiating the sale of the Dry Creek Slide mine with Eastern people. The price is $55,000.

The Mayflower mine at Muletown, which was recently bought by Ormsby & Stoddard, is working. The vein has widened in the shaft to 4 feet of rich ore, some of which is shipping grade.

At the Bully Hill mine it is reported that an 800-foot drift has been run in sulphide ore. Crosscuts show about 40 feet of solid ore. The grade of the ore is not stated.

Siskiyou.

E. B. Edson has bought the Sullivan mine on Willow creek, near Gazelle, and is developing it.

Boston capitalists have been buying California gold mines within recent years. The latest investment reported is the Dwinell quartz mine, in the Gazelle district. This mine has been bought through E. T. Wallace of Yreka for $125,000. The Boston purchasers have had an option on the mine for several months. The property is reported to have a large vein of shipping ore. The new owners will put in stamp mills.

Tuolumne.

At the Black Oak mine, near Soulsbyville, it is reported that in sinking below the 850 level a new body of rich ore has been found. Some of the ore runs $300 per ton. For several years this mine has been shipping large amounts of ore to Selby at Port Costa, running $100 to $140 per ton.

The Shawmut-Eagle mine, half a mile north of Jacksonville, is running full force, 150 men employed and forty stamps dropping. The superficial detritus overlying the mineral zone east of the massive quartz cropping is being run through the mill, and is said to contain $7 per ton in gold, besides sulphurets. The management is considering the building of cyanide works.

The Dead Horse mine, at Carters, is unwatered and work in the mine has been resumed. The main shaft is down 1700 feet.

J. Joseph is cleaning out the old workings of the Ferguson mine, on Merced river. The mine was extensively worked in early days to the lower tunnel level, since which time it has been idle.

Dorsey & Frazer, working a pocket claim on Jackass hill, near Tuttletown, have taken out $6000 the past few days and claim enough in sight to make the amount $10,000.

The Alameda mine, near Tuttletown, which for three months has been idle, is to be started up. It has been leased to H. M. Donald.

Yuba.

The Priestly dredger has been launched on the Yuba river, near Smartsville, to be operated by a 75 H. P. electric motor, with power from the Yuba E. P. Co. In the dredger is an Archimedean screw 8 feet 8 inches in diameter and 72 feet long. The cost of the dredger is about $37,000.

COLORADO.

BOULDER COUNTY.

At Eldora the Mogul tunnel is being advanced on the west branch. The east branch has reached the Clara lode and rich tellurium gold ore is found. A vein in the west branch is reported to run $1000 per ton, and a 2-foot vein averages $60, and one of 3 feet, $40.

CHAFFEE COUNTY.

(Special Correspondence).—The present outlook for extensive development in Turret Camp this winter is flattering. The winters are usually mild and snow does not hinder work of any kind.

The Turret City G. M. & M. Co., of which W. J. Root of Chicago is president, has a plant of machinery on the ground ready to set up. A. G. Stephenson is superintending the work. The plant consists of a 60 H. P. boiler, 8x10 hoist and a No. 3 pump. Mr. Root says they will put the present shaft down 1000 feet, and will not do much development short of 500 feet. A shipment from the property returned $64.50 per ton in gold 1⅞ in copper.

A plant of machinery is now on the siding for the Nabob M. Co.

The Anaconda Co. have their plant up and running. The plant consists of 50 H. P. boiler, 6x8 hoist and a No. 7 pump. The plant is new throughout. The shaft is being sunk on below the 100-foot level, while crosscuts and drifts are being run from the 100-foot station. The last shipment made from this property gave a return of $63 per ton in gold. A stamp mill will be put up at the mine to handle the low-grade ore, of which they have 5 feet, which averages $13 per ton. The payroll for November will be upwards of $5000.

Turret, Cal., Nov. 24th, '99.

CLEAR CREEK COUNTY.

In the Brostrom claim at Ozone, ten miles from Idaho Springs, a vein 50 feet wide has been cut. The ore is low grade. Mill runs have returned $4 per ton, besides concentrates. Mr. Brostrom has let a contract for a 25-stamp mill at the mine. The formation resembles granite, is soft when mined, but after exposure for a few days it becomes hard.

The Florence tunnel is reported in ore. The vein is not exposed on the surface, but in the tunnel is 2 feet wide and assays $75 per ton in gold. The ore is free milling. It is reported that the company will put on machinery and work this vein. P. D. Goodyear is Supt.

EAGLE COUNTY.

It is reported a pyritic smelter will be built at Red Cliff to treat low-grade sulphide ores of Battle mountain.

The Iron Mask group at Gilman is outputting 80 to 100 tons of ore per day. Ore is being hoisted from both the Iron Mask and Clinton inclines, and both sulphides and carbonates are being shipped. The former goes to Salt Lake and the latter to Pueblo. The face of the drainage tunnel is in about 200 feet. Several new bodies of sulphides and carbonate ore have been opened in the Iron Mask within the past few weeks. The company is employing sixty men.

GILPIN COUNTY.

The Flack mine, operated by lessees, has opened a 2-foot vein in the 400 level, from which shipments are being made.

F. Rickard has been appointed Mgr. O. K. mine, on German hill. The main shaft, 400 feet deep, will be retimbered. The mine has been a good producer under the leasing system for several years, and the owners will now operate it themselves.

The shaft of the Americus is down 926 feet and sinking with three shifts. A fine vein has been opened in the bottom, but not high enough to ship. The 400 level is producing a regular output of good ore.

A strike has been made in the Concrete, the smelting ore running seven ounces per ton, and the mill dirt two ounces per ton.

The tunnel on the Geiger mine of Pine Creek district has cut a 12-inch vein of smelting ore, and shipments are to be made.

The cleanup of ten stamps of the Gilpin mill on a week's run on Robert Emmet ore resulted in fifty-five ounces bullion. The last shipment of smelting ore ran $200 net per ton.

Shipments from Black Hawk for the first week in November were seventy-nine cars of smelting ore and concentrates.

The owners of the Cook mine will build a tram road from the mine to the new mill now building at Black Hawk.

The tunnel on the London group, in Pine Creek district, now in 400 feet, has cut a rich streak of tellurium. The streak is from ¼-inch to 3 inches wide.

The Ivanhoe mine, on Quartz hill, is working ten men and producing a fair grade of ore

from the 800 level, says the Denver *Republican*. The smelting ore runs $40 to $50 per ton and seventy-five tons of mill dirt shipped last month gave good returns.

JEFFERSON COUNTY.

A vein of gold rock has been found on the farm of J. Snyder, six miles from Evergreen. It is said it will average $50 per ton.

LAKE COUNTY.

The Boston Gold-Copper Smelter, capacity 300 tons a day, is the fourth smelter now operating at Leadville.

The Rock Hill Con. is down 600 feet and driving to the Iron fault. The lime shows evidences of heavy mineralization. The Revenue has a heavy flow of water in the wash and is cutting a station for an 18x8x18 station pump. A company is also being organized in the East to develop the Robinson placer, which will sink a shaft in Georgia gulch.

The O'Brien & Barker lease on the Fortuna tunnel has made several shipments of first-class ore carrying an ounce and a half in gold, with some silver and a good percentage of lead.

The Sedalia mine, on Little Ellen hill, is working from the 700 level, which has recently produced 300 tons of good gold ore carrying a good percentage of lead. The ore in the bottom of the shaft runs $50 gold and 20% lead.

S. Morley, Baer Bros. and J. M. Wormell are pushing development on the Venus, on Sugar Loaf mountain, on the opposite side of the Arkansas valley from Leadville. The Tiger, an adjoining property, has produced $500,000.

The water is being lowered in the Humboldt mine by joint arrangements with the Adelaide people. When the copper stopes are uncovered and the workings in shape, the Humboldt will begin shipping copper ore and the Adelaide will produce iron sulphides, high grade in silver.

OURAY COUNTY.

A new lead has been opened in the second level of the Newsboy by the leasers, which shows gray copper and yellow copper-silver ore.

The Wedge mine is again in good ore and working a large force steadily. The owners will build a new mill in the spring.

H. F. Brown, formerly of the American Nettie, is driving a tunnel 1000 feet long to cut the main body of ore at 1200 feet in depth. The property is owned by a syndicate in Toronto, Canada.

In October 225 cars of ore were shipped from Ouray station.

SAN JUAN COUNTY.

The Ridgeway, near Silverton, recently shipped a carload of ore to Durango which returned $800 per ton. Two more carloads of the same ore were packed down the mountain and since shipped. The claim is being worked under a lease.

SUMMIT COUNTY.

The new 20-stamp mill at the Cashier mine is completed. A small dynamo for lighting is being installed. A separate engine will be used to drive the dynamo and concentrators. The mine will be worked through a tunnel 500 feet to the mill. The track, which is laid with twelve-pound rails, is covered from the tunnel to the mill to avoid delay from snow. Large quantities of gold-bearing ore are blocked out in the mine.

In the placer mines the preparatory work for the season of 1900 is going on. Several new dredging plants and a number of steam excavating plants are contemplated.

Blanks, Jonson & Heter, operating the Helena and Bellevue, are keeping the Gold Pan mill running day shift on second grade ore from the dump of the Helena. The first grade runs well in lead, does not require concentrating, and is of a good smelting grade. There are two streaks of good grade galena ore, besides a large body of concentrating ore, opened in the shaft of the Helena.

The Banner G. M. Co. have commenced sinking a 200-foot shaft on the Fountain Valley claim. A contact vein carrying good values has been discovered and will be developed.

TELLER COUNTY.

(Special Correspodence). — The Mary McKinney, at Anaconda, is shipping forty tons per day. The mill ore runs from $25 to $40 per ton, the smelting ore running from $80 to $140. The shipments at present are from the 300 level, which is opened 1600 feet along the strike of the veins. Recent work has opened the same ore body at the 400 level. The two parallel veins on the property are about 40 feet apart at the surface, but it is believed they come together at about 400 feet depth. Some water is encountered, and the pumps lift 800 gallons per minute.

C. A. Phillips, Supt. Dead Pine mine, on Battle mountain, states that the property is shipping 200 tons per month. There are two shafts, 1600 feet apart, the first being at a depth of 835 feet and the second about 400 feet. A force of 40 men are employed, the major portion of the work being development. Air drills are to be put at work in the ore body. Heretofore the three air drills were employed in prospecting work. The property belongs to the Ophir M. & M. Co.

The Ajax is shipping twenty tons per day from the 600-foot shaft, as greater depth is being gained. Besides the ordinary character of the sylvanite, this property has produced some rare streaks of calaverite. A new and much larger plant of machinery has been ordered, which it is intended will be put in place next spring.

At the Granite mine the new 300 H. P. electric motor is being installed. Other surface improvements are being made.

The Lillie, same locality, produces 1000 tons per month, the average value of which runs $55 per ton. The shaft is now 800 feet deep.

The Dillon, in charge of Supt. J. P. Horgan, is shipping about 500 tons per month. The shaft is being sunk from 480 to 600 feet. This is one of the new properties on Battle mountain and is well equippped with steam hoist and air compressor. M. Finnerty, of Denver, is heavily interested.

The Doctor, on Raven hill, is being operated under lease by the Doctor & Chief M. & L. Co., with J. Winchester as superintendent. The shaft is 800 feet deep; some shipments are being made, though at present the principal work is for development purposes.

The Orpha May, in charge of Supt. J. Starkweather, ships about 500 tons per month. The main shaft is 900 feet deep, over which is heavy hoisting machinery. The group comprises thirty-eight acres on Bull hill, on which there are four other shafts. In the main workings there are thirteen levels, ore shipments being made from all of them.

The Vindicator, near Independence, is shipping about 3000 tons per month. The buildings and hoisting facilities here are on a large scale.

The Jerry Johnson, one of the new properties on the eastern slope of Bull hill, is under lease and ships about twenty-five tons per day from a 130-foot shaft. The grounds extend 1400 feet on the trend of the vein and end-lines with the Damon on the west. The ore body opened is said to be 40 feet wide in places, the ores running $50 to $80 per ton. An important suit is pending between the Damon and Jerry Johnson ownerships, involving the rights of the former under the apex theory.

The Gold Coin is producing about 100 tons per day, the Wild Horse 35 tons and the Jack Pot 50 tons, all being under the Woods management. The last-named is operated under lease, which expires on April 9, 1900. The Economic Gold Extraction Co.'s reduction works has begun operating. When fully complete its capacity will reach 350 tons per day. The mines controlled by the Woods Investment Co. are expected to supply as much ore as the plant can handle.

The Oneida mill is operating, using the Murphy process of reduction, consisting, in part, of very fine pulverization, roasting and amalgamation.

The November output of the district reaches, in round numbers, 40,000 tons of ore, but it is asserted by ore buyers that the average tonnage value is hardly up to that of the October output.

Substantial progress is being made, looking to a considerable increase of the milling facilities for the district.

Keen activity in the Cripple Creek mining stock market from one to two months ago resulted in the tieing up of no small amount of money in those channels, and the general slump of prices which has prevailed for the past ten days has created a noticeable stringency in money matters, felt mostly by tradesmen. The stocks of well-known mines and those of prospects which can make a substantial showing will, it is generally believed, gradually resume former prices. WASCOTT.

Cripple Creek, Nov. 25, 1899.

Some time since an ordinance was passed by the City Council of Cripple Creek giving the right to mine under the city to the Kansas City & Cripple Creek G. M. Co. The lease having lapsed by default, a new ordinance was recently introduced giving the same right to M. S. Beale. It gives to the city a joint interest in the direction of the lease, provides that certain royalties shall be paid to the city; also, that the mining under the city shall be under the direction of the City Council, which shall provide that no stoping shall be done near enough to the surface to affect the security of the residents; that no ore or waste shall be dumped upon any of the streets and alleys; that no outlets shall be made that might prove dangerous to the city. No action has yet been taken.

The Victor mine is again reported in pay ore, for the first time since December, '98, when it was officially reported that the Victor vein had pinched. The ore body has been found on the 1000-foot level 100 feet from the shaft. Its extent has not been determined. The ore assays from $60 to $300 per ton. Moffat & Smith, the largest stockholders in the mine, have for some time been advancing $10,000 per month for exploration work and the mine now has a debt of $70,000. The Victor adjoins the Isabella mine, which recently shipped fifty tons of ore to the smelter which netted $165,000.

A rich strike is reported on the Chicken Hawk on Guyot hill, adjoining the Republic of the Mary McKinney Co., and it is thought that the ore found is a continuation of the latter. The find was made at a depth of 500 feet. There is 4 feet of ore in the breast which assays four ounces to the ton.

W. S. Stratton, before going to Europe, bought the Longfellow group on Bull hill. A force is at work sinking a new working shaft, which is to be put down 1000 feet.

IDAHO.

The Peacock mine in Seven Devils district is reported bonded to the Boston Copper Co.

John Merrill of Placerville says that $110,000 has been paid on the Granite and Fall creek placer ground by an Eastern dredging company, and that the next payment will be $115,000.

LEMHI COUNTY.

The machinery for the hoist of the Dr. Franklin Co. has been taken to the Brown Bear mine in Blackfoot district. The hoist will be ready and sinking commenced in the 500-foot shaft by January 1st. It is reported that the company have options on another group in Blackbird district.

At the Midland Belle mine, eight miles north of Salmon City, an incline shaft was sunk on the vein 90 feet deep, on a pay streak 1 foot wide of soft, brown oxide of iron, worth $50 per ton, free gold. At the bottom of the incline the pay streak is 18 inches and assays $200 in gold.

SHOSHONE COUNTY.

The Sixteen to One M. Co. has the stationary cables for its tramway in place and the running cable ready to place in position. The mill is not ready for work, but it will be early in December.

MONTANA.

MADISON COUNTY.

The Maggie A. Gibson dredger, near Virginia City, has closed down for the season, which was not satisfactory financially.

SILVER BOW COUNTY.

Butte will produce more copper this year than ever before in its history. All of the important mines in the Anaconda group are being equipped with new hoisting works and steel head frames. Extensive improvements are also being made on some of the Heinze properties. It is reported that the Anaconda Co. will show net earnings of $9,000,000 for the year. The company are paying out $330,000 monthly in wages.

NEVADA.

CHURCHILL COUNTY.

The property of the National Nickel Co. will be sold on the 9th to satisfy a judgment obtained by the Nevada Nickel Syndicate against the former company in the U. S. Circuit Court.

STOREY COUNTY.

The Truckee River General Electric Co. has awarded a contract to the Westinghouse Electric & Mfg. Co. for the construction of two generators of 1000 H. P. each for the power house at Floriston, on the Truckee river. Each generator will weigh 90,000 pounds. The plant will be in duplicate, so that in case of accident to one of the parts the duplicate can be used until the other is repaired.

The first elevator placed in the C. & C. shaft worked satisfactorily for a time, but never as well as No. 2. The first is now to be removed and a duplicate of the second elevator put in its place, when better results are hoped for. The latest official telegram is as follows:

VIRGINIA, Nev., Nov. 29, 1899.

To Aug. Waterman, Secretary Comstock Pumping Association, San Francisco: At 6:30 this morning the water was 102 feet and 10 inches below the 1950-foot level station. No. 1 elevator has been running continuously. JOS. R. RYAN.

Comstock miners who went to Costa Rica are returning. They have had enough of it.

WHITE PINE COUNTY.

The Chainman cleanup was finished last week and another lot of gold dust and bullion is on its way to the refinery, says the White Pine *News*. J. P. McOmie, one of the owners and superintendent of the plant, says that, considering the number of obstacles met and overcome in treating the ore, the results are satisfactory. In the early part of the run the extraction was poor, but it was improved until the last five tanks showed an extraction of from 76% to 83% of the gold values in the ore, and this, it is expected, can be improved upon. A force of mechanics are fitting the mill with steam pipes for heating purposes and getting ready for winter. The reserves in the mine already blocked out and of a milling grade are sufficient to keep the plant in operation at its present capacity for several years, and there is still a large territory above water level yet to be explored. The refractory character of the ore has handicapped the property in the past.

NEW MEXICO.

In the Cerrillos mining district silver-lead ores, suitable for fluxing, are locally reported to exist in great quantity. The zinc found in the lead below the water level has heretofore been the chief deterrent in development.

BERNALILLO COUNTY.

A strike of engineers and mechanics at the Albemarle mine, Bland, has locked out 250 men. Fifteen strikers demanded higher wages, which the management refused. The strikers were paid off and both the mine and the mill were closed down. Boston capitalists own the mine. The high price of wood and the impossibility of getting coal at present will prevent the resumption of work until the electric power-house at Madrid is finished.

EDDY COUNTY.

The Galistee M. Co., in which Thomas A. Edison and New York capitalists are interested, and which bonded the Ortiz grant from Missouri capitalists to test Edison's process for extracting gold from placer ground and ore, has filed incorporation papers at Santa Fe.

GRANT COUNTY.

Important copper discoveries are reported from the Santa Rita mountains, and a large number of prospectors are stampeding to the place. A. B. Sanford says that the ore does not occur in fissure veins, but is found in deposits of greater or less extent, all of which are highly mineralized, native copper being frequently found, sometimes in large masses and sometimes disseminated through the rock in fine particles. It is said that not a hole has been sunk to a reasonable depth without finding ore.

SANTA FE COUNTY.

J. P. Victory has made arrangements by which the turquoise trust acquires 90% of the turquoise properties in New Mexico, which at present supplies the bulk of turquoise to the world. The trust is incorporated under the name of the North American Turquoise Syndicate, capitalized at $1,000,000.

OREGON.

BAKER COUNTY.

W. L. Vinson is going to put a $50,000 dredger on his placer ground on Powder river, near Sumpter.

J. H. Stoddard of Sumpter, it is stated, panned $60 in coarse gold from 100 square feet of ground in a pit 10 feet deep, within the limits of the town of Sumpter. The same formation is found along either bank of Powder river, running through town, and owners of adjoining placer claims are preparing to commence operations. W. L. Vinson, who controls two miles of ground along the river channel, has ordered a dredger to work the deposit. It is estimated the ground will average 30 cents per cubic yard. The dredger will be in operation by April 1, 1900

JACKSON COUNTY.

Dr. E. O. Smith, who has bonded the Haggin mine at Tolo for $25,000, proposes to sink a 1000-foot shaft.

JOSEPHINE COUNTY.

The first gold dredger in southern Oregon is being operated by the English-Canadian Co., at Faun's mine, on the Illinois river, near Waldo.

UTAH.

JUAB COUNTY.

A report from Centennial-Eureka states that the ore body on the 700 level was explored for 11 feet and assays show $70 per ton. Upon the dip the vein shows stoping ground 600 feet, the ore chute being 80 feet in width and 60 feet high. The general average of its body shows $30 gold, 25 ounces silver and 3% copper. The strike in the surface tunnel shows 20 feet of ore in a chute independent of any hitherto explored. The first assays showed $44 gold, 35 ounces silver and 1% copper; later assays gave $144 per ton gold and 139 ounces silver.

In the Tesora, at Tintic, a 22-inch streak of high-grade ore has been struck, lying on the foot wall. By the side of it, in the same vein, which is 6 feet between walls, are 4 feet of second-class ore. The high-grade copper-bearing vein has been traced from the Alaska to the Tesora, nearly two miles.

SALT LAKE COUNTY.

Tribune: The Horace Greeley and Gem mines, at Bingham, have been bonded by Salt Lake and Bingham people. The Horace Greeley has long been a producer and the Gem has some good copper-bearing ore. The claims adjoin each other on Muddy gulch, a tributary of Carr Fork, with the properties of the United States M. Co. on one side and the Last Chance group on the other. The ground is traversed by two veins that have been opened in the Greeley, by a crosscut tunnel that intersects each at a depth of 150 feet. From these workings ore worth $160,000 has been marketed. Recently the ground has been worked on a lease, the shipments, 263 tons, netting $41 per ton. The ores show an average of 32% lead, 26 ounces silver and $15 gold per ton. —The management of the West Mountain placer, Bingham canyon, has contracted with the Jordan Narrows people for power and placed an order with the Westinghouse people of Pittsburg, Pa., for two electric hoists. These are to be installed at the two new inclines by which the gold-bearing channel is to be opened to bedrock, the inclines to go down from the rim at an angle of 25° to reach the bedrock at 250 feet. The inclines will be run 600 feet apart along the bar; the gravel will be raised and dumped into the sluice boxes. The two hoists will be followed by others.

SUMMIT COUNTY.

Most of the miners stoping in the Ontario at Park City have been laid off until an adjustment of differences between the management of the mine and the smelter upon sampling was had. About 1000 tons of Ontario ore are tied up in the smelter yards, the smelter management declining to allow it in the furnaces until a resampling has been had and alleged inaccuracies in the sampling of Park City ores traced to their proper source.

The New Anchor mill is putting through 100 tons of ore daily.

E. Williamson has two shifts operating at the Boulder Basin property, on the copper belt south of the Anchor.

The following shipments of ore were made the past week from Park City:

	Tons.
Silver King	600
Daly-West	316
Anchor concentrates	140
Apex	35
Valeo	25
Total	1,116

At the Daly-West carpenters are building a 40-foot addition to the north end of the mill to make room for Wilfley tables. This will make ten Wilfleys, and hereafter five tables will be run on slimes instead of two, as at present. From 120 to 150 tons of ore are being run through the mill daily, and four men separate first-class from second-class ore for the sampler.

TOOELE COUNTY.

Capt. J. R. DeLamar has introduced the caving system of mining in his Mercur mines. This is a system largely practised in the Lake Superior iron mining regions, by means of which large ore bodies may be cheaply and expeditiously removed without the employment of timber. It can not be successfully applied under all conditions, but is peculiarly suited to the Mercur mines.

WASHINGTON.

FERRY COUNTY.

Development of the Insurgent mine in Republic camp is to be resumed in December. The first assessment on the capital stock has been levied. It is stated that the new work will be in the nature of deep development. The earlier work on the property has shown high values near the surface. The company will now go down on the vein to determine the value of the mine. The Insurgent has the Lone Pine cross leads. It has been idle two months.

Work is to be resumed on the Alabama at Republic. The property is east of the Tom Thumb in the north end of the camp. The company proposes to extend the crosscut tunnel 50 feet, within which distance it is expected to encounter the vein at a depth of 125 feet.

Spokesman-Review: The Tom Thumb mine at Republic is to be equipped with machinery. At the 150 level telluride ores have been found. In the north drift the ore assays $106, while in the south drift $262 has been obtained. The general averages from this

level have exceeded averages on the 100 level by over 50%.

WHITMAN COUNTY.

The Mother Lode, in Mascot Camp, thirty-seven miles from Palouse City, is free gold quartz. The owners are J. and C. Taylor of Farmington. Gold is distributed through the quartz, discernible to the eye. The ledge is a mixture of white and blue quartz, heavily oxidized and carrying iron rich in gold, which, when crushed, is found to contain free gold imbedded in the iron.

The Hoodoo placers, that have yielded $2,000,000, are just below the Mother Lode mine. The same quality of iron is found in the placers.

Five years ago Chinamen took out $1700 in gold from a boulder of quartz weighing a ton that had slid down the mountain side. The Taylor Bros. instituted search and discovered the lode three years ago. The surrounding ground has been located by people let into the secret by the brothers. The ledge is extensive.

WYOMING.

The State of Wyoming Syndicate, Limited, has been incorporated in London, for the purpose of acquiring and working any petroleum or oil-bearing lands, soda deposits and coal, iron or copper mines in Wyoming.

CARBON COUNTY.

A corporation known as the Boston-Wyoming Smelter, Power & Light Co. has been organized to build a copper smelter at Grand Encampment.

It is estimated the Ferris-Haggerty mines will output 100 tons of copper ore daily during the winter.

The drift in the Eureka has cut into a large body of quartz containing copper ore. The new ore body is not rich enough to ship, but will furnish concentrating ore.

CROOK COUNTY.

A short distance northeast of the central peak of Warren's Peaks is an irregular ledge traversing trachyte. It consists mainly of feldspathic rock, coarsely crystallized, with the crystals imbedded in a fine-grained feldspathic ground mass. The ledge has a reddish-brown color and in portions of it are considerable quantities of black limonite and black manganese oxide. The rock contains gold and the gulches tributary to the lode are also gold bearing. Gold and silver ores are also found at Inyan Kara and Sundance Buttes, south of Warren's Peaks.

FOREIGN.

BRITISH COLUMBIA.

At a recent joint meeting between representatives of the Mine Managers' Association and the Miners' Union an order was given to the union to furnish the Payne mine with a full force of men. This is the initial step to resume operations by all mines in the Silver-Lead Mines Association district, and means an end to the lockout existing in the Slocan for the past four months. The regular union scale of wages is to be paid, $3 50 for eight-hour shifts.

The following are the results of the Hall Mines Company's operations during October: Copper smelting—13 days 19 hours; 2,919 tons of Silver King ore from the company's mine and 189 tons of purchased ore were smelted, containing (approximately): Silver King ore, 64 tons copper, 33,930 ounces silver; purchased ore, etc, 12 tons copper, 10,380 ounces silver, 332 ounces gold. Lead smelting—20 days 22 hours; 457 tons of purchased lead ore were smelted, together with 192 tons of Silver King ore from the company's mine, from which were produced 149 tons of bullion, containing (approximately): From Silver King ore, 2,260 ounces silver; from purchased ore, etc, 145 tons lead, 15,770 ounces silver, 682 ounces gold.

On the Second Relief mine, near Erie, a large body of pay ore has been opened; the force has been increased and work will be prosecuted throughout the winter. The lead is 6 feet in width, with good values.

Kootenaian: It is reported that the Lake Shore group of mines at Moyie, in East Kootenay, owned by the Canadian Gold Fields, Ltd., and the Moyie and Queen of the Hills claims, adjoining the Lake Shore group, have been consolidated. The deal also includes the St. Eugene group at Moyie. The new company will be known as the St. Eugene Con., and will be capitalized at $3,500,000. The properties are all silver-lead producers, and the Lake Shore and St. Eugene mines are shippers. Together they will make the biggest silver-lead mining company in British Columbia.

SOUTH AFRICA.

The Transvaal gold supply may be tabulated as follows:

	Tons milled.	Ounces gold secured.	Value.
1887	.....	23,125	
1888	.....	208,121	
1889	.....	389,557	£2,250,000
Unrecorded	.....	42,000	
1890	.....	494,817	.....
1891	.....	719,268	2,560,000
1892	.....	1,210,869	4,297,610
1893	1,217,792	1,478,477	5,187,206
1894	2,674,673	2,024,164	6,963,100
1895	3,456,575	2,277,640	7,840,779
1896	4,011,697	2,280,892	7,864,341
1897	5,325,355	3,034,678	10,683,606
1898	7,331,446	4,295,609	15,141,376
Aggregate		18,469,219	
1899 (9 months)		3,913,810	£13,700,000
Totals		22,383,029	£76,488,018

Dividends paid by the Rand mining companies in recent years, according to the figures furnished by the Chamberlain mines, are as follows:

1892	£ 811,864	1896	£1,638,881
1893	1,100,203	1897	2,707,180
1894	1,540,394	1898	4,847,505
1895	2,198,943		

The existing conditions in South Africa make mining news difficult to obtain. Most of the mines of the Witwatersrand are closed and none are operating with full and competent force.

MEXICO.

It is reported that G. A. Treadwell has sold the Copito mines in Sonora, east of Magdalena, to New York capitalists for $3,500,000. The ore is rich in copper and gold.

In the placers near El Cozon mountains, Sonora, Jose Montijo recently picked up an $800 nugget.

It is reported that near the head of the divide in the mountains east of Hermosillo excellent gold prospects exist, which have only superficial development or none at all.

Personal.

J. P. EVANS of Denver, Colo., is in Kingman, Arizona.

BERNARD MACDONALD is at present sojourning at Rossland, B. C.

COL. G. H. MENDELL is giving expert testimony in Portland, Or.

H. S. SHERARD is inspecting mining property at Ainsworth, B. C.

MARSDEN MANSON of San Francisco will return from Virginia Jan. 1, 1900.

J. W. MACKAY, of Comstock bonanza fame, is to be a Southern Pacific director.

A. L. MOORE is the new Supt. of the Green mine, near Sugar Pine, Tuolumne Co., Cal.

C. DICK of San Francisco claims to be the only Chinese traveling salesman on the road.

CHAS. GRACEY succeeds E. G. Eckis as Supt. Southwestern M. Co., El Dorado canyon, Nev.

E. H. NOYES of Boston is visiting the property of the Little Tiger M. Co. of Yreka, Cal.

M. S. AQUIRRE, of Nogales, has been appointed manager of the Cobre Grande Copper Co.

DR C. J. TEASS succeeds Dr. Drake at the Mountain Copper Co.'s hospital at Keswick, Cal.

W. C. RALSTON leaves San Francisco, Cal., for Boston on the 5th inst., to be absent five weeks.

S. W. TRAYLOR, of the Colorado Iron Works Co., has returned from Globe, Arizona, to Denver, Colo.

BENEDICT CROWELL of Cleveland, O., is in Salt Lake City, Utah, examining mining properties near that city.

W. J. BROWNING AND F. WILDING of Chihuahua, Mexico, are examining the Strode mine, Trinity Center, Cal.

W. A. CARLYLE left Rossland, B. C., on the 17th ult. to assume the general management of the Rio Tinto mine, Spain.

VICTOR M. CLEMENT has returned to Salt Lake, Utah, from an inspection of mining property near Marysvale, in Beaver county.

THE State of Idaho will issue a reward of $1000 for the apprehension of Ed Boyle, one of the leaders of the dynamiters in the Cœur d'Alenes.

G. E. TOMLINSON AND E. C. WEBSTER of Pasadena, Cal., have recently returned from Chloride, Ariz., where they went to examine some mining properties.

HENRY CALLAGHAN, a California miner now in charge of the Lakeview Con. mines, Western Australia, is in San Francisco, and returns, via London, on the 5th.

J. RANDAL has returned to San Francisco from Sonora, Mexico. He says the war between the Mexican Government and the Yaquis will last for two years. He thinks that the desire of the Mexicans for the Yaqui lands is the principal cause of the war.

E. S. YOUNG of Vladivostock, Siberia, says there is a vast and increasing market in Siberia for American flour, agricultural and mechanical implements and other manufactured products, and predicts a permanent volume of trade between this country and the territory Russia is now developing.

CAPT. WM. ABERCROMBIE, who has spent six years in Alaskan exploration, and who has just surveyed an all-American route to the Klondike, has gone to Washington to make his report to the Secretary of War. He says that the main feature of the expedition is the completion of plans for the opening of the Klondike region for the American miner so he can land at Valdez with his pack pony and prospect any part of the public domain without interference from the officials of a foreign country.

T. C. DUNN of New York, Pres. Munina-Alaska G. M. Co., has returned from Cook Inlet. He considers the outlook for development in the Cook Inlet country and on the Kenai peninsula good. His headquarters are at Homer. This is also headquarters for the Cook Inlet Coal Fields Co. They have built a dock there and are building six miles of track extending back from the beach. Mr. Dunn's company has been prospecting. The ore is low grade, but there is plenty of it, both in quartz and slate, and he talks of a mill in 1900.

D. B. MAY, Commissioner General Land Office in Alaska, is here from Sitka en route to Washington, D. C., and says that Alaska's present mining laws permit a few men to monopolize the country; that powers of attorney are being abused and should be stopped; that 6000 claims have been located by about 200 miners. He thinks that Congress should regulate the size of placer claims. At present a man can take up a strip 1320 feet by 660 feet, or about twenty acres. Commissioner Day thinks that these twenty acres could be divided among several with plenty of pay for all, and that the amount now allowed for placer claims should be cut down to 500 feet. Who can tell what a Day may bring forth!

Industrial Notes.

—Denver, Colo., is to have a Pullman car repair shop.

—The Great Northern Express Co. will open an office in San Francisco.

—Wyoming convicts are breaking up seven miles of condemned U. P. cars at Laramie.

—Telephonic communication begins this week between Truckee and Grass Valley, Cal.

—The Pacific & Idaho Northern Railway Co. has 400 men grading in Weiser canyon, Idaho.

—Everett, Wash., is to put in a $55,000 sewer system, including 9¾ miles vitrified clay pipe.

—The $35,100 Plumas county, Cal., 4% 35-year refunding bonds were sold to S. Holmes at 101.196.

—Paper money has fallen to one-fifth its normal in value in Colombia, S. A., because of the decline in coffee.

—Demand for quartz miners in Colorado has so drawn upon the coal miners as to threaten a coal famine in that State.

—The Colorado Springs, Colo., Mining Stock Association contemplates the erection of a new mining stock exchange.

—Rydstrom & Goerig have a contract to build an electric railway between Seattle and Tacoma, Wash., for $600,000.

—The arbitration commission at Vancouver, B. C., shows evidence of desire to exclude Chinese miners from Canadian mines.

—The Southern and Central Pacific Companies are credited with the intention to spend $6,000,000 in improvements in 1900.

—The California wide-tire law goes into effect January 1, 1900, but will apparently be as much of a dead letter statute as the newspaper signature law.

—By Dec. 31, 1900, there will be an all-Canadian telegraph line between Vancouver and Dawson. There is already a telegraph service as far north as Quesnelle, B. C.

—A steamship in the Alaskan trade is about as good paying property as any at present. The Roanoke is credited with receiving $80,000 passenger money in one round trip.

—Eastern street railway companies are importing steel rails from Scotland and Germany. The Federal Steel Co. of New York is shipping steel rails to Glasgow, Scotland.

—The general organizer of the American Federation of Labor in Wisconsin estimates that the average advance in wages in Wisconsin for all classes in the year past was 15%.

—The extension of the copper vein of the United Verde mine, Arizona, has been discovered again—this time by a Kansas City mining engineer—in the grand canyon of the Colorado river.

—The McCloud River Lumber Co., Siskiyou county, Cal., is to be sold to an Eastern company for $2,500,000. A railroad is now operated twenty miles. The new company will extend the road to Fall River, sixty miles.

—The Russian government is about to establish a steamship line from Port Arthur to the United States, to be operated in connection with the Transsiberian Railroad. Either San Francisco or Seattle will be the eastern terminal.

—Within the past few years the United States, in sea-going tonnage, has dropped from the second place, next to Great Britain, to the fourth position, below Germany and France, and, if steamships in foreign trade alone are considered, below Norway and Spain, and only slightly ahead of Japan.

—The Standard Oil Co. has advanced the price of crude petroleum 2 cents in the Pennsylvania fields and 1 cent in the Lima, Ohio, fields, making the quotation for the Pennsylvania product $1.58 per barrel and for Ohio $1.07. This advance is the latest of a series, during which the Standard has increased the price nearly 40 cents a barrel. The present prices are the highest in four years.

—During October orders were given by the various railroads in the United States for the building of 33,023 new cars, of which 19,418 were box, stock, furnitnre and refrigerator cars, 10,781 were gondola and coal cars, 1700 were steel cars, 810 were flat cars and 314 were passenger and street railway cars, 100 of the latter being for export. Orders for 323 locomotives were also given, thirty-eight of these being for export.

—Engineers are designing the earthquake-proof steel palace for the Crown Prince of Japan which is to mark the advent of American steel construction in the Mikado's lands. The Imperial Government has appropriated $3,000,000 for its erection. Foundations are being laid with a view to rearing the framework in February. Around the skeleton, on beams and bars, will be built a house of granite and marble, expected to eclipse in beauty of design anything the Orient has ever known. The structure will spread to dimensions of 270x400 feet, raising to a height of 60 feet.

—Carlisle Mason of Butte, Mont., has a scheme to utilize the water power of the different rivers along the line of the Oregon Short Line Railroad from Salt Lake, Utah, to Pocatello, Idaho; from Pocatello to Butte; and from Pocatello west and north to Spokane, Wash., and the coast. The scopy plan embraces the erection of plower plants at all the stations, with the expectation that the Oregon Short Line and O. R. & N. will run cars by electrical power. The combined mileage of the two systems is over 2000 miles. The only steam plant that would be required, Mr. Mason figures, would be at Monida. He calculates that about 180,000 H. P. could be secured along the lines of the two railroads. He claims that he has $5,000,000 subscribed in Salt Lake. The railroad officials laugh.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING NOVEMBER 21, 1899.

637,493.—TEMPORARY BINDER—A. S. Abbott, Los Angeles, Cal

637,223.—FEED WATER HEATER—C. F. Bainter, Los Angeles, Cal.

637,224.—FEED WATER HEATER—C. F. Bainter, Los Angeles, Cal

637,546.—ACETYLENE GAS APPARATUS—G. S. Bennett, Portland, Ogn.

637,497.—LOCK—Burden & Lovatt, Pilot Bay, B. C.

637,718.—OILING ROADS—L. B. DeCamp, Alhambra, Cal.

637,502.—WINDOW—G. O. Dean, S. F.

637,242.—WATERING TROUGH—G. W. Ehrman, Maltly, Wash.

637,507.—WATER PIPE CONNECTION—H. H. Gorter, S. F

637,338.—WEIGHING SCALE—E. Hanak, S. F.

637,612.—SEED DROPPER—G. B. Hopper, Santa Maria, Cal.

637,260.—RANGE—J. E. Hunt, Portland, Ogn.

637,205.—SHADE ROLLER—J. H. Kaufman, Marysville, Cal

637,514.—POWDER CONTAINER TOP—I. G. Leek, S. F.

637,738.—HANDLING BARRELS—J. E. Ludwig, S. F.

637,471.—MORTAR FOR STAMP BATTERIES—W. A. Merralls, S. F.

637,472.—MORTAR FOR STAMP BATTERIES—W. A. Merralls, S. F.

637,662.—CULINARY STEAMER—J. G. & M. S. Phenix, Hoodsport, Wash.

637,417.—PUMP—V. J. A. Rey, S. F.

637,303.—CHARCOIL POINT—E. R. Tait, Oakland, Cal.

637,538.—TELEPHONE MOUTHPIECE—G. W. Van Alstine, Los Angeles, Cal.

637,686.—FILTER—W. Weir, Colfax, Cal.

637,307.—LUMBER DRIER—Wendling & Crawford, S. F.

637,308.—LUMBER DRIER—Wendling & Crawford, S. F.

31,854.—DESIGN—L. Hudgin, Lochiel, Ariz.

31,881.—DESIGN—J. B. Kelly, Portland, Ogn.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LOCK.—O. H. Burden and S. Lovatt, Pilot Bay, Canada. No. 637,497. Dated Nov. 21, 1899. This invention relates to improvements in locks which are applicable to doors, trunks and to any parts which it is desirable to lock and make secure. It comprises a spring-pressed slidable bolt, a fixed casing within which it is movable, a hollow cylindrical knob shank extending transversly to the bolt and turnable within a fixed exterior cylinder or casing having circumferential slots made in it so as to expose the surface of the cylindrical knob shank. The bolt has elastic arms extending rearwardly upon each side of and engaging the knob shank above and below through the slots in its casing, so that when the knob is turned in either direction it will retract the bolt. A cylinder is located interior to the knob shank and has a slot made longitudinally from end to end with inwardly projecting lugs or pins. A key has corresponding grooves or channels adapted to be introduced into the slots, and a tumbler consisting of jointed sections is pivoted within the slot in the interior cylinder and has a lug projecting outwardly, and a spring by which it is normally forced in that direction. Slots are made through the knob shank and the exterior fixed cylinder, with which slots the tumbler engage when they are coincident, and the outer ends of the tumbler are so formed as to be engaged by the key when it is introduced so that the tumbler is moved about its pivots and retracted to allow the knobs to be turned and the bolt to be withdrawn.

LUMBER DRIER—G. X. Wendling and O. W. Crawford, San Francisco, Cal. No. 637,307. Dated Nov. 21, 1899. The object of this invention is to provide a means for stacking lumber so that heat passages or flues are formed within the body of lumber thus stacked and heat may be passed directly therethrough. In conjunction with this is a truck having a swinging framework adapted to receive and hold the lumber, the framework being so journaled to the truck that it may be turned into one position for the purpose of loading, and afterwards turned to the position which the lumber is to occupy while being dried. The kiln is so constructed that after the frame is loaded and the stack of lumber completed upon it the stack is locked in place upon the frame with flues or passages formed by the piling of the lumber. The car or truck is then run into the kiln and, fitting between the sides, the heat from the heat pipes or other source of heat passes up between these sides and is by them directed through the flues or passages which are formed in the lumber, so that every part of the lumber is exposed to the direct current of the heat. Suitable valves or gates are provided for the escape of the heat from the drying chamber, and these gates are so arranged that by opening certain ones the direction of the heating current will be changed and caused to pass through any part of the lumber stack.

Catalogues Received.

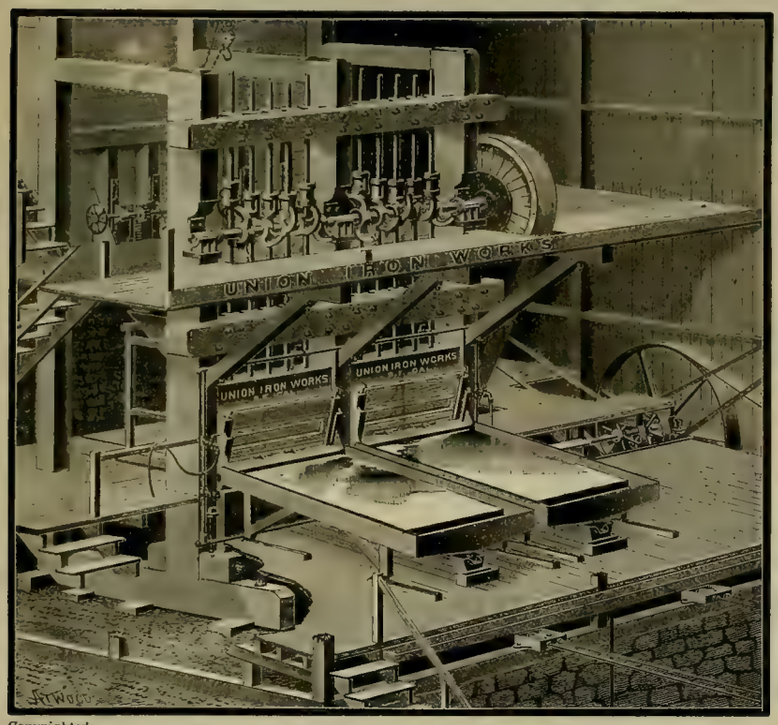
Catalogue No 35, issued by the M. C. Bullock Mfg. Co., 1170 W. Lake st., Chicago, Ill., is devoted to an exposition of the Champion mine ventilator, which it fully illustrates and describes. Considerable interesting data is furnished on the subject of mine ventilation, and all the requirements connected with the installation of a Champion ventilator are treated in concise tabulated form.

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MODERN TEN-STAMP BATTERY.



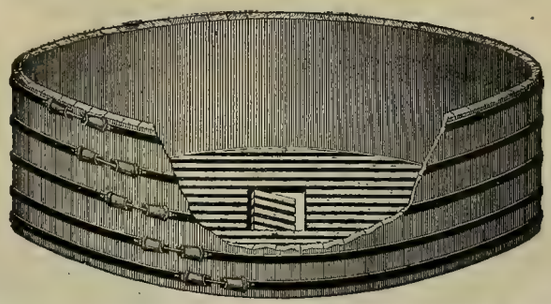
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The illustration shows the details of a modern 10-stamp battery of the back-knee type, driven by belt and tightener from a shaft located upon the battery frame sills below the mortars and plainly illustrates not only the battery and its various parts, but also shows the ore-bin gate, feeders, copper apron plates and water piping, all in their relative positions.

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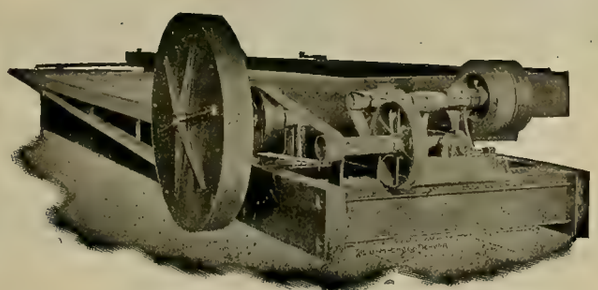
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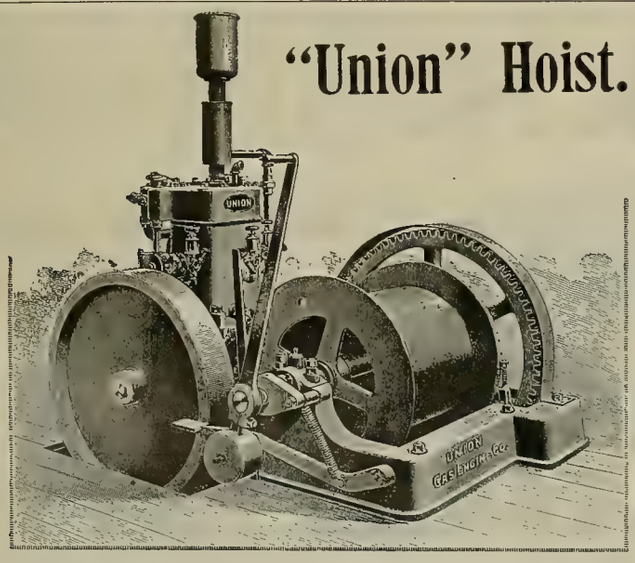
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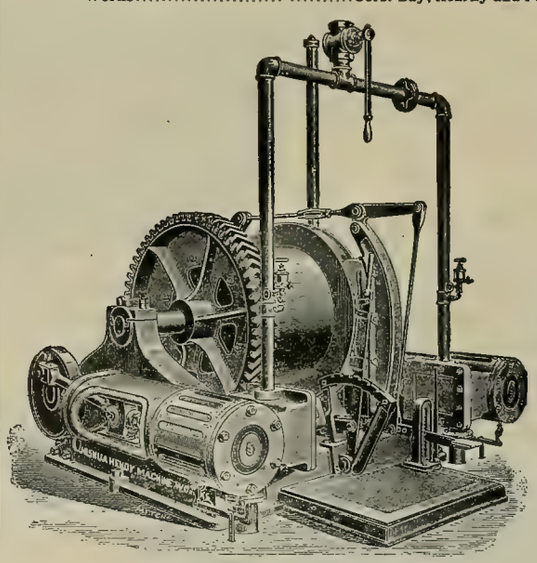
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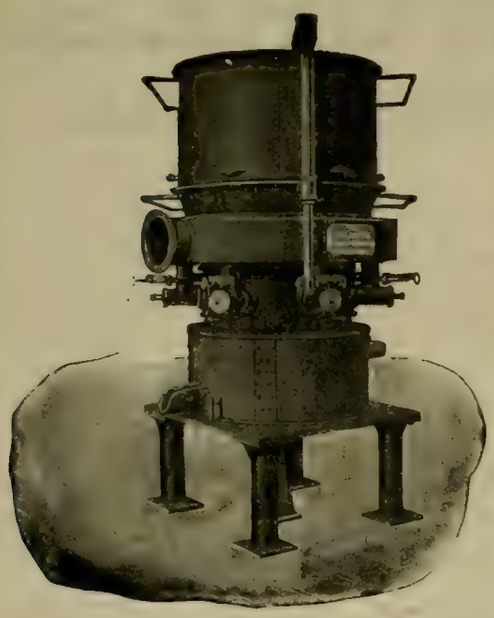
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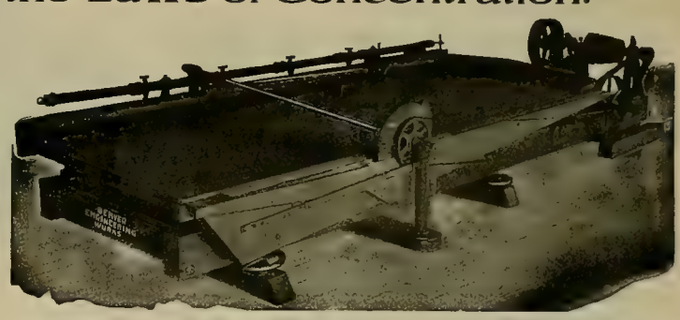
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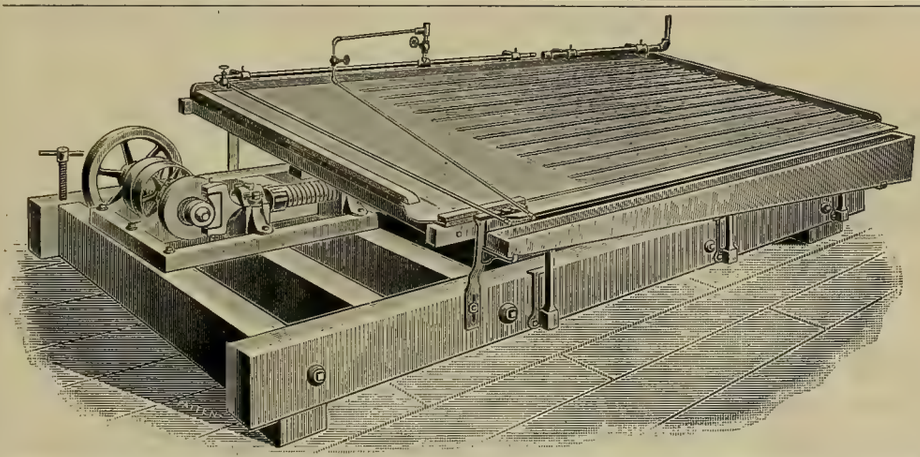
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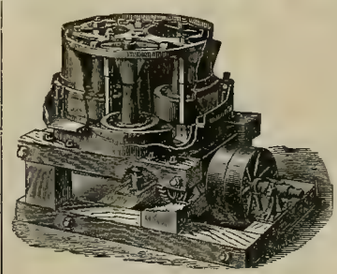
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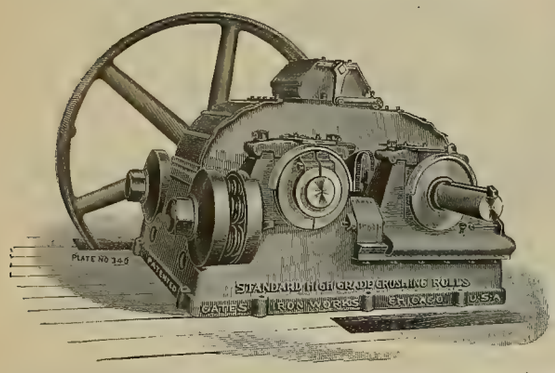
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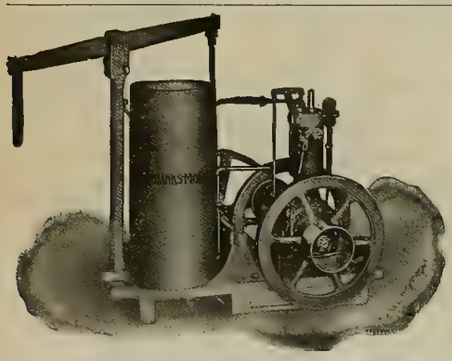


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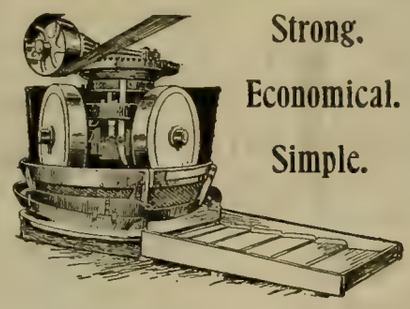
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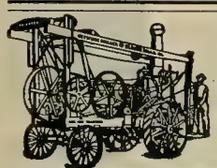
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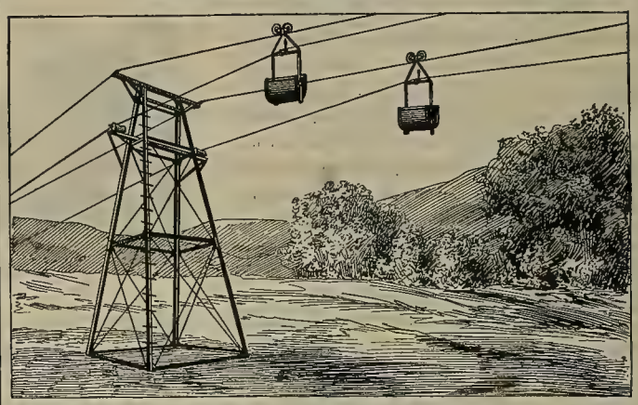
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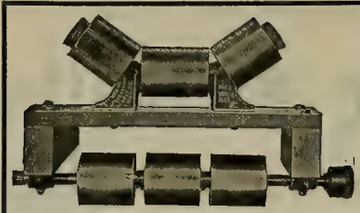
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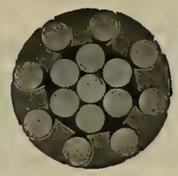
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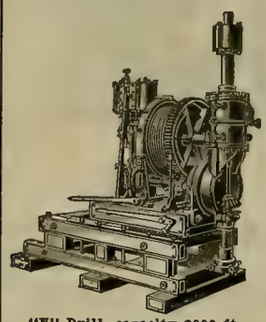
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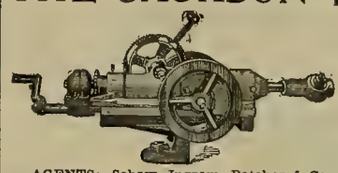
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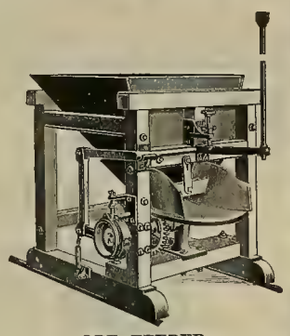
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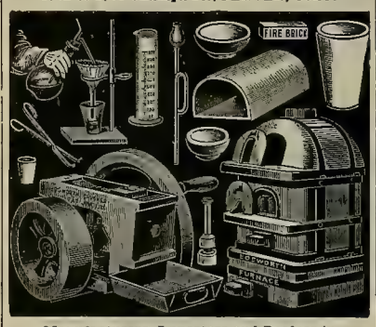
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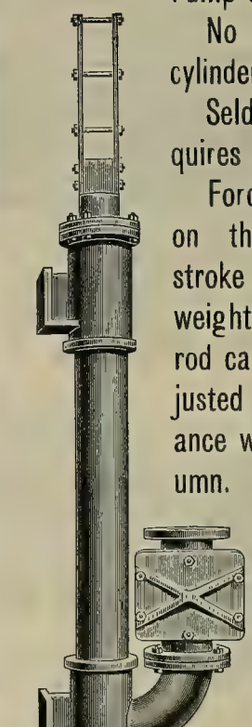
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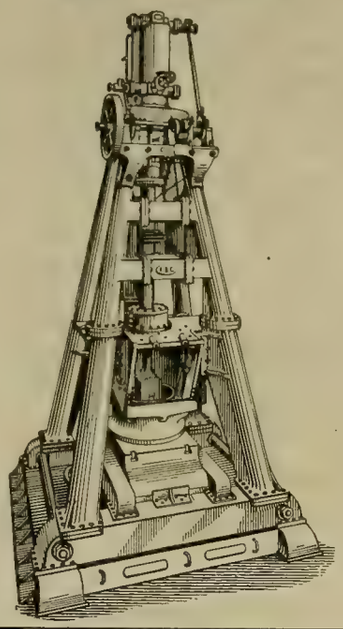
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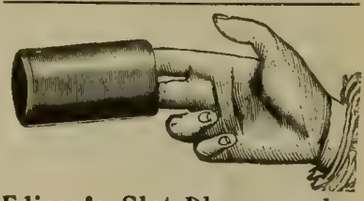
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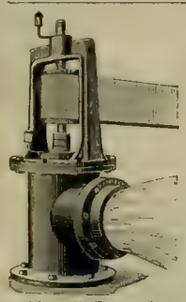
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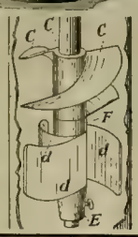
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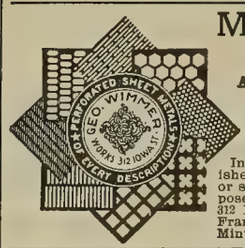
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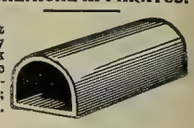
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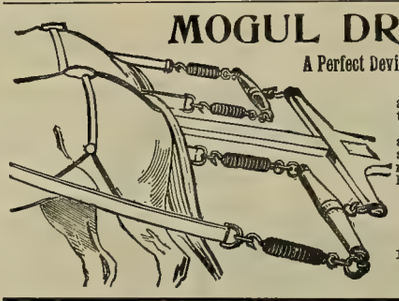
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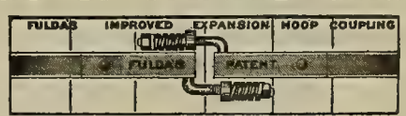


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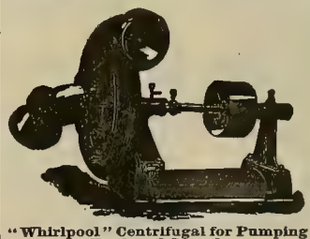
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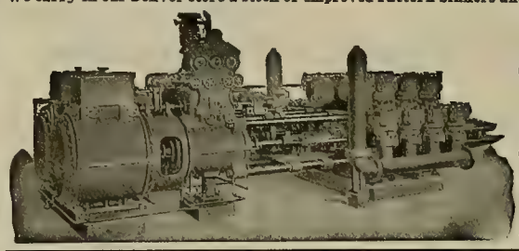
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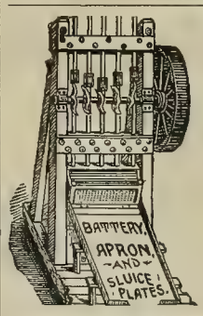
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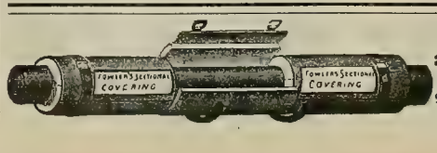
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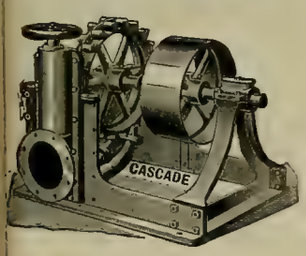
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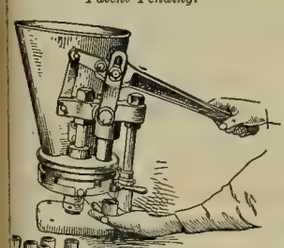
Our experience of 38 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.



JAMES LEFFEL & CO.
SPRINGFIELD, OHIO, U. S. A.

Patent Pending.



PERFECT CUPELS

can be made by anyone with ease and dispatch with

CALKINS' CUPEL MACHINES.

Compact, easily operated, can't get out of order, everlasting.

NO ASSAY OFFICE COMPLETE WITHOUT ONE.

Descriptive Pamphlet and Price List Mailed on Application.

THE AUTOMATIC.

This machine will make ive sizes cupels of ideal erfection.

Capacity, *600 an hour.*

Three designs and grades.

F. W. BRAUN & CO.,
Assayers' Goods of Every Description,
LOS ANGELES, CAL.

All miners who have used the

TRUAX

Automatic Ore Cars

by they are the best cars on the market.

OVER THREE THOUSAND IN USE.

Manufactured in San Francisco, Cal., by

THE TRUAX MFG. CO.,
114 FIRST STREET.

IMPROVED 1898.



Patented: Jan. 5, 1892. Aug. 27, 1895. July 19, 1898.
In Canada: June 21, 1898.

Manufactured in Denver, Colorado, by

THE TRUAX MFG. CO.,
1717-1719 WAZEE ST.

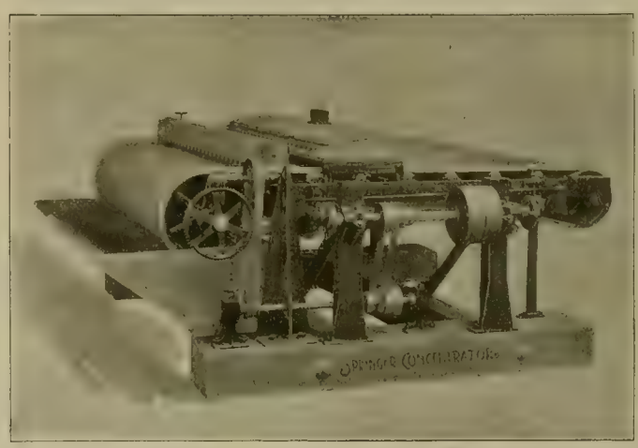
We make all kinds of Cars, Skips and Charging Carts for the Mine, Mill and Smelter.

SEND FOR PAMPHLET.

Dealers Wanted in Mining Sections to Handle the Truax Ore Cars.

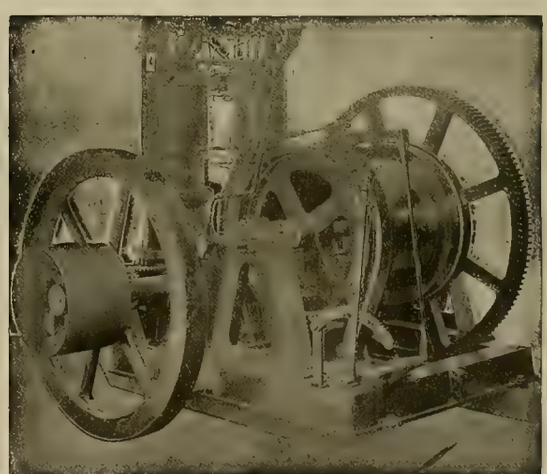
$1000.00 that there is no Belt Machine that will do more, cleaner, or better work than---

THE SPRINGER CONCENTRATOR.



The best 6-foot rubber belt machine in the market. You will see at a glance that this Concentrator embraces all of the best qualities of other good concentrators, besides many adjustments and improvements which none of the others contain. This machine is shorter than any other concentrator. See report of Supt. Lowring of Utica mine in "Mining and Scientific Press" of Jan'y 14, 1899, wherein he cut three 12-foot Frue vanners down to 8 feet in length and got a saving of 8 cents more per ton from the 8-foot than from the 12-foot machine after a thorough test of a run of thirty-five days. This is the strongest, simplest, most durable, less wear and tear, and takes less power to run than any other. It has only one-half as many pieces in its construction as in some concentrators. All belts are tightened by sliding boxes, and the shaking frame can be raised or lowered and leveled while running at full speed. Weight only 1500 pounds, thus a saving of one-half in transportation. This Concentrator is now running from Alaska to Mexico, and giving the best of results. All mining men should see thir Concentrator before purchasing any other. Price for 6-foot rubber belt machine, f. o. b., $400. Address all correspondence to **AMOS C. SPRINGER, 976 Pine Street, San Francisco, Cal.**

Improved Mining Hoist.



THE

Golden Gate Gas Engine

THE MOTIVE POWER.

Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.

Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS, 211 & 213 MAIN STREET, SAN FRANCISCO, CAL.

JOHN WIGMORE & SONS CO.

WE ARE AGENTS FOR

Dow Steam Pumps,
Goulds Power Pumps,
Hercules Gasoline Hoists,
Giant Air Compressors,
Giant Rock Drills.

117-123 S. LOS ANGELES ST., LOS ANGELES, CAL.

Market Reports.

SAN FRANCISCO, Nov. 29, 1899.

SILVER.—London, 27¾d; New York, 59¼; San Francisco, 59@59⅝; Mexican Dollars, 47¾@48⅛; New York exchange, sight, 10; telegraphic, 15 cents premium.

LEAD.—New York reports steady, $4.60 bid, $4.65 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake at $17 @17.25; brokers' price, $17.25. Local—Mill copper plates, 23¼c.

The price received for Lake copper for 1899 is not expected to average much above 16c per pound, notwithstanding the 18½c market ruling in June and the present 17c market. This is due to the sales made last year for delivery this year at 12½@13c. The average selling price per pound for past years will be of interest:

1898	12.10c	1890	15.75c
1897	11.25c	1885	11.12c
1896	10.88c	1880	20.12c
1895	10.75c	1875	22.50c
1894	9.56c	1870	20.62c
1893	10.75c	1865	36.25c
1892	11.50c	1860	22.50c
1891	12.60c		

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Dull, $28 bid and $28.25 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $50; export, $45.50 @46; carload lots, special rates.

The quicksilver market remains firm without change since last week's quotations.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Very weak; $4.40 bid, $4.50 asked.

A report from Joplin states that the prospects for an independent smelter are growing less. It is now stated that at least three old smelters will be started up and the need for an independent one obviated.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¾c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½ @6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2¾c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7½c; 6s, 12 oz., 5½c; 6s, 10 oz., 5¼c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 50
Brymbo	7 50	Cannel	9 50
Pennsylvania, bd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 61c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19½c; Astral, 19½c; Star, 23½c; Eocene, 21½c; Extra Star, 23½c; Elaine, 24½c; Water White, bulk, in tanks, 13½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 59c; cs., 64c; No. 1 bbl., 49c; cs., 54c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

San Francisco Stock Board Sales.

SAN FRANCISCO, Nov. 28, 1899.

9:30 A. M. SESSION.

100 Alpha	04c	300 Mexican	52c
500 Best & Belcher	42c	300	53c
350 Con. Cal. & Va.	$1 65	50 Ophir	$1 10
250	$1 70	200 Sierra Nevada	42c
100 Crown Point	21c	200 Union Con	36c
200 Hale & Norcross	41c	50 Yellow Jacket	19c
100	43c		

2:30 P. M. SESSION.

400 Belcher	30c	100 Ophir	$1 20
200 Best & Belcher	47c	150	$1 25
100 Challar	23c	700 Potosi	30c
300 Con. Cal. & Va.	$1 85	100 Sierra Nevada	44c
100 Hale & Noro's	41c	200 Standard	$2 75
200 Mexican	56c	300 Yellow Jacket	18c
100	55c		

California Wide Tire Law.

The California law goes into effect January 1, 1900. It does not prescribe tires in terms of weight capacity, but in dimensions of skeins and axles, as follows:

SECTION 1. The width of tires for wheels upon wagons or other vehicles to be used upon public highways of the State of California shall be, for the following styles of wagons, as follows: Two and three-fourth-inch steel or thimble skein axle, 1⅞-inch tubular steel or iron axle, not less than 3-inch tire; 1¼-inch steel or iron axle, 2⅛-inch tubular or iron axle, not less than 3½-inch tire; 3-inch steel or thimble skein, 1⅝-inch steel or iron axle, 2⅜-inch tubular steel or iron axle, not less than 4-inch tire; 3¼-inch steel or thimble skein, 1¾ or 1⅞-inch steel or iron axle, 2⅝-inch tubular steel or iron axle, not less than 4½-inch tire; 3½-inch steel or thimble skein, 2-inch steel or iron axle, 2¾-inch tubular steel or iron axle, not less than 5-inch tire; 3¾-inch steel or thimble skein, 2¼-inch steel or iron axle, 3 or 3¼-inch tubular steel or iron axle, not less than 5½-inch tire; 4-inch and larger steel or thimble skein, 2½-inch and larger steel or iron axle, 3¼-inch and larger tubular steel or iron axle, not less than 6-inch tire. Other styles of axle shall have tires of same width as those of equal carrying capacity above specified. All intermediate sizes shall have tires of the same width as the next larger size above specified.

To translate these dimensions into weight capacity, has been secured the following table of equivalents from one of the best authorities in the vehicle trade on this coast:

Size.	Width of tire.	Capacity, lbs.
2¾-inch steel or thimble skein..	3 -inch	2,500
1¼-inch steel	3½-inch	2,500
2⅛-inch tubular		
3 -inch steel skein	4 -inch	3,000
1⅝-inch steel		
2⅜-inch tubular		
3¼-inch steel skein	4½-inch	4,000
1¾-inch steel		
2⅝-inch tubular		
3½-inch steel skein	5 -inch	5,000
2 -inch steel		
2¾-inch tubular		
3¾-inch steel skein	5½-inch	7,000
2¼-inch steel		
3½-inch tubular		
4 -inch and larger steel skein..	6 -inch	9,000
2½-inch steel		
3¼-inch tubular		

Recently Declared Mining Dividends.

Osceola Copper M. Co., Michigan, $279,000; payable Dec. 15.

Pennsylvania Gold M. Co., California, 20 cents per share, $10,000; Dec. 1.

Raven Gold M. Co., Colorado, $10,000; Nov. 27.

Tamarack Copper M. Co., Michigan, $360,000; payable Dec. 28.

Lillie Gold M. Co., Colorado, $11,250; Dec. 1.

Boston Get-There Zinc Co., Missouri, monthly 1%; payable Dec. 10.

Commercial Paragraphs.

A CONTRACT for a new 3500-ton cruiser has been awarded by the Navy Department to the Union Iron Works of San Francisco, Cal., to be constructed in accordance with the department's designs. The vessel is to be called the Tacoma, will cost $1,041,900, and is to be built in twenty-seven months. While rated as fifteen knots, Chief Constructor Hichborn says it will make seventeen knots if necessary.

FOR SALE.

"Placer Property, which has been thoroughly explored and which shows it to be a paying property."

Address **E. N. BREITUNG,**
Marquette, Mich., U. S. A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

Quicksilver

For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

CHEMIST, age 30, desires position as assistant in mine, works or laboratory, with opportunity for advancement. Five years' college and university training. Highest references. Address M. S., Mining and Scientific Press.

SITUATION WANTED by Practical Steam Engineer, with twelve years' experience. Can handle any kind of steam machinery. Address J. F. SNOW, care George H. Larkin, No. 12 Fremont St., San Francisco, Cal.

Metallurgical Chemist and Assayer open for position after December. Three years' Scotch college training and four years' practical experience of cyanide work, assaying, etc., in Spanish America. Speaks Spanish. Good references. Address METALLURGY, care Mining and Scientific Press.

Electrical and Steam Engineer, with first-class experience in electrical mining machinery and haulage, wants a steady position; is industrious, strictly reliable, does all the repair work in first-class style. Good references. Address J. M. S., Mining and Scientific Press, San Francisco, Cal.

Position Wanted by undersigned as electrician. Graduate of a leading technical college. Wide and very practical experience of ten years with various systems of lighting and power, including three years in charge of a plant for the leading steel company of America, and three years in charge of 3-phase plant for representative Colorado mine. Address RELIABLE, care Mining and Scientific Press.

WANTED—POSITION BY A MAN WHO IS expert in milling and concentration of gold ores. Understands assaying, retorting and melting. Highest of references. Address W. B. G., 626 McAllister St., San Francisco, Cal

ASSAYER AND CHEMIST,
15 Years' Experience, Wishes Position.
Will go any place. Best of references. Address CHEMIST, this office.

WANTED.—PRODUCING GOLD PROPERTY, earnings and reserves warranting seven figures Bank references. Principals only. Address ARGUS, care this office.

WANTED.—A STAMP MILL MILLWRIGHT.
Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from W. H Secombe, in the Landecker Mine, near Placerville, El Dorado Co., to deposit tailings in a ravine tributary to Webber Creek; from Jos. J. Hoffman and T. M. Browne, in the Paragon Mine, at Bath, Placer Co., to deposit tailings in Volcano Canyon; and from G. W. Coates and E. S. Randall, in the Pebble Hill Placer Mine, near Smith's Flat, El Dorado Co., to deposit tailings in Little Chunk Canyon, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 4, 1899, at 1:30 P. M.

TO ASSAYERS.
A fine set of assay scales with pulp balances, all in good order, will be sold for $125.00, if applied for soon. The outfit consists of one Troemner's No. 5 balance, of latest pattern, with aluminum beam and agate bearings, original cost $175.00; also, one Becker's pulp balance, No. 18, with 8-inch beam and weights, costing $26.00. Both said balances mounted in glass case with sliding doors. Further particulars by addressing Box 4, San Andreas, Cal.

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

FRED C. MILES,
CISCO, PLACER CO., CAL.
Copper, croppings 50 ft. and over. Good percentage at surface. Gravel and gold mines.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.
H. E. RUNKLE, Mining Broker, El Paso, Texas.

FOR SALE.
Gold Properties in Various Stages of Development.

Single claims and groups. Large gravel properties, dredging and hydraulic. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,
100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

FOR SALE CHEAP.
80 H. P CORLISS ENGINE;
TWO STEEL BOILERS, 50 H. P. EACH;
HEATER AND STEAM PUMP.
All in first-class condition.
THE VISALIA MILLING CO.,
VISALIA, CAL

GRAHAM, GARRETT & CO., PROMOTERS,
211-212 Peyton Blk., SPOKANE, WASH.

First-class mines and mining stocks for sale at all times. Correspondence solicited. Moreing & Neal and Clough's codes used.

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BUSINESS COLLEGE.
24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPARTMENT: Mathematics, Draughting, Strength of Material, Chemistry, Assaying, Blow-Pipe Analysis, Geology, Mineralogy, Surveying, etc., under the direction of Prof. O. H. Packer, an engineer of national reputation.

ELECTRICAL DEPARTMENT: Theory and Practice; Construction,

BUSINESS: Bookkeeping, Shorthand, Typing, Modern Languages, etc.

Twenty teachers; individual instruction; can enter at any time; Catalogue and Journal free.

RUPTURE Hydrocele, Varicocele, Piles, Fissure, Fistula, Ulceration, etc., cured without operation or detention from business. NO PAY UNTIL CURED. Consultation free. Call or send for pamphlet. DRS. MANSFIELD & PORTERFIELD, 838 Market Street, San Francisco, Cal. **PILES**

DEWEY, STRONG & CO.,
PATENT AGENTS, 330 Market St., S. F., Cal.

FOR SALE. New Hercules Gasoline Hoist, 35 H. P., built in sections for transportation—never been used—**WILL BE SACRIFICED.** Also 12 H. P. second-hand Hercules Gasoline Engine, in guaranteed order. Address E. H. PALMER, 405 Sansome St., S. F., Cal.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.

Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

GENERAL PHOTO-ENGRAVING CO.
[SUCCESSORS TO DEWEY ENGRAVING CO.]
FINE ZINCOGRAPHS, HALF-TONES, AND DESIGNING.
ENGRAVINGS OF MACHINERY OUR SPECIALTY.
SEND FOR SAMPLES AND PRICES. NO. 536 CLAY STREET,
TELEPHONE BLACK 1466. SAN FRANCISCO, CAL.

Are You Confronted With a Difficult Ore-Separating Problem?
THE WETHERILL MAGNETIC SEPARATING PROCESS
may prove the solution. Apply to Wetherill Separating Company, 52 Broadway, N. Y.



Powell's Signal Oiler.

LEVER UP, Oil Dropping;
LEVER DOWN, Oil Shut Off.

Doesn't interfere with the adjustment.
Most perfect Oiler in the world.
Haven't you need for such an Oiler?
In stock by all Jobbing Supply Houses.
Manufactured only by
THE WM. POWELL CO.,
Cincinnati, O.

Quicksilver

—FOR SALE BY—
The Eureka Company,
OF SAN FRANCISCO.
ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

THE LITTLE ALASKA GOLD WASHER.



Weighs only 7½ pounds. Crated for shipment, 11 pounds.
One man can wash 5 tons of dirt per day.
In working, the operator does not have to wet his hands, and can stand in an upright, natural position, and does not have to hold the weight of the dirt in his arms.
Requires very little water and saves more gold than any other washer. Send for Circular.

RUSSELL & KINSEY,
204 So. Broadway, - - LOS ANGELES, CAL.

.PIPE.

For HYDRAULIC POWER and IRRIGATION.

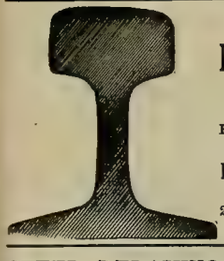
OIL STORAGE TANKS.
GENERAL SHEET IRON WORK.

Lacy Manufacturing Co.
LOS ANGELES.

Everything Electrical.

Estimates given on Electrical plants or wiring of any description.

SOUTHERN ELECTRICAL CO.
3d and Main Sts.,
LOS ANGELES.



FOR SALE.
Relaying Rails
For Mines and Street Railways.
LEE CHAMBERLAIN & CO.,
217 N. Los Angeles St., Los Angeles.

STEEL RELAYING RAILS and LOCOMOTIVES
AT REDUCED PRICES!
Correspondence solicited.
C. J. TALLON,
308 Market Street, San Francisco, Cal.

DEWEY, STRONG & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
330 MARKET ST. S.F.

Assessment Notices.

SIERRA NEVADA SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 4th day of November, 1899, an assessment (No. 117) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on THURSDAY, the 7th day of December, 1899, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 26th day of December, 1899, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.
E. L. PARKER, Secretary.
Office—Room 14, Nevada Block, No. 309 Montgomery street, San Francisco, California.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of November, 1899, an assessment (No. 4) of Ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of December, 1899, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 3d day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
J. MIDDLETON, Secretary
Office—213 Jackson St., San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 10) of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
A. F. FREY, Secretary.
Office—632 Sacramento street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 14) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

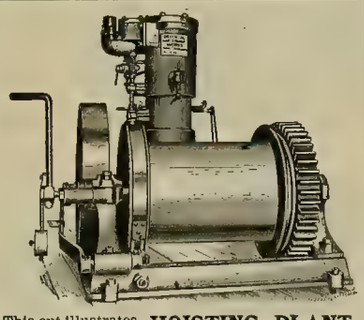
By order of the Board of Directors.
JOSEPH H. MOOSER, Secretary.
Office—320 Sansome street, room 24, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of November, 1899, an assessment (No. 21) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHARLES BOVONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

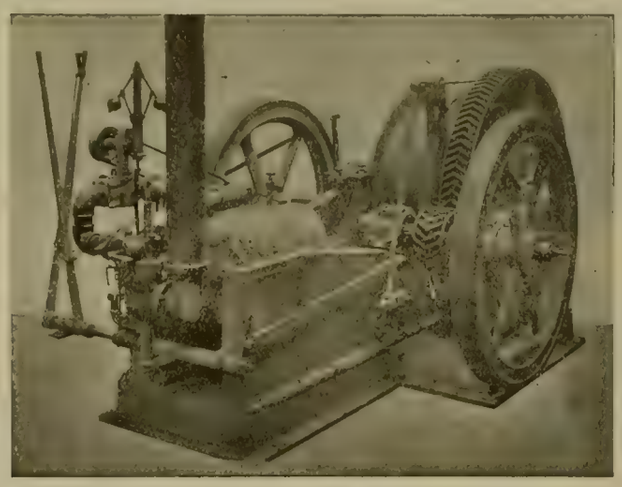


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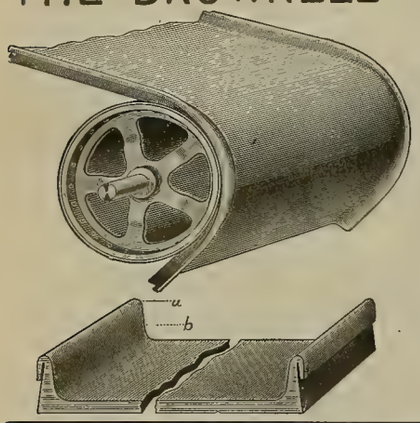
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SUPT. OFFICE WILDMAN GOLD MINING COMPANY, SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintendent.

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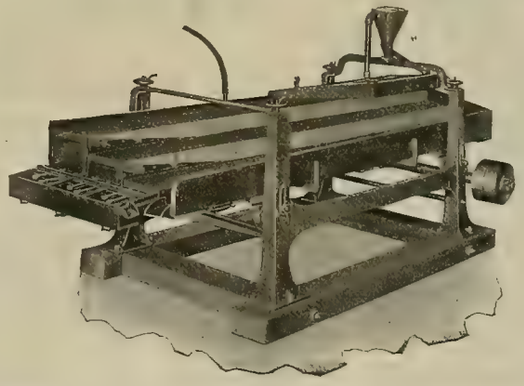
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No. 2057.—VOLUME LXXIX. Number 24. SAN FRANCISCO. SATURDAY, DECEMBER 9, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Granite Mountain-Bimetallic Mine, Phillipsburg, Montana.

Montana has produced a number of famous bonanza mines, among them the Granite Mountain–Bimetallic, near Phillipsburg, in Granite county. It lies 2500 feet up the slope of a rugged mountain, covered with granite boulders, on the east side of Flint creek. The Granite Mountain mine is near the Summit, and the Bimetallic adjoins it on the same vein lower down the slope. The walls are hard, dark gray granite. The vein near the surface has a width of from 2 to 18 feet and is free from the walls, with a gouge of clay on both walls. In depth it develops into a great vein, ranging from 50 to 150 feet in width, with a pay streak 2 feet to over 20 feet wide. A peculiarity of this vein is that at no point along its course does the pay shoot reach nearer than 100 feet of the surface. The vein at the outcrop is recognized by iron-stained seams in the softened granite.

The Granite Mountain was the first discovered, and, like most other great mines, it has an interesting history. It was found by E. D. Holland, now of Deer Lodge, Mont, who, while hunting one day in '75, followed a deer up the mountain. The fleeing animal loosened a fragment of ore which rolled down the slope toward the hunter, who, attracted by its appearance, took it to an assayer. The latter gave Holland little satisfaction as to the value of the ore, but evinced a great interest in the locality from which it came. This the hunter kept secret until such time as he could locate the vein without being observed. He placed the names of J. W. Estell and Dr. J. M. Merrill on the location certificate, and these three, with small capital, began the development of the property. Subsequently prominent merchants of St. Louis, Mo., became interested, the discoverer (Holland) and Estell selling their two-thirds interest for $40,000. Dr. Merrill retained his interest.

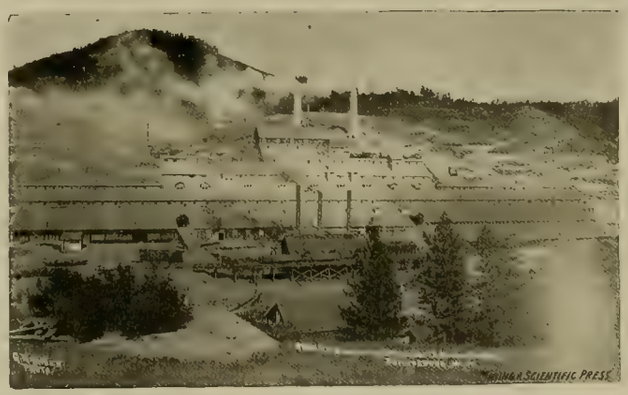
Expensive development work was done, but no pay rock of consequence developed, and the company became discouraged. Capt. Plummer of St. Louis, who had charge of the property, put up a large sum to continue work when the home company refused or were unable to continue the investigation farther, and it is a matter of record that an official letter was sent him directing him to discontinue work, but had not reached him when a rich strike was made, which was so encouraging that the directors telegraphed to disregard the letter and continue the work.

The first shoot near the surface was low grade, and adits were driven in several hundred feet on a barren seam to the second shoot, from which the first 1435 tons returned about $275,000. A 20-stamp mill was built to work this ore. Then, in grading for a retort building, another vein was uncovered, which led to the richest shoot ever found in the mine.

The Bimetallic was found by sinking on the line of the fissure and crosscutting to the pay streak, and this mine, though not so valuable as the Granite Mountain, also became largely profitable.



CENTENNIAL–EUREKA MINE, TINTIC, UTAH.



THE GRANITE MOUNTAIN-BIMETALLIC MILL, MONTANA.

The Centennial-Eureka Mine, Utah.

One of the most valuable mines in Utah is the Centennial–Eureka, at Eureka, Tintic district. Recently a contract was made to furnish 100,000 tons of ore to the smelters. The property comprises twenty-seven patented mines, but the principal value is based at present on a shoot 200 feet in length and 80 feet in width. Its average value is placed at $35 per ton. It contains over $30 in gold and silver and some of the ore carries 20% copper. The mine is developed to a depth of 1200 feet.

About the year '85 W. W. Chisholm, J. F. Woodman, Jacob Bamberger and J. D. Kendall, with others, began active continuous work upon certain claims which are now included within the property of the Centennial–Eureka Mining Co. Some time after that date the property was incorporated under the above name. From time to time, as opportunity arose, additional claims were located and purchased, until at present the company owns something like 100 acres of ground.

Although some ore was found from the beginning, the property was not put upon a paying basis or a dividend declared until October, '89, and regular dividends were begun the following July, which have been paid each month most of the time since that date.

Like other mines in and around Eureka, Utah, the Centennial–Eureka is found in dolomitic limestone; the ore bodies are large and rich and give promise of great depth. The values in the ore are gold, silver and copper, with small amounts of lead.

This mine has paid $2,130,000 in dividends to its original owners, furnished one of the finest mill plants in the State and purchased several hundred thousand dollars' worth of additional territory—almost all of which has been accomplished with the proceeds of ore produced above the 400 level.

The mine is equipped with a hoist capable of going to a depth of 3000 feet with a 20-drill compressor.

Contracts have been let by the company to build an aerial tramway from the mine to the railroad, which will reduce the cost of handling ore about 70% and will transport coal from the railroad to the mine at the same time.



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J. F. HALLORAN.....Publisher

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Centennial-Eureka Mine, Tintic, Utah; The Granite Mountain-Bimetallic Mill, Montana; Bimetallic Hoist, Looking Toward Granite Mountain, Montana; The Granite Mountain Hoist, Montana, 657. Plan Showing Drifts, Crossouts and Raises Preparatory to "Block Caving" in Pewabic Mine; Cross Section, "Block Caving," Pewabic Mine; Longitudinal Section, "Block Caving," Pewabic Mine; Plan Showing Block of Ground Ready for Caving, Pewabic Mine; Plan Showing Drifts and Crosscuts Through the Block After Being Caved, Pewabic Mine; Vertical Section Showing "Sub-Drifts," Chandler Mine; Stull Rooms Used in the Fayal Mine, 660. "The Steeples," from Johnson's Cabin, S. E. Kootenay, B. C.; Near Head of Middle Fork Spillimachene River, B. C., 661. Latest Mining and Metallurgical Patents, 663. Salt Works, Carmen Island, Lower California, 664. Contact of Leached Sandstones and Serpentine; Open Seams at Right Angles to Planes of Bedding; Open Seams With Planes of Bedding. 665.

EDITORIAL.—The Granite Mountain-Bimetallic Mine, Phillipsburg, Montana; The Centennial-Eureka Mine, Utah, 657. An Important Tunnel Decision, 655-659-662.

MINING SUMMARY.—667-668.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 682.

MISCELLANEOUS.—The Caving System of Mining, 660. Picturesque British Columbia; Recent Mining Decision, 661. The Nature and Nomenclature of Veins, 662. Latest Mining and Metallurgical Patents, 663. Blasting by Electricity; The Islands of Lower California, 664. Phenomena Attending the Accumulations of Bitumen; The Divining Rod in Arizona; A Wolframite Mine, 665. Motive Power at the Mines; Winter Navigation on the Great Lakes; Starting a Blast Furnace; Too Much Gold, 666. Recently Declared Mining Dividends; Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents, 669.

An Important Tunnel Decision.

Based on a former Colorado decision, it has been the law in that State that locators and developers of tunnel sites and tunnels had a legal right to ore veins and ore bodies cut as the tunnel work progressed, and that such tunnel workers had similar right to take out such ore throughout the full width claimed on the length of the tunnel location.

On the 21st ult. the Supreme Court of Colorado upset all this by a decision to the effect that where a tunnel site crossed prior locations the owners of such prior locations are entitled to all mineral within the limits of the lines of such prior locations, and which may be developed or discovered by the prosecution of such tunnel work. The Colorado cross-lode cases are reversed by the decision—this matter being discussed and illustrated in "Lindley on Mines," Secs. 557-560. It will be observed that the Colorado Supreme Court stands by and upholds what Justice Field of the U. S. Supreme Court once aptly termed "the iron-clad potency" of a federal mining patent. It announces that a U. S. patent can not be attacked except by direct legal action in the name of the United States.

So far as California, Montana and Arizona are concerned, this latest decision puts Colorado in line with court ruling and general practice. But it may occasion considerable litigation in Colorado, as it goes directly against former Colorado ruling on that subject.

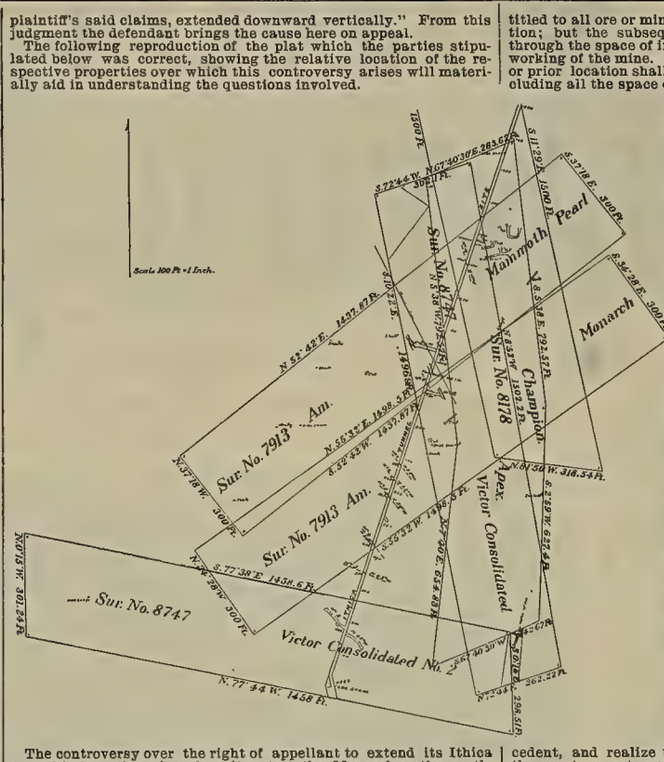
It is a question of great interest—to Colorado miners. Nine-tenths of the inquiries received at this office from Colorado on points of mining law and custom are on this very question of tunnels and tunnel sites.

Following our usual habit, the full text of the Colorado Supreme Court decision is herewith published. Our Colorado readers especially would do well to preserve this decision. Questions as to what it was and what it did, will be asked for the next five years, and can best be answered by reference to the official text as follows:

The case was the Calhoun Gold Mining Company, appellant, vs the Ajax Gold Mining Company, appellee, No. 3954, on appeal from the District Court of El Paso County. Justice Gabbert delivered the opinion of the court.

Appellee, the owner of the Monarch, Mammoth Pearl, Ajax and Champion lode mining claims, commenced this action in the court below to recover damages and restrain appellant, as defendant, from removing ore claimed to be within the boundaries of these claims, and to which it asserted it was entitled by virtue of such ownership, and also to restrain defendant from prosecuting work upon a tunnel which the latter was excavating underneath such claims. Defendant answered, justifying its removal of ore and excavation of the tunnel upon two grounds: (1) That it was the owner of the Victor Consolidated claim, the vein of which crossed each of those embraced within the claims of plaintiff. (2) That it was the owner of the Ithica tunnel site, projected across these claims, by virtue of which it was entitled to extend a tunnel underneath them. That in prosecuting work thereon, it had penetrated the claims of plaintiff, and discovered, located and claimed numerous blind veins underneath the surface of such claims; that it had also cut the vein of its Victor Consolidated claim in this tunnel underneath the surface of plaintiff's claims and removed ore therefrom of the value of four hundred dollars, and that it claimed to be entitled to excavate and run this tunnel for the purpose of discovering such blind veins, to work and remove ore therefrom and from its Victor Consolidated vein. By stipulation, the Champion was dropped from the case. Upon the issues made by the pleadings, the facts thereby admitted, a stipulation as to those controverted and certain documentary evidence, the cause was tried to the court, which resulted in a judgment, adjudging plaintiff to be the owner in fee of each of its lode claims in controversy in their entirety as patented, and, inter alia, with respect to veins, "together with all veins, lodes or ledges having their tops or apexes therein, and including all that portion of the said Victor Consolidated vein within the side and end lines of the plaintiff's said claims, extended downwards vertically," for damages in the sum of four hundred dollars, and also enjoining defendant from prosecuting work upon or extending its tunnel underneath the claims of plaintiff, and, with respect to removing ore, enjoined defendant (employing the language of the judgment) "from further taking out, extracting or removing ore by means of said tunnel, or otherwise, from within the side lines of plaintiff's said claims, extended downward vertically." From this judgment the defendant brings the cause here on appeal.

The following reproduction of the plat which the parties stipulated below was correct, showing the relative location of the respective properties over which this controversy arises will materially aid in understanding the questions involved.



The controversy over the right of appellant to extend its Ithica tunnel is from the point where it enters the Monarch on the southerly side, and from thence across the claims of plaintiff. The blind leads discovered are in that portion of the tunnel between the point where it enters plaintiff's claims on the south and the breast of its excavation. The vein of the Victor Consolidated is also cut in this tunnel at point marked 961. The conflict in the lode claims of the respective parties is included in the territory bounded by the south side line of the Monarch, the north side line of the Mammoth Pearl and the side lines of the Victor Consolidated between these two lines. We are relieved from stating the pleadings to any considerable extent, or determining the questions of law thereby presented, because on the trial below it was stipulated that the following are involved:

"First. Whether or not the Ithica tunnel, in such pleadings described, is entitled to a right of way through plaintiff's lode claims.

"Second. Whether or not defendant has acquired, by virtue of said tunnel and tunnel site location, the ownership and right to the possession of the blind veins cut therein, to wit, veins or lodes not appearing on the surface, and not known to exist prior to the date of the location of said tunnel site

"Third. Whether or not defendant is the owner and entitled to the ore contained in the vein of its Victor Consolidatad claim, within the surface boundaries and across plaintiff's lode claims.

"Fourth. Whether or not the defendant may in this cause introduce evidence for the purpose of showing that there was no discovery of mineral in place on the Monarch and Mammoth Pearl claims of plaintiff prior to the location of said tunnel site."

From the pleadings, evidence and stipulation of the parties, the facts established, so far as material to the controversed questions of law involved, are that each of appellee's claims was located prior to either the lode claim or tunnel site of appellant; that the receiver's receipt on each of the claims of appellee issued prior to the location of the tunnel site, and prior to the issuance of receiver's receipt on the Victor Consolidated; that the patents upon the lode claims of appellee issued prior to the patent on the lode claim of appellant; that the patent to the Ajax issued prior to the location of the tunnel site and on the Mammoth Pearl and Monarch subsequent to such location; that the vein of the Victor Consolidated was discovered and located from the surface, was not known to exist prior to such discovery, extends throughout the entire length of that claim and on its strike crosses each of the veins in the claims of appellee upon which they were respectively discovered and located; that the tunnel cuts numerous blind veins underneath the surface of the claims of appellee, which do not appear upon the surface and were not known to exist prior to the location of the tunnel; that the vein of the Victor Consolidated was cut in this tunnel underneath the claims of appellee and ore of the value of four hundred dollars removed therefrom. It also appears that the patents upon the lode claims of appellee embrace the conflict with the Victor Consolidated without any reservation as to either surface or veins, and in this respect conform to the receiver's receipts upon such claims: that the patent on the Victor Consolidated excludes the surface in conflict with the claims of appellee and all veins having their apex within such conflict, which are the same exceptions contained in the receiver's receipt for that claim; that the portal to the Ithica tunnel site was at the date of its location on public domain; that work thereon was prosecuted diligently and that the location of such tunnel was in all respects regular; that all necessary steps were taken by appellant to locate the blind veins cut in such tunnel, which are in controversy in this case; that the record titles of the claims of appellee are vested in it and the record titles of the Victor Consolidated, the Ithica tunnel site and blind veins discovered thereon underneath the claims of appellee are vested in appellant. The record discloses that appellant offered testimony tending to prove that at the date of the location of its tunnel site mineral in place had not been discovered on the Monarch and Mammoth Pearl lode claims. The rights of the parties depend principally upon a construction of the following sections of the Revised Statutes of the United States:

"Sec. 2322. The locators of all mining claims heretofore made, or which shall hereafter be made, on any mineral vein, lode or ledge, situated on the public domain, their heirs and assigns, where no adverse claim exists on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States and with State, Territorial and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations and of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins, lodes or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges; and nothing in this section shall authorize the locator or possessor of a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another.

"Sec. 2323. Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnels shall have the right of possession of all veins or lodes within three thousand feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel.

"Sec. 2336. Where two or more veins intersect or cross each other, priority of title shall govern, and such prior location shall be entitled to all ore or mineral contained within the space of intersection; but the subsequent location shall have the right of way through the space of intersection for the purposes of the convenient working of the mine. And where two or more veins unite, the oldest or prior location shall take the vein below the point of union, including all the space of intersection."

The main questions presented for our determination, for convenience we summarize as follows:

1. Is appellant the owner and entitled to the ore contained in the veins of the Victor Consolidated claim, within the surface boundaries of appellee's lode claims?

2. Has appellant acquired, by virtue of its tunnel site location, the ownership and right of possession to the blind veins cut therein underneath appellant's claims, and is its tunnel entitled to a right of way through the lode claims of appellee?

3. Should appellant have been permitted to introduce evidence for the purpose of showing that there was no discovery of mineral in place on the Monarch and Mammoth Pearl claims of appellee prior to the location of the Ithica tunnel site?

All these were answered in the negative by the court below.

The first question represented involves, particularly, a construction of Sec. 2336, supra. The rights of a junior location to the ore of its vein embraced in the conflict with a senior have been determined by this court in Branagan v. Dulaney, 8 Colo., 408, and in several subsequent cases, which have adopted the doctrine announced in that case on that subject, and if we adhere to the law as announced in those cases, then the rights of appellant to the ore in the vein of the Victor Consolidated included in the territory of that claim conflicting with that of appellee are fixed and settled; for under these decisions it would be entitled to all this part of its vein, except where it intersects the veins of appellee's claims. It is contended by counsel for appellee that the ruling in Branagan v. Dulaney and the cases following it is wrong, and that this question should now be reconsidered. In opposition to a reconsideration of the rights of cross lode claimants, as declared by those cases, it is urged that the doctrine of stare decisis applies, and, even if wrong, should not now be disturbed, because the rule therein announced has been established for such great length of time as to become a settled rule of property in this State. We are aware of the gravity of reversing a long established precedent, and realize that it should not be disturbed, except for the most cogent reasons; that the people of this commonwealth have a right to presume that when a question has been once settled by this court, that its decision is correct, and that all may rely upon it. We understand, generally, that when a decision has established a settled rule of property, upon which rights are predicated, (and especially those relating to real estate), the law will be adhered to by the court announcing it, and those bound to follow its adjudications, even if erroneous—Black on Interpretation of Laws, Sec. 152—but this rule is not inflexible. Courts are not bound to perpetuate errors merely upon the ground that a previous erroneous decision has been rendered on a given question. If it is wrong, it should not be continued, unless it has been so long the rule of action, and relied upon to such an extent, that greater injustice and injury will result by a reversal, though wrong, than to observe and follow it Black on Interpretation of Laws, supra; Sutherland's Stat. Constr., Sec. 316; Boon v. Bowers, 30 Miss., 246.

The law as announced in Branagan v. Dulaney had led to much confusion, and has been a fruitful source of litigation. Under it doubts have been cast upon titles to mining properties, and supposed rights reduced to uncertainties. Judging by the experience of the past, coupled with the knowledge of the present, great activity in mining, to some extent caused, perhaps, by the marked improvements in mining and the reduction of ores, this industry is comparatively in its infancy in this State; and if the rule regarding cross leads as announced by this court is wrong, it will result in more injury in the future to perpetuate it than will temporarily be caused by its reversal. It is a matter of common knowledge that, ever since the decision of this court on that question, its correctness has been doubted by many eminent members of the bar of this State familiar with mining law, and has even been the subject of expression to that effect by this court—The Argonaut C. M. & M. Co. v. Turner, 23 Colo., 466—in which it was said, in speaking of the rights conveyed by patent to a mining claim, that it conveys all lodes or veins having their apexes within the boundaries of such claims, except, perhaps, cross lodes. This doubt has been generally entertained by those engaged in mining, so that notwithstanding the length of time that has elapsed since the rendition of the first decision of this court on this question, it is safe to assume that it has not been implicitly relied upon as a sound exposition of the law relating to cross leads, and that in the great majority of instances parties have governed themselves accordingly.

The law construed in Branagan v. Dulaney is an Act of Congress. The doctrine of stare decisis is based upon the assumption that the rules of law to which this doctrine applies have previously been determined by a court having final jurisdiction on the questions involved. For this reason, where the decision of a tribunal is subject to review by one having superior authority over it, for that purpose, or the question determined may be passed upon by such tribunal in another case, the doctrine of stare decisis does not apply with full force until the same questions have been determined by the court of last resort. The construction of an Act of Congress cannot be said to be authoritatively settled until passed upon by the highest court authorized so to do. This is the Supreme Court of the United States. It has never decided the question regarding cross veins as presented in the case at bar. The decision of this court on that question may be reviewed by that tribunal; so that although this court has given the statutes affecting cross lodes a construction which has since been followed by this State, nevertheless, as these same statutes are still open to construction by the highest tribunal of the land, their meaning on the subject of cross leads as involved in this case has not been finally determined so as to become stare decisis. In Arizona, California and Montana a different construction regarding the rights of cross lode claimants has been given from that announced by the Supreme Court of this State. Watervale M. Co. v. Leach, 33 Pac., 418; Wilhelm v. Silvester, 101 Cal., 358; Pardee v. Murray, 4 Mon., 234.

Whether or not the reasons given for this conclusion are sound, is not material. Sooner or later this question must be determined by the Supreme Court of the United States, and, when it is, the law thus settled must be followed by all the courts of the States and Territories in which the Act in question is in force. For these reasons we conclude that, although this court has passed upon the identical question regarding cross veins now involved, it is not precluded from again considering it, under the doctrine of stare decisis, or that the law as announced by this court in previous cases has become a settled rule of property in this State; and if upon a reconsideration of such question we conclude that our previous decisions thereon were wrong, we should not wait for a superior tribunal to so declare.

Before proceeding, however, with a discussion of this question, we suggest that were it not for the expression in the Argonaut C. M. & M. Co. v. Turner, supra, the action of the trial court, in refusing to follow Branagan v. Dulaney, would certainly be subject to criticism.

Previous to the Act of 1872 relating to mining claims, which with a few modifications has been in force ever since its passage, the rights of a locator were practically limited to the vein upon which his location was made. That was the thing granted; the rights to surface ground only attached for the purpose of the convenient working of the vein so located—no rights to any other vein except the one upon which location was made were given. Under the law then in force the surface ground, with the vein located, varied, controlled, as it was, in a great measure by local rules, or, in their absence, by the judgment of the Land Department in each particular case, as to the area necessary for the convenient working of the mine; so that, as might be expected, the patents issued under the law prior to the Act of 1872 embrace surface areas different and irregular in form. By this latter Act a marked change was effected. The surface area which could be controlled by one location was definitely fixed, and, this area being extensive, it was necessary that rights therein should be definitely declared. The rights of the locator to the mineral which might exist underneath such surface area was no longer limited to the one vein upon which he made his location. By Sec. 2322, supra, it is expressly provided that from and after the passage of the Act of which it forms a part the locat-

ors of all mining claims theretofore or subsequently made to which no adverse rights had attached on the tenth day of May, 1872, upon compliance with the laws and regulations governing their title, shall have the exclusive right of possession and enjoyment of the surface included within the lines of such locations, and of all veins throughout their entire depth apexing inside of such surface lines extended downward vertically, although such veins might so far depart from a perpendicular in their course downward as to extend outside of the vertical side lines. This section, standing alone, would seem to be clear, explicit and unambiguous. It provides a test by which the right of a locator to a vein inside of the lines of his location extended downward vertically should be determined, namely, if the top or apex of a lode was within the boundaries of his claim, as above designated, then he should be the exclusive owner thereof, provided, of course, that no adverse rights thereto existed at the date of his location

It is claimed by counsel for appellant that this section, by implication, excepts cross veins, because no extralateral rights are given such veins, such rights being measured by the end lines of the claim extended in their own direction, and as cross veins would not intersect these lines, no extralateral rights would attach to such veins. That question is now involved in th s case. Appellant is making no claim to any portion of the veins in controversy by reason of extralateral rights; and, besides, the vein of the Victor Consolidated is given no such rights, because by the judgment appellee is only declared to be the owner of that portion of the vein within the boundaries of its claims extended downward vertically. The most that can be said for this section on account of its phraseology is that cross veins are not given extralateral rights; and yet we can conceive of a location where a cross vein upon its strike may cross the one upon which the location is made, and intersect both end lines. But granting, for the sake of argument, that veins crossing the one upon which the location is made have no extralateral rights (but upon that question we express no opinion), this would only operate as a limitation as to such rights, and not as to others which would attach by virtue of a location, for naming limits of a grant is not equivalent to saying that nothing is granted which does not extend to those limits. Del Monte M. Co. v Last Chance M. Co., 171 U. S., 55. It is by virtue of Sec. 2336, particularly, that counsel for appellant contend that the portion of the vein of the Victor Consolidated in controversy belongs to the latter, their position being that by this section cross veins are excepted from the operation of Sec. 2322. It is the section construed in Branagan v. Dulaney. The rule adopted by the Court in construing it in that case is an arbitrary one, and never resorted to except in cases where the different sections of an Act are in conflict, namely, "as between conflicting sections in the same statute, the last in order of arrangement will control;" and, applying this doctrine, reached the conclusion that under Sec. 2322 the locator of a claim acquired no rights to cross veins apexing within the limits of his location.

The rule above announced is only applicable when there is an irreconcilable conflict between the different sections of the same Act, and no reasonable construction will harmonize the parts. But as the two sections under consideration do not conflict in all their terms, the real question presented in construing them is, does the latter qualify the former? It is presumed that each section is intended to co-act with every other of the Act of which it is a part, and that no one is intended to antagonize the general purpose of the enactment. Sutherland's Stat Const., Sec. 160. It is also a rule that in order to ascertain the legislative intent every section of an Act is to be construed—that it is to be construed as a whole—supra, Parkinson v. State, 74 Am. Dec., 522—and that construction which renders the whole Act harmonious and gives effect to every clause and part is to be favored. 23 Enc. Law, 309; Brooks v Mobile School Comms, 31 Ala., 227; People v. Burns, 5 Mich, 114; Patterson v. Sperrman, 37 Iowa, 36.

In Branagan v. Dulaney it was assumed that the "space of intersection" meant the intersection of the ve ns of conflicting cross locations, and as the mineral in this space was given to the prior location, and none other, that, therefore, the junior locator of a cross lead had all the ore of his vein within the space of intersection of the conflicting locations, save at the space where the veins intersected. Sec. 2336 does not purport to provide for the location of cross veins over territory included within a prior, valid and subsisting location. Its purpose appears to be to fix the rights of the claimants of such veins, to settle what might otherwise be conflicting rights between claimants of veins crossing or intersecting each other, and provide easements for the benefit of the claimants of such veins—Wilhelm v. Sylvester, supra—and unless in making such provisions it impliedly gives the junior cross claim the ore of his vein, except at the point where it intersects the vein of the senior location, the doctrine announced in Branagan v. Dulaney cannot be upheld, so that in order to determine what rights are conferred upon a junior cross claimant under this section the real question is, what is meant by the "space of intersection?"

The words emp oyed in the statute are to be construed with reference to its subject matter and the objects sought to be attained—23 Enc. Law, 322 Brewer's Lessee v. Blougher, 14 Peters, 178; Sedgwick's Stat. Constr, 359—as well as the legislative purpose in enacting it, and its language should receive that construction which will render it harmonious with that purpose, rather than that which will defeat it—Ibid, 319; Taylor v. Board of Comm., 67 Ind., 383; People v. Lacombe, 99 N. Y., 43. When ambiguous, its general intent as gathered from the statute furnishes a key by which its ambiguities may be solved, and thus its words given that meaning which will harmonize with that intent.—Sutherland's Stat. Constr., Secs. 218, 219. Conditions with reference to the subject matter of the Act, which it is apparent from its context it was necessary to provide for, may also be considered in ascertaining what is meant by that which is apparently ambiguous—People v. Lacombe, supra. It is evident from the provisions of Sec. 2322 that the intent of Congress was to give to the locator of a claim to which no adverse right had attached every vein apexing within the surface bound aries of his location, unless its intent is negatived by Sec. 2336. The words "intersect" and "cross" as used in this section are not strictly synonymous, and in using both, it must be presumed, intended to provide for different conditions. Veins might intersect, either on their strike or dip, and not cross. In that event it was necessary to provide what location should have the ore at the space of intersection, and it was declared that the prior location should have the ore within the space. In case they crossed, then a further provision was necessary, and it was provided that the junior location should have the right of way through the space of intersection for the convenient working of his mine. From a casual reading of this section it might be inferred that the "space of intersection" meant the intersection of the veins, but that does not necessarily follow, when its meaning is ascertained by one or more of the canons of construction which may be invoked is ambiguous, or different conditions exist which would control its import, or if, by giving it that limitation, the section in which it occurs conflicts with other portions of the Act. Previous to May 10, 1872, as before noticed, no rights attached to any vein except the one upon which the location was made. All rights which attached previous to that date were in no manner disturbed—Sec. 2322, supra, and Sec. 2344, ibid. In case of conflicting cross locations made prior to that date each locator would hold the vein located upon up to the point where they intersected on their strike. It was necessary to settle which should have the ore within the space of intersection of such veins, and, if they crossed, what further rights the junior locator should have. This was done. In such cases intersection would clearly mean the intersection of the veins. In the case of locations made under the Act of 1872, or prior to that date, which were substantially parallel, the respective veins in each might either intersect or cross upon their dip, in which event it would be necessary to provide which should be entitled to the ore within the space of vein intersection; and here, again, the meaning of "space of intersection," or the subject to which it refers, is the intersection of the veins. Again, under the conditions last noticed, the veins might unite, and to provide for this contingency it was declared that the prior location should take the vein below the point of union, including all the "space of intersection," which in that instance also refers to the intersection of the veins.

It may be urged that the construction thus far of this section is in conflict with Sec 2322, for the reason that under the latter the ownership of the space of intersection would depend upon which vein filled that space. Granted that this may be true, then we must invoke the rule that an Act must be construed as a whole, and if the construction of Sec. 2336 so far given modifies Sec. 2322, it is not violating any rule applicable to the construction of different sections of the same Act, which apparently conflict. This construction, however, does not cause any conflict between the two sections. The former gives to the locator the veins to which his rights attach throughout their entire depth, and if upon their strike—limiting the latter to rights which vested prior to the tenth day of May, 1872,—or in descending into the earth a body of ore bounded by the foot and hanging walls of his veins, extended to their general course, has been intruded, from another source, or if in descending they unite with other veins, these are not reasons why he should not be the owner of such spaces of intersection, or enlargements of his veins, caused by intersecting or uniting with others, but, on the contrary, according to the terms of Sec. 2322, he should be, provided, of course, that his title is prior to that of the location of the veins intersecting or uniting with his; so that the construction of these sections, under the conditions noted, render them harmonious, and Sec. 2336 simply recognizes that in conflicts in such cases priority of title should govern—a test which is clearly in harmony with Sec. 2322, and limits the provisions of Sec. 2336 thus far to easements only.

It may also be said that an easement would exist in favor of a junior claimant to follow his vein through the space of intersection caused by veins crossing upon their dip, because by Sec. 2322 the locator is entitled to follow a vein in its course into the earth outside the vertical side lines of his location. This may be true, but as to veins crossing on their strike, no such right is impliedly given by that section, and as we have endeavored to demonstrate, such a right was necessary under conditions above noted. In case of locations made subsequent to the Act of 1873 which cross each other, or those made under that Act which likewise conflicted with locations made prior to the date it took effect, it was also necessary to provide for po sible conditions, namely, the respective rights of the claimants of such locations, within the conflict of their claims, and particularly for a right of way for the junior claimant; and the vital question now to determine is, what is meant by the space of intersection in such cases as employed in Sec. 2336, and which party would own the ore of the vein of the junior location within that space. We again reiterate that the clear intent of Sec. 2322 was to give the locator of a claim to which no adverse rights were in existence at the date of his location, all veins apexing within its surface boundaries. That eminent jurist, Mr. Justice Brewer, with his extended experience in mining litigation, certainly spoke advisedly, in Del Monte M. Co. v. Last Chance M. Co., supra, (although the precise question now being considered was not there presented), when he said, in speaking of the rights of a locator under the provisions of this section: "Every vein whose apex is within the vertical limits of his surface lines, passed to him by virtue of his location. He is not limited to only those which extend from one end line to another, or from one side line to another, or from one line of any kind to another; but he is entitled to every vein whose apex lies within his surface lines." To the same effect is the language employed in Iron Silver M. Co. v. Elgin, supra. By that section he has been given title to all such veins. Such being the case, was it intended by Sec. 2336 to modify that grant or vest title in a cross-claimant to any part of a vein apexing within the boundaries of a prior, valid location, and especially what rights were intended to be granted or fixed under the conditions now being considered?

It provides that in such cases priority of title shall be the test by which the ownership of the ore at the space of intersection shall be determined. That is in accord with the rights conferred by Sec. 2322. So stating, however, is not equivalent to a grant. That language does not import that an exception is carved out of an estate which has already passed. Under the facts now in mind, the senior location, by virtue of Sec. 2322, would own the ore of the junior cross vein within the boundaries of his location, and before that right could be divested under Sec. 2336, it must appear from the wording of the latter that such right is thereby expressly excepted. That the language of this section is not susceptible of the construction that creates such an exception, it seems to us is clear, when we bear in mind that which we have already stated—that it does not pretend to deal with the location of cross veins over senior valid locations, but the purpose of which was to provide for easements, and settle rights which might otherwise be doubtful, or the subject of controversy, without some further declarations than those contained in Sec. 2322; and so we conclude that to render the two sections harmonious, the space of intersection as used in Sec. 2336, when applied to the facts now being considered, means the intersection of the c.aims. Barringer vs. Adams, 472, 473.

Under Sec. 2322 no rights were given the owner of a location crossing a prior one to invade the latter for any purpose in following his vein upon its strike. This was an important matter; without such right a portion of his claim might be rendered valueless, but if the expression "space of intersection" be limited to the intersection of veins as the space through which he should have a right of way for the convenient working of his mine, it would be of no avail, for he would have no right under which he could reach that easement; and so again, in order to recognize one which would be of any value to the junior cross-claimant, the space of intersection must also mean the intersection of the claims. Morrison's Mining Rights, 9th Ed., 115. The learned author of the work just cited, in treating the subject of title to ore included in the space of intersection as between conflicting cross-locations, under Sec. 2336, gives the following cogent reasons why, in his opinion, as between such locations, the owner of the junior has a right of way through the senior, but no right to the ore of the claim which he crosses:

"It was within the power of Congress, by a subsequent clause, to have made the crossing lode an exception carved out of the general grant of the words of the previous section, but has it attempted so to do? The only grant of Sec. 2336 is the right of way, which of itself implies that it is not a grant of the vein, but of an easement, to which the estate of the prior location is made servient."

"To give any part of the space of intersection to the holder of the later location would be to take from the older location something already granted to it. To create an exception out of this grant as he originally takes it, under Act of Congress, would require in the wording of the Act expressions as strong as are required to create an exception in a deed. An exception is equivalent to the reconveyance of land already conveyed. A right of way is not an exception, but a reservation, which may be inferred from any wording indicating an intent to create an easement. It takes nothing from the body of the grant of the first locator, but compels the first locator to use or hold his grant or claim subject to a right or privileges to the junior or overlapping claimant of reaching the other end of his claim by passage through the senior location."

Under the conclusion reached in Arizona, California and Montana, in the cases above cited, the ore within the space of overlapping claims would belong to the owner of the senior location. In the Arizona case, that conclusion was reached upon the ground that the expression "space of intersection" meant intersection of the veins; that they might so intersect upon either their strike or dip; but as to the former, it was limited to locations made prior to the tenth day of May, 1872. The learned judge who wrote the opinion in that case appears to have given it careful consideration, but in seeking to harmonize the two sections it seems to us fell into the error of (1) holding that the space of intersection meant intersection of veins only; (2) imposed a limit upon the provisions of the section when announced that it only applied to the intersection of veins upon their strike, under locations made prior to May 10, 1872, which is not warranted, either expressly or by implication; and (3) by so doing necessarily deprived a junior location, made under the Act of 1872, of the right of way across a senior location, if the former crossed the latter. In the California case, the eminent jurist who wrote the opinion, seems to have entertained similar views regarding the application of this section to rights which vested prior to May 10, 1872, but except as to those rights, inclined to the conclusion that this section only referred to the intersection of veins upon their dip, which would also result in depriving a junior cross-claimant of a most important right. We think that Chief Justice Beatty, who concurred in the opinion, in that case, more nearly announced the true doctrine when he said:

"I think, however, that too much is conceded, both in the opinion of the Court and in the argument of counsel for respondent, in assuming that the provisions of Sec. 2336 cannot be applied to locations made since the passage of the mining law of 1872 on veins which intersect upon their strike, without bringing it in conflict with the plain terms of Sec. 2322. This wholly unwarranted assumption has been the source of all the trouble and difficulty which the Land Office and some of the State courts have encountered in their attempts to construe provisions of a statute which are in perfect harmony, but which have been erroneously supposed to be inconsistent."

The opinion in the Montana case is not altogether clear, but seems to limit the space of intersection as applied to the facts there presented, to the intersection of the conflicting claims, but does not enter into discussion of the subject; so that although we agree with the conclusion reached in each of those cases, we cannot accept the limitations imposed upon the provisions of this section, or indorse the reasons advanced by the learned writers of the opinions in the Arizona and California cases.

Our conclusion is that the provisions of Sec. 2336 apply to locations made under the Act of 1872 as well as before, refer to the intersection or crossing of veins either upon their strike or dip; that the space of intersection, in determining the ownership of ore within such space, means either of intersection of veins or conflicting claims, according to the facts in each particular case, and grants a right of way to the junior claimant for the convenient working of his mine through such space upon the veins (underneath the surface) which he owns or controls outside of that space. This construction renders the two sections entirely harmonious, gives effect to every clause and part of each, and in so far as Sec. 2336 regulates or in any manner provides for rights as between conflicting claims, it applies only to intersections consistent with all the provisions of Sec. 2322.

As we understand the ruling of the Land Department in issuing patent for conflicting mining claims, there is always excepted from the surface of the junior the portion conflicting with the senior, as well as all veins apexing within such conflict. This practise is in accord with our views: and although such a construction would not be controlling, the interpretation put upon the Act by those whose duty it has been to construe, execute and apply it is entitled to much weight. 23 Enc. Law, 339; Frost v. Pfeiffer, 26 Colo., ——, 58 Pac., 147; People v. Lefevre, 21 Colo., 218.

The receiver's receipt, as well as the patent issued appellant, excepted therefore all veins apexing within the conflict between its claim, the Victor Consolidated, and those of appellee. The patents to the latter granted all such veins, and thus all rights attaching by priority of location have been preserved to appellee. The location of the Victor Consolidated was junior to that of the claims of appellee, and from this fact, and the views expressed, it follows that the appellant cannot complain of the judgment of the lower court in so far as it awards to appellee the vein of the Victor Consolidated, and all veins apexing within the boundaries of the claims of the latter, and awarded damages for the removal of ore. These veins are in conflict with the case of Branagan v. Dulaney, and that case, as also those of this court following it, in so far as they conflict with the doctrines now announced regarding conflicting cross claims, are overruled. The language of the judgment of the lower court regarding the rights of appellant in the conflicting territory, is very explicit, but only extends to acts of trespass, and does not prohibit those which it may exercise therein by virtue of its ownership of the Victor Consolidated claim.

The determination of the second question presented involves a construction of Section 2323, supra. The contention of counsel for appellant is that in all patents for lode claims, blind leads are excepted, and that the patentee takes no title thereto by virtue of his patent. In answer to this, we have only to advance one step further in the construction of Sec. 2323, and call attention to the fact that the test there applied by which the ownership of veins embraced in a valid, subsisting location is determined, is, that they apex within the boundaries of his claim extended downward vertically, without regard to where such apexes may be with reference to the surface; so that again the question presented is: does Sec. 2323 conflict with or in any manner modify the provisions of Sec. 2322? and in construing them the same rule must be observed relative to the construction of an Act of Congress as in sections that have already been invoked. The former provides what rights may be acquired to blind veins discovered in a tunnel run for the development of the vein, or for the discovery of mines, but upon what ground may such tunnel be run, or within what territory must be the blind leads discovered therein be located, in order to give the discoverer any rights thereto? A valid location of a mining claim, so long as it is in full force and effect, operates as a bar to a second of the premises so claimed —Belk v. Meacher, 104 U. S., 279; Gwillim v. Donnellan, 115 U. S., 45; Del Monte M. Co. v. Last Chance M. Co., 171 U. S., 55. The only exception is that a given location leaves open to others such rights therein as do not attach by virtue of such location; in other words, that a location only carries with it such rights as it is entitled to under the law by virtue of which it is made, and that all rights not attaching are reserved to others. It is upon this ground that appellant contends that its right to the blind lead in question attach; that is, that under Sec. 2323 these veins are impliedly excepted from the locations and patents of appellee's claims. If such a conclusion can be deduced from the sections under consideration, they are hopelessly in conflict, for, first, there is granted all veins the ownership of which is determined in the manner we have designated, including blind, and then immediately following the grant to the latter is withdrawn. A location can take no rights which conflict with a prior, valid one so long as it is kept alive. The law contemplates, and the authorities recognize, that the very life of a mineral location depends upon the fact that it is made upon unappropriated mineral domain, and upon the one exception already noticed, this requirement extends to the entire location—that is, it cannot embrace any ground, nor can it initiate any rights within the boundaries of a prior, valid, subsisting location, except those reserved from the latter. This rule extends to all classes of mineral locations: in other words, priority determines the rights between conflicting locations. The tunnel of appellant was commenced upon ground open to location, but at the time it was located and work thereon commenced, the ground embraced within the claims of appellee had already been located and claimed as lode claims, so that the rights of appellee to the ground within the boundaries of its claims, and the leads in question, had attached before appellant attempted to initiate any title thereto, and therefore none attached by virtue of the location of, or work upon, its tunnel site, unless it appear that by virtue of Sec. 2323 a tunnel for the discovery of blind leads may be projected across and extended into prior, valid, subsisting locations, and title to the blind leads discovered within the boundaries of such claims thus be secured. It provides how inchoate rights to blind veins may be initiated; how they may become absolute; but nowhere does it in terms, either expressly or implicitly, declare that for these purposes it may be projected into or across prior, valid locations To give it the interpretation that it does is to inject a meaning of which it is not susceptible, renders it irreconcilable with the provisions of the section preceding, and overthrows the doctrine of priority—the foundation upon which mining rights rest. It does not provide that under a location for tunnel site purposes a right is granted to search for minerals in lands belonging to another, or that thereby a location for such purposes can be carved out of appropriate public domain, while limiting it to locations for tunnel site purposes to ground not previously appropriated renders it harmonious with Sec. 2322. That the latter was the clear meaning and intent of Congress in passing the Act, of which these two sections form a part, is apparent from the further reading of Sec. 2323, which in terms provides that locations on the line of the tunnel contemplated by this section, of veins not appearing on the surface, made by others after the commencement of work thereon, and while it is being prosecuted with reasonable diligence, shall be invalid, a clear recognition of the controlling principle of priority. Counsel for appellant assert that the Enterprise M. Co. v. Rico-Aspen M. Co., 167 U. S. 108, and Ellert v. Campbell, 18 Colo. 510, affirmed in 167 U. S. 116, are authority for their propositions, that blind leads are excepted from all locations and patents; that no rights to such leads attach until discovered; that a tunnel site may be projected across and its tunnel extended underneath previous valid, subsisting locations, and title to blind leads discovered in such tunnel within the boundaries of such claims not known to exist previous to the commencement of work thereon may be thus acquired by the owner of su h tunnel. Neither of such cases so hold, and while they cannot be said to be directly in point, because the facts in the case at bar and those are entirely different, yet by analogy the principle upon which the right to blind leads discovered and located under the section of the statute relative to tunnel sites which was applied in those cases is the same as that upon which we base our decision here, viz., priority of location: for in each of those cases the tunnel site was located prior to the date of the location of the lode claim within territory embraced within the tunnel site location, and within the boundaries of which the blind leads were discovered and located, which were the subject of controversy. It was upon this ground, as we read and understand the opinions of these cases, in connection with the facts, that the inchoate rights of the tunnel claimants to such leads were predicated, and by virtue of which, when discovered on the line of the tunnel, they become absolute. On the subject under consideration one further question needs to be determined, namely: Has appellant a right of way for its tunnel through the territory of appellee? It is contended by counsel for appellant that under Sec. 2338, Rev. Stat. U. S., and Sec. 3141, Mills, it is entitled to such right. The first of these sections provides that in the absence of necessary legislation by Congress the Legislature of a State may provide rules for working mines involving easements, drainage, and other necessary means to their complete development, and that these conditions shall be fully expressed in the patent. The section of Mills' referred to provides that a tunnel claim located in accordance with its provisions shall have the right of way through lodes which may lie in its course, but it will be observed that this section only refers to tunnels located for the purpose of discovery, and if any of its provisions are still in force, which appears to be doubted in Ellert v. Campbell, supra, they can have no application to the case at bar, because the section of the Revised Statutes only provides for easements, for the development of mines; and the section of Mills' relied upon does not attempt to confer any such rights, but is limited to the one purpose of discovery. In this respect it has been clearly superseded by the Act of Congress; so that if appellant is entitled to the right claimed it must attach by virtue of some provision of this Act.

Mining rights are statutory, but not purely so. They relate to real estate, and such rights as are not defined or limited by statute are still controlled by the rules of the common law. Such rights as are conferred by a valid, prior location, so long as it remains in full force and effect, are preserved from invasion, and cannot be infringed upon or impaired by subsequent locations—Lindley on Mines, Sec. 363—and are as fully protected under the rules of the common law as any other classes of real estate. Under the statute, the subsequent locator has not right to penetrate a senior valid, subsisting location underneath its surface boundaries extended downward vertically, except for the purposes specified in the mining laws. We will not undertake to specify what these exceptions may be, but so far as they are not fixed by statute, the possession and enjoyment of the ground underneath the surface of a valid, subsisting location cannot be invaded. These exceptions do not in-

(Continued on Page 662.)

The Caving System of Mining.

The first to introduce into the mines of the West the caving system is Capt. J. R. De Lamar at his Utah mines, the result of which will be watched with interest by miners throughout the country.

As an outgrowth of the necessity of a cheap method of mining the iron ores of northern Michigan the caving system has resulted. It requires a relatively small amount of timber for the quantity of ore recovered, and fatal accidents are not more common than in other mines employing the systems common to the western mining regions. The different mines of the iron ranges employ somewhat different systems, depending upon the character of the ore and wall rocks.

In the proceedings of the Lake Superior Mining Institute, E. F. Brown gives the following brief but clear idea of the method employed in the Pewabic mine, at Iron Mountain, Mich.:

The system of mining herein described has been in successful operation at the Pewabic mine, Iron Mountain, Mich., for a period of three years, and about 600,000 tons of iron ore has been extracted from the points in the mine where it has been found advantageous to make use of this method exclusively. This system has been employed most extensively upon a large body of highly silicious, hard hematite ore, of uniform quality.

For convenience in operating, the ore body is first divided into blocks, having a length, on the trend of the strata, of about 250 feet, the width of the blocks depending upon the distance between the slate walls, or foot and hanging. The height is the distance between levels, ordinarily 100 feet. The accompanying plates show one of these blocks of ore in various stages of preparation for actual mining, also the condition of the overburden, consisting of broken sandstone and old timber, which had been caved by earlier mining operations.

Fig. 1 shows the plan of crosscutting and raising

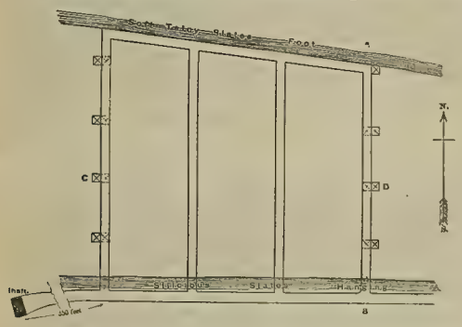


Fig. 1.—Plan Showing Drifts, Crosscuts and Raises Preparatory to "Block Caving" in Pewabic Mine.

in blocking out the ore, also the location of the ore with reference to the main level.

The main level is driven in the hanging wall slate, about 20 feet from the ore body, and parallel with its trend. From the main level, crosscuts are extended across the ore body to the foot wall. We usually make four crosscuts, thus dividing a block of ground 250 feet long into three blocks of about 80 feet each. Adjacent to the two crosscuts, which mark the eastern and western boundaries of the original block, we start upraises 50 feet distant from each other, and extend these upraises 80 feet, or within 20 feet of the level immediately above.

Figs. 2 and 3 are vertical sections taken

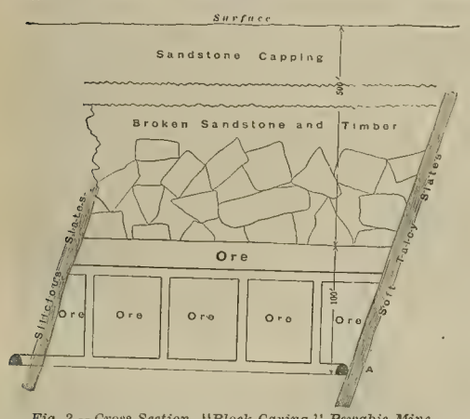


Fig. 2.—Cross Section, "Block Caving," Pewabic Mine.

through *A-B* and *C-D* on Fig. 1 and show the upraises in detail. Chutes are constructed at the bottom of the upraises, and, commencing at the top, underhand stoping is carried on until a trench 8 feet wide and 80 feet deep has been cut across the ore body from foot to hanging wall.

In the underhand stoping the ore falls into the chutes when blasted, and is run into the tram cars by gravity. During the time required to cut the trenches across the ends of the block, we are also employed in undercutting it, and when the trenches

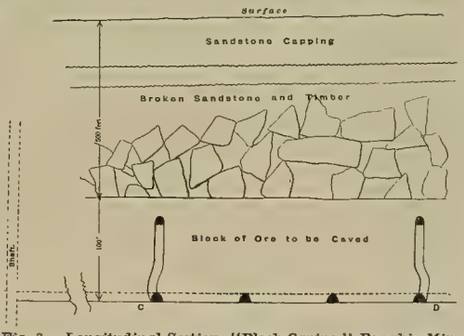


Fig. 3.—Longitudinal Section, "Block Caving," Pewabic Mine.

are completed we have the bottom of the block about in the condition shown by Fig. 4. That is, we have two strong pillars alongside of the main cross-

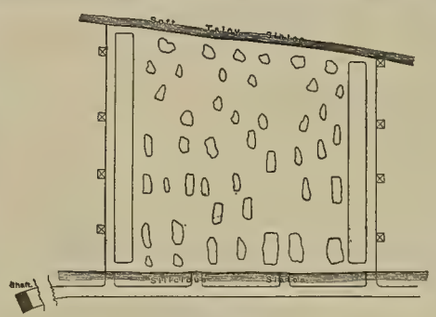


Fig. 4.—Plan Showing Block of Ground Ready for Caving, Pewabic Mine.

cuts on the ends of the block, while the balance of the ground is resting on small legs of ore, irregular in size and shape.

These legs and pillars are then made as small as is consistent with safety to our miners. The remaining portion is then drilled, and when all have been drilled, they are blasted in sections. The ends of the blocks being cut off and the entire block thoroughly undercut, the ore soon begins to cave. This usually occurs in large masses of many hundreds of tons each.

To illustrate the hardness of the ground and the results obtained, it may be well to state that no timber is used in prosecuting the work just outlined, and that it requires several weeks for a block of this ore to settle a distance of 7 feet, but within six or eight months the ore becomes crushed so that four-fifths of the entire block could be put through a 3-inch opening. After the block of ore has settled down to the original level, and been sufficiently crushed to allow easy driving of crosscuts, the two crosscuts in the central portion of the block, as shown on Plate V, are advanced through the caved ore, and from these crosscuts drifts are run to the eastern and western boundaries of the caved territory. These drifts are usually located about 25 feet apart, on the line of the crosscuts. The drift nearest the foot wall is connected with the adjacent crosscut, and from this drift short crosscuts are extended, at intervals, to the foot wall.

These drifts and crosscuts are all closely timbered, and after the initial timbering require but little attention in the way of repairs. The work of mining is now commenced by allowing the caved ore to run into the drifts and crosscuts through the opening in the end, or breast, of each. The broken ore is sim-

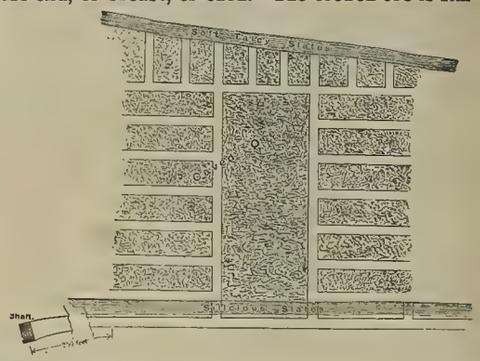


Fig. 5.—Plan Showing Drifts and Crosscuts Through the Block After Being Caved, Pewabic Mine.

ply shoveled into the tram cars and taken to the shafts, the breast of the drifts always being full of broken ore.

When a full output is desired, the crew consists of one miner and four shovelers at each of the points in operation. Two of the shovelers are always employed in filling the ore, while the other two are tramming it to the main level. No drilling is required, and but little powder is used in blasting.

Drawing the ore in this manner forms funnel-shapped spaces in the body of broken ore, and these are eventually filled by the caving of the timber and broken sandstone from the old level above. When the ore has been so far removed, at any point, that the waste material is shown in the working faces, we blast a few of the timbers in the drift and draw our point of operations nearer to one of the main

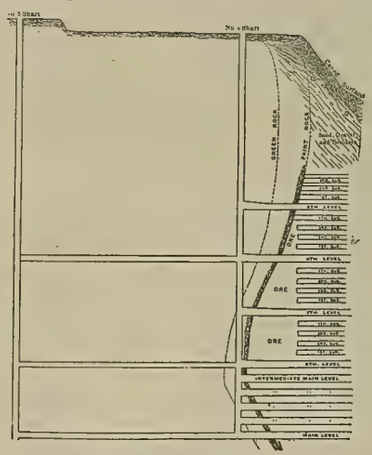


Fig. 6.—Vertical Section Showing "Sub-Drifts," Chandler Mine.

crosscuts. This operation is continued, and repeated until the ore in the territory formerly traversed by the drifts has been exhausted and replaced by the waste from above. Other drifts from the main crosscuts are then driven in the pillars remaining between the first drifts, and the operation repeated as in the first work. In actual work, it is found possible to draw the ore for 3 or 4 feet on

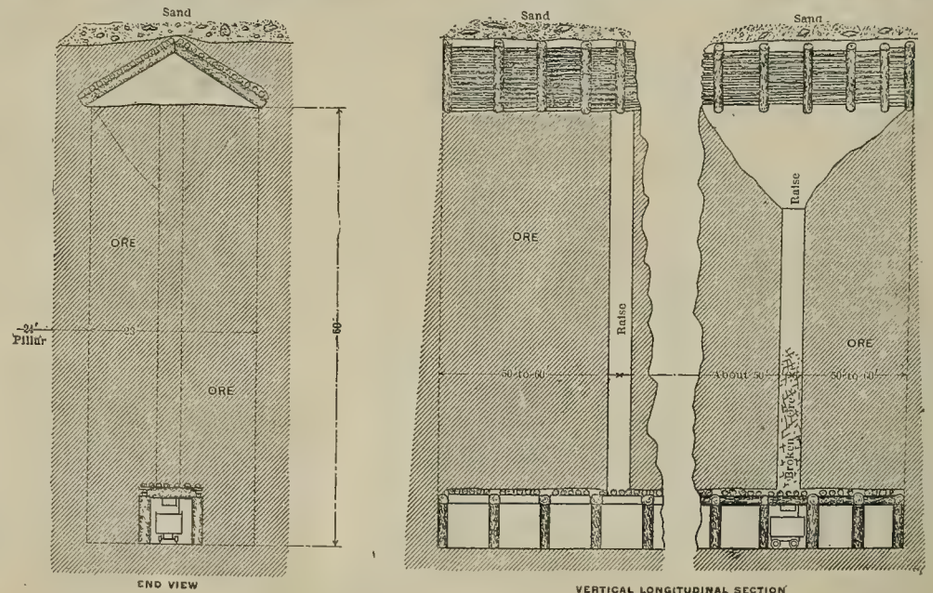


Fig. 7.—Stull Rooms Used in the Fayal Mine.

either side of these drifts; consequently the second set of drifts practically cleans up the broken ore.

The typical block of ore, herein described, was caved during the fall of 1897. This block contained, originally, about 350,000 tons of ore, and it has yielded about 120,000 tons during the shipping season. A much larger output could have been obtained if desired. We have never had any fatal accidents in connection with operating under this system, and it can, without exaggeration, be called a safe method of mining. With modifications to accommodate varying conditions, this system has been applied to the mining of soft ore bodies, and the results obtained in this direction have been satisfactory to us.

Figures 1 to 5 show the progress of development of a block of ore in the caving system as practiced at the Pewabic mine.

At the Chandler mine, in the Vermillion range, the method of mining is somewhat different. The accompanying cut, Fig. 6, shows a vertical section through two of the principal shafts. The system employed at this mine down to the eighth level is described by Prof. F. W. Denton in the Transactions of the American Institute of Mining Engineers, as follows: Main levels are driven 75 feet apart and generally there are two main drifts at the bottom of each block, running approximately parallel on opposite sides of the block of ore. From these main drifts raises are put up at intervals of about 50 feet, and from these raises four series of sub-drifts are run. The sets in the main drifts are made of 9-foot caps and 7-foot legs, and those in the sub-drifts of 6-foot caps and 6-foot legs. This leaves about 8 feet of ore between the sub-levels. The sets are placed 3 to 4 feet apart. As the raises are put up, sets are placed to start the first sub-drifts; but these drifts are not started at once, but are omitted to strengthen the main drifts until the fourth, third and second subs are worked out. When the sub-drifts are completed, the block of ore between any two levels is honeycombed with drifts with vertical intervals of 8 feet of ore. When mining above has been completed, the removal of the ore pillars on the top subs begins. The pillars are sliced away, the back is caved, and the caved ore is removed in wheelbarrows to the chutes leading to the main level below. The chutes are 4 feet square and lined with 2-inch plank placed on edge. When the sand or overlying timber appears, a new slice is taken off the pillar and the back of ore is caved as before, until finally all the sub-drifts have been worked out, when the operation of caving is continued in the block below, which, in the meantime, will have been honeycombed by the first or preparatory sub-drifts.

Below the eighth level the method of mining has been modified. What are called intermediate main drifts are driven through the ore at intervals of 20 feet instead of 75 feet, and no sub-drifts are used. The intermediate main drifts are of the regular size, 9-foot caps and 7-foot legs, which leaves about 10 feet of ore to be caved, instead of 7 or 8 as before. Stations are made at the shaft for each intermediate main level. Under this modified system, the removal of each 20-foot block will be done as before, but the putting up of raises will be saved; and it is intended to use cars, and thus do away with wheelbarrows as far as possible.

Owing to the presence of sand and broken "paint-rock" in the caved ground above, the ore obtained by the caving process is more or less mixed with these impurities, and the percentage of iron in it is lowered from 64% to 60%. This ore, however, is obtained very cheaply; and it is claimed that this compensates for the injury to its quality. Although broken up, the ore in its undisturbed state is really quite hard. In driving main drifts, machine drills have to be employed frequently.

Top lagging is employed in the sub and main drifts, and side lagging where necessary, but no attempt is made to lag the bottom of the sub-drifts before caving the back.

At the Fayal mine, in the Mesabi range, there is from 65 to 90 feet of surface over the ore. The top of the ore slopes south. The method of mining has been by rooms, and by top drifting and caving. The rooms are about 24 feet wide, with pillars between of about the same width, or a little less. The rooms are carried up to the overlying sand, which may make them as high as 65 feet; the length may reach 300 feet. All rooms are filled, after they are completed, by running in the glacial drift that forms the roof, from the top of a raise put through to the surface for the purpose.

When rooming is not employed raises are put up to the sand, and from the tops of these raises what are called "sub-drifts" are put through the ore, dividing it up into a series of blocks or pillars one drift set high. These "subs" are timbered with drift sets. The first series of sub-drifts, just under the sand, are known as "A subs." When the "A subs" run into rock or the overlying sand a second series of subs known as "B subs" is run 12 feet lower, center to center, than the "A" subs. The "C" and "D" subs follow in order.

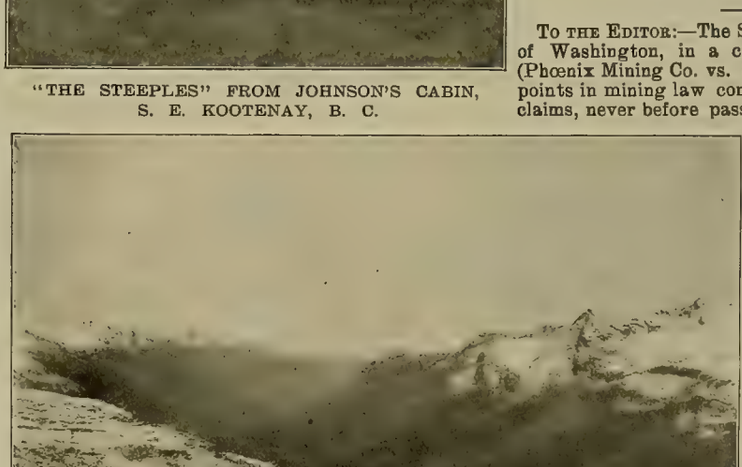
One series of subs is not extended under the one above, as a rule, until the upper one has been worked out; and, when necessary, in order to reach timber or ore chutes, the drifts are staggered so that the roof of the lower drift does not come entirely under the floor of the upper drift.

After blocking out the ore by these drifts the pillars or blocks are mined by slicing and caving, *i. e.*, a drift will be run along the farther side of a pillar; then this drift will be caved, and a second slice taken off alongside the first, and the operation will be repeated until the block has been mined. Each slicing drift is not run entirely across the block, but two drifts are started, one from each side, to meet half way down the side of the block.

Before caving these slicing drifts 1 inch boards of the cheapest grade obtainable are placed over the bottom of the drift, to keep the sand from mixing with the ore mined from the next lower series of drifts. The raises used for ore chutes are placed about 100 feet apart, and thus far regular mine cars, running on tracks, have been used in the sub-drifts.



"THE STEEPLES" FROM JOHNSON'S CABIN, S. E. KOOTENAY, B. C.



NEAR HEAD OF MIDDLE FORK SPILLIMACHENE RIVER, B. C.

The first main sub-drift timber sets are made of 12-foot caps and 8-foot legs, making 10 by 8 feet in the clear; and the sets used in slicing have 8-foot caps and 8-foot 8-inch legs, making 7 feet 6 inches by 8 feet in the clear. The top of the ore is irregular, a condition which often leaves bunches of ore above the top of the subs. This ore is obtained during the slicing and caving by raising up above the drift sets and, if necessary, putting in "baby" sets. When the next lower drifts are run under the caved ground all of the 12 feet of ore is removed as follows: The legs being 8 feet long, the caps 1 foot in diameter and the lagging 6 to 8 inches thick, a total excavation of about 10 feet is required to make room for the sets, and the space remaining between the top of the lagging and the planking above is filled with blocking, the planks being allowed to settle as little as possible.

At first the rooms were carried up by overhand stoping, with the aid of square-set timbering, in the usual manner, the square sets being 7 feet 6 inches from center to center of legs and the rooms therefore three sets wide. Recently, however, an experiment has been tried of putting in what are termed in the mine "stull rooms." The top of the room is first cut out by driving a wide drift just under the sand and supporting this drift with saddle-back timbering, which becomes the roof of the room. This roof timber is put in by driving from the sub drifts on the same level, thereby avoiding the hoisting of timbers. The rooms could be started from the tops of raises if necessary. After the roof is thus securely supported, the ore is stoped underhand. Fig. 7 shows the saddle-back over the stull room.

A special feature of the Fayal mine is the use of "timber slides" for getting timber into the mine, which are made by putting up raises to the surface, 5x5 feet in section, and equipping them with skid-ways, down which the timber is allowed to slide. The skid-ways are curved at the bottom to diminish the velocity of the timber. The angle of the first slide was 45°; but the later ones were put at 38°, which is considered to be about the best angle.

Picturesque British Columbia.

About the headwaters of the Middle Fork of Spillimachene river, in British Columbia, a large number of claims have been located and considerable development work done, notwithstanding the great altitude—8000 to 9000 feet—and the heavy snows of winter. The accompanying illustration is from a photograph taken near the head of the stream. International basin lies at the head of the creek and is 8000 feet above the sea, the surrounding hills rising 1000 feet higher. It is above timber line and is surrounded by glaciers. It snows in this region every month of the year, though the summer snows are light and quickly disappear. The country rocks are slates, schists and quartzites, through which course quartz veins carrying sulphides of the base metals and gold.

In British Columbia the midsummer days are long, as evidenced by the engraving of The Steeples, taken from Johnson's cabin in Southeast Kootenay after 8 P. M. The picture shows the picturesque scenery of the locality, which is in striking contrast with that at the head of the Spillimachene.

Recent Mining Decision.

To the Editor:—The Supreme Court of the State of Washington, in a case recently handed down (Phœnix Mining Co. vs. Scott), decides several new points in mining law concerning unpatented mining claims, never before passed upon in this State, and some of which are not in harmony with the decisions of other States.

The court holds, first, that an unpatented mining claim is not community property and the wife of the locator need not join in a deed to convey the same.

Second, that the estate of the locator in an unpatented mining claim is not such an estate as will be subject to a lien of a general judgment against the locator.

The statute of this State provides that a judgment shall be a lien upon all the real estate of the debtor that is not by law exempt.

The court also holds in this case that an unrecorded mining deed has priority over an execution levied on a mining claim; and as the subject of innocent purchaser is not mentioned by the court, it practically holds that a levy on a mining claim which is unpatented is void.

The court says: "At common law, a judgment did not attach to a mere equity, though the equity was accompanied by possession." A legal location of a mining claim would seem to be more than a mere equity accompanied by possession, when the owner can, without obtaining a patent, extract all of the ore therefrom if it amounts to millions of dollars and leave it practically worthless for the one who finally obtains the patent.

The tendency of all the decisions of the court of this State is to treat this class of property more like personal property than real estate, and a as mere right of possession rather than as real property, which may ripen into a fee simple title.

The ruling of this court on this subject is at variance with the law of both Colorado and California, and it seems to me that our court has taken a middle ground between the law of Canada, which holds that an unpatented mining claim is a personal property and can be transferred by a bill of sale, and that of the United States, which holds such property to be real estate.

F. M. Jeffery.

Republic, Wash., Nov. 28th, '99.

The Nature and Nomenclature of Veins.

In the monograph of the United States Geological Survey on the "Quicksilver Deposits of the Pacific Slope" Dr. George F. Becker contributes the following description of mineral veins and ore deposits, which applies equally to the ores of other metals as well as to those of quicksilver:

Excepting when ores are deposited in beds, like coal, or in placers, like gold gravels, the existence of open subterranean spaces of greater or less size is a necessary condition for the formation of ore bodies of any kind. The ore may be deposited in openings which existed before deposition began, and which either were cracks between masses of rock broken asunder or were interstices in porous rock like sandstone. Room for the ore may also be made by solution of the rock mass either before ore deposition or during that process. It is a mistake, however, to suppose that the masses stoped out in the exploitation of mines usually represent spaces which were empty before the deposition of ore in them. It is said that cases occur in which open caves in limestone have been filled with ore, but cavities of this kind appear to be confined to limestone, and to have formed only above the water level of the district by the solvent action of surface waters charged with carbonic acid. Ore deposits, however, are by no means confined to limestones, and are more often found in rocks of this class which have never been drained than in those which have been exposed under the conditions needful for the formation of caverns. It is also conceivable that yawning fissures should form in the earth's crust, and that they should be filled up solely with ore and gangue minerals; but such cases, if they exist, are exceptional. All observations and theory point to the conclusion that most fissures are formed under a compressive stress of greater or less violence, or that a tendency to compress the rocks into folds gives rise to fissures and faults when the applied force exceeds the tenacity of the rocks. It is also well known that in faulting the hanging wall commonly sinks relatively to the foot wall. Fissures formed under such conditions cannot yawn. The walls must come together at intervals, and the intervening spaces must be filled to a greater or less extent with the fragments of wall rock. Observation shows that veins very usually answer to this description and that the space occupied by ore corresponds, in great part, to the interstices between fragments of wall rock which loosely filled the fissure before the ore was deposited. This is observed with particular frequency in large veins, while small ones are comparatively free from rock fragments. Irregular ore bodies connected with fissures still more often represent masses of rock fragments rather than caverns.

In some cases irregular chambers, connected with fissures, are solidly filled with ore and gangue minerals. Such bodies are found in limestones under conditions which preclude the supposition that they represent pre-existing caverns, and they are usually accompanied by evidences of substitution of ore for carbonate of lime. The deposits of Eureka, Nevada, and Leadville, Colorado, are of this type. In these cases broken rock seems originally to have filled the spaces in question, much as stopes in mines are often filled with rock by miners to prevent their collapse after the removal of the ore. Solutions of ore finding access to these spaces through the main fissures have come in contact with very extensive surfaces of limestone. The limestone has been dissolved and ore has replaced the rock, molecule for molecule. Whether similar substitution occurs in other rocks than limestone, and with other ores than those of lead, has not been sufficiently investigated.

Fissures in the earth's mass would extend indefinitely, both laterally and vertically, if the rocks possessed neither plasticity nor elasticity. No rocks, however, are devoid of either of these properties. It is well known, accordingly, that fissures are not of indefinite length. They sometimes pass over into folds, as several geologists have pointed out, and even in granite areas dykes of eruptive rock may sometimes be observed, which diminish gradually in width to a fine edge and disappear. There is every probability that fissures also die out in depth in similar manner, though where considerable faults have occurred the depth of a fissure must be very great. Many fissures certainly penetrate from the surface of the earth to the foci of volcanic activity, a depth at least equal to that at which earthquake shocks originate, or several miles from the surface.

When the term fissure vein is used without any qualification it brings to mind a very simple and common form of deposit, a fissure with well-defined walls, usually nearly straight, or curving gradually and including vein matter which is commonly composed of ore gangue, and fragmentary masses of country rock. It appears to me very desirable not only to call a deposit of this kind a simple fissure vein, but to limit the application of this term to veins of this kind.

Where the formation of a fissure is accompanied by a strong compressive stress groups of parallel fissures form, often passing over into a common fold at each end. The dislocation is then distributed over a number of parallel surfaces instead of a single surface, and this distribution takes place according to a definite law, which I have examined on other occasions. In some cases such fissures form with great regularity and are distinct from one another as far as they can be traced. If ore-bearing solutions enter such ground, they deposit distinct parallel veins. Such deposits are naturally described as groups of parallel veins.

In many cases the tendency to the formation of groups of parallel fissures is obstructed, perhaps by irregularities in the tenacity of the rock or by the action of complex forces. In such instances approximately parallel fissures form, which die out in the direction of their strike, being replaced by others to one side or the other. More or less diagonal stringers must then exist, connecting the principal crevices. Sometimes fissures of this kind run together and separate again, without, however, diverging at any high angle.

In all cases these veins are linked together by direct continuations of divergent strike or by small stringers intersecting the layers of rock which intervene between them. It appears to me convenient and natural to call such systems "linked veins," to distinguish them from simple fissure veins and parallel systems of veins on the one hand, and from netted (or reticulated) veins on the other.

There are still other less usual groupings of veins which do not need to be christened. No one would hesitate to speak of a system of veins which radiated from a central point as radiating veins, or of a vein which sends off numerous stringers into the country rock as a branching vein, and such descriptive terms are clear and precise.

A slight degree of irregularity in the tenacity of the rocks or in the character of the rupturing force suffices to produce linked fissures instead of groups of parallel fissures. Greater variations in the rock or a torsional stress accompanying the dislocation will result in crushing portions of the country rock adjacent to the main fissure. This crushing will not, as a rule, be confined to a simple zone parallel with the fissure, but will reduce only occasional masses of rock along the fissure to fragments. When in such cases ore and gangue minerals are subsequently precipitated the deposit will be confined to the main fissure where the adjoining country is unbroken, but it will spread into the neighboring rock where crushing has occurred, the excrescent ore bodies being nevertheless merely lateral extensions of the filling of the fissures. Miners then usually call the entire occurrence a fissure vein, and with no little reason, since the whole deposit is so evidently and closely dependent upon the existence of a fissure. In some of the simpler cases of this kind even formalists will grant the applicability of such a term as irregular vein, or vein with irregular walls. "Pipe vein" has also sometimes been used to express structure of this kind, but this term has been applied in such various senses as to be objectionable. When the irregularity of the deposits is great, it has been usual for mining engineers and geologists to describe rather than to name them, to speak of stockworks and impregnations connected with them, and the like. It does not seem expedient, however, to designate ore bodies so closely related by different names unless the connection is also expressed by some appropriate term. The connection existing between the various portions of a deposit is at least as important as the form of the various parts, and, if miners err in giving a wrong impression as to form, the usual nomenclature of mining geologists ignores the close interdependence recognized in the language of the miners.

It seems to me that deposits of this description may conveniently be called "chambered veins," and that the irregular, excrescent bodies of ore of such deposits may fitly be denominated vein chambers. I propose these terms to express the external form only, and to embrace irregular ore bodies contiguous to a fissure, whether they consist of reticulated masses, of impregnations, or ore deposited by substitution. A chambered vein may, then, be defined as a deposit consisting of an ore-bearing fissure and of ore bodies contiguous with the fissure which extend into the country rock. The term is intended for use in contradistinction to the term fissure vein, or, more explicitly, simple fissure vein, which is thus restricted to those cases in which the occurrence of ore is limited to a single, defined fissure. Transitions between the two forms are not infrequent, and such occurrences may be referred to conveniently as veins which are to some extent chambered, or which show a tendency to chambering.

In granites and gneisses it is not infrequently the case that simple fissure veins are formed which, from the croppings downward, are very irregular. I doubt, however, whether, if in these cases the surface still remained as it existed at the time when the fissure was formed, the superior portion of the deposits would be found to possess an equal degree of regularity. When a fissure is formed a fault almost or quite invariably accompanies it, for it is a force tending to elevate one portion of a region above another which usually produces the fissure. When a fault takes place it is well known that the hanging country is commonly depressed relatively to the foot wall, and a projecting edge of the hanging ground must then press and scrape against the foot wall. This wedge-like mass, not being supported at the surface by overlying rock, is greatly exposed to fracture, and will generally be more or less fissured, even when it is composed of firm material, such as granite. If ore deposition follows from solutions which reach the upper part of such fissure, the irregular cracks in the lip of the hanging country will fill with vein matter and the simple vein will be surmounted by a chamber or a series of chambers close to the surface.

If a country be composed of rock of feeble and variable tenacity, the tendency of the ground near the surface to break up into irregular fragments will be much greater than where the country is firm and homogeneous, and the formation of chambers of ore close to the original surface is the more to be expected. The ore bodies which were found near the croppings of the Comstock lode were of this description, and so are most of the superficial cinnabar deposits of California.

I propose for these irregular bodies found at the croppings of veins the name "cap chambers," to distinguish them from the lateral ore bodies of chambered veins. The term vein chamber, then, includes cap chambers as well as lateral chambers.

So far as we know anything of the mechanical conditions of ore deposition, it appears from the foregoing paragraphs that many deposits which now appear as simple fissure veins must once have included cap chambers, and must, consequently, have come under the definition which I have proposed of a chambered vein. The cap chambers in these cases must have been removed by erosion. Where ore deposition has continued until all available crevices were filled, as has sometimes but not always been the case, it is evident that cap chambers will contain a comparatively large amount of ore, often more than will be found within an equal vertical interval far from the surface, where the fissure system is more simple. Such was the case, for example, on the Comstock lode. Such also may have been the case on the gold belt of California, and the immense amount of auriferous gravel would then not represent the erosion of contracted quartz veins, such as are now being mined, but of the cap chambers of the veins. This hypothesis greatly reduces the amount of general erosion which the existence of these gravels would imply.

An Important Tunnel Decision.

(*Continued from Page 659.*)

clude a right to drive a tunnel through such a location for the purpose of discovery.

We are not aware that the precise questions presented for our determination, which we have designated as proposition second, in the former part of this opinion, have ever been passed upon by an appellate court. In the case of Stratton v. Gold Sovereign M. & T. Co., reported in Mills' Legal Adviser, 350, in which case complainant brought an action to restrain defendants from extending a tunnel through the claim of the former, which had been located prior to the date of the tunnel site, the defendants answered that they were driving such tunnel for the avowed purpose of discovering and claiming blind veins within the territory of complainant's claims. Complainant applied to Judge Hallett for a temporary injunction, which he granted, and in the course of his opinion said:

"Chapter 6 of the Revised Statutes provides for three kinds of locations on the public mineral lands, which, in common speech, are called 'lode locations,' 'tunnel locations' and 'placer locations.' When a location has been properly made in either class, and so long as it shall be fully maintained by use and enjoyment or by patent, the territory embraced in such location is not subject to adverse location by a claimant of the same class, or any other class. The reason is, that the territory covered by such location has been severed from the public domain, and has become private property, which is no longer open to a new appropriation."

Our construction of Sec. 2323 is, that a tunnel site can only embrace unappropriated public domain, and that under it no rights are conferred to extend a tunnel, though previous valid, subsisting locations. From the record before us, appellant had no right to invade the premises of appellee, through its tunnel, and in the absence of any proof to the contrary, the presumption attaches that all veins discovered in that part of its tunnel under appellee's claims belong to the latter—Wakeman v. Norton, 24 Colo. 192—and the judgment of the court, that appellee was the owner of these veins, and enjoining appellant from further extending its tunnel into, or using that portion of it under the claims of appellee, is correct.

The final question passed upon by the trial court, under the stipulation, relates to the offer of appellant to prove that at the time of the location of its Ithica tunnel site, no ore had been discovered in the Monarch and Mammoth Pearl. This offer was denied. At the time the tunnel site was located, and work commenced thereon, receiver's receipts had been obtained for these claims, upon which patents subsequently issued. These evidences of title took effect by relation as of date of the location of the respective claims—Lindley, Sec. 783. As against a collateral attack, the action of the Land Department in issuing such patents conclusively settled that all steps necessary to constitute a valid location of these mining claims had been taken, which included the discovery of mineral. This question has been so frequently decided that we do not deem it necessary to discuss it. Lindley, Sec. 777; Davis' Admr. v. Weiboid, supra; Poire v. Wells, 6 Colo., 406; Justice M. Co. v. Lee, 21 Colo., 260; Smelting Co. v. Kemp, 104 U. S. 636; Steele v. Smeling Co., 106 U. S. 447. It is contended on behalf of appellant that this principle is not applicable as between tunnel site and lode locations, because its rights were not involved in the patent proceedings. As to inchoate rights which attach to a tunnel location, this may be true, but it had none, unless it successfully attacked the title of appellee in apt time, for the location of appellee's claims was prior to the location of the tunnel site. At the time of that location, receiver's receipt had issued upon the Mammoth Pearl and Monarch. We can not understand how, upon any possible theory, the rule announced is not applicable, as between a tunnel site location over a prior lode location, upon which a patent has already issued. So long as the title to the claim of appellee was only evidenced by receiver's receipt it was still subject to an attack in a way; but when patent finally issued upon these claims, it conclusively settled, as against the junior location, of appellant's tunnel site, that all steps necessary to constitute a valid location of appellee's claim had been taken.

Errors are assigned upon the action of the Court below, in denying appellant's petition to remove the cause to the Circuit Court of the United States for the District of Colorado. No argument is made on this assignment, and we therefore decline to consider or pass upon it.

A further error assigned and argued by appellant is, that the Court erred in overruling its motion for leave to develop the blind veins in its tunnel within the lines of appellee's claims, for the purpose of establishing their character. Its acts in attempting to initiate title to these veins was a trespass, which it was not entitled to continue under any leave of Court.

This disposes of all the questions argued, and finding no error in the record, the judgment of the District Court is affirmed.

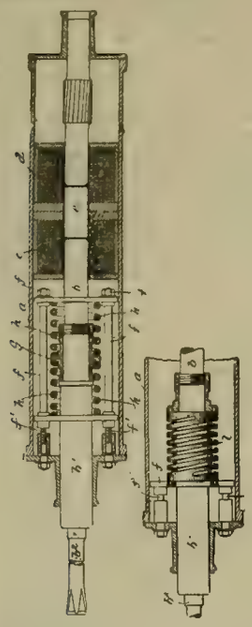
The case will, undoubtedly, go to the highest tribunal, the Supreme Court of the United States, for final adjudication.

Latest Mining and Metallurgical Patents.

Patents Issued Nov. 28, 1899.

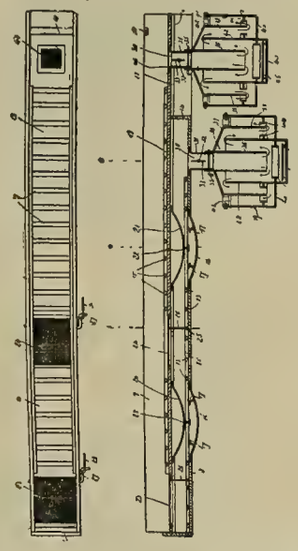
Specially Reported for the MINING AND SCIENTIFIC PRESS.

RECIPROCATING DRILL.—No. 637,809; A. E. W. Meissner, Charlottenburg, Germany.



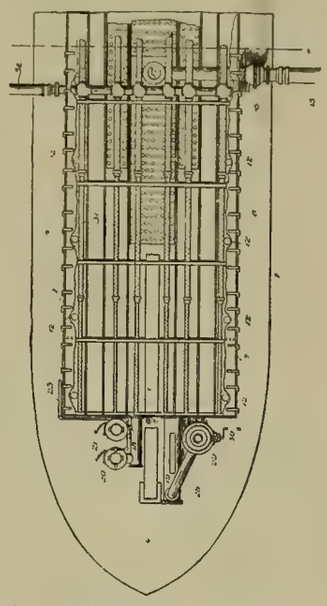
In a drill, the combination with the casing, a drill-rod, and a collar removably held by threads on the latter; of a spring adjustably connected at one end to the casing and attached at its other end to collar, and an electric motor devoid of springs and entirely independent of spring for reciprocating the drill-rod, as and for the purpose set forth. The combination with the casing, a spring-carriage therein, and threaded connections between these parts for permitting the adjustment of the carriage bodily; of a reciprocating drill rod moving through the casing and carriage, a spring attached at one end to carriage, connections between its other end and the drill rod, and means entirely independent of the spring for reciprocating rod through a predetermined path.

GOLD WASHING APPARATUS.—No. 637,861; J. H. Fellows, El Dorado, Kans.



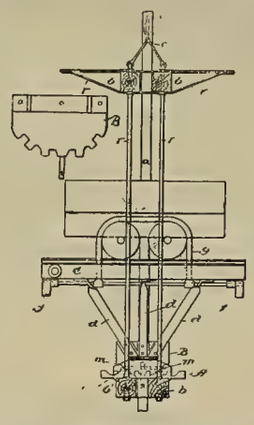
In an apparatus of the class described, a casing provided with a longitudinal perforated partition, the bottom of casing being provided with receptacles having transverse baffles and adapted to contain quicksilver, said partition being provided with transverse riffles and with deflectors adapted to operate in connection with receptacles, and provided with transverse baffles which operate in connection the baffles with which receptacles are provided; each casing provided with a sieve, and riffle bars arranged upon partition, and upon the bottom of casing, the bottom of casing and partition being provided respectively with a receptacle and a deflector, each of which is provided with baffles which co-operate to swirl a mass of water passed through apparatus. In the main casing, comprising a bottom, sides and end, bottom being turned upward at one end to form an upright transverse partition, a longitudinal perforated partition detachably mounted in casing and extending at one end beyond upright partition, gold-retaining devices connected with partition and the bottom of main casing, and comprising riffles and receptacles provided with deflectors, a supplemental casing connected with and adapted to receive auriferous water from the bottom of casing, and a supplemental casing connected with longitudinal partition at a point thereof in the portion which extends beyond upright partition, and adapted to receive auriferous water therefrom.

METHOD OF DISPOSING OF DREDGINGS.—No. 638,145; A. G. Rose, New York, N. Y.



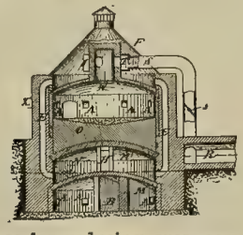
The method of disposing of dredgings which consists in keeping them confined from exposure to the open atmosphere, delivering them into the interior of an air-tight compartment, purifying the air expelled by the influx of dredgings, from the compartment, and finally discharging the dredgings from the compartment without exposure to the atmosphere.

DUMPING CAGE.—No. 638,114; W. G. Halbert, Westville, Ill.



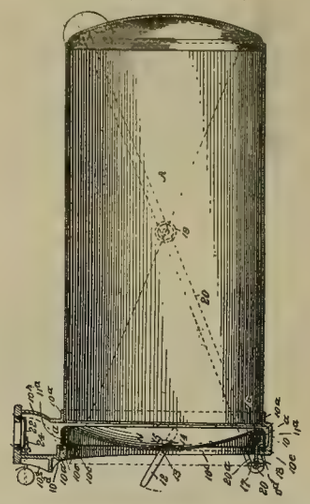
A tilting cage provided with a pivotal platform, platform being sustained by toothed rocker members, mounted on stationary toothed castings, that are axially ranged in a line vertically coincident with the center of gravity of platform, toothed members being slightly flattened on their bearing-faces to provide a suitable base. A tilting cage provided with a pivotal platform, that is sustained by toothed rocker members mounted on stationary toothed castings, members being axially ranged relatively to platform and provided with limiting stop pins.

FURNACE FOR REDUCING ORES.—No. 639,099; L. Correa, La Felguera, Spain.



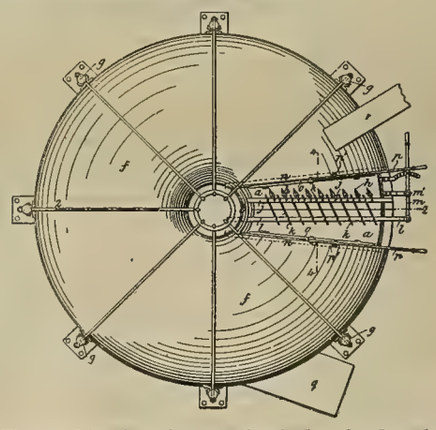
A gas furnace for reducing ores, comprising four superposed chambers, namely, an air receiving chamber, next below this air receiving chamber, a smelting chamber having a hearth, and a burner for gas and air in its upper part, next below the smelting chamber, a hot air chamber, connected by flues with the air-receiving chamber and with burner, and next below the hot air chamber a fume chamber connected with the smelting chamber and with the fume outlet. A gas furnace for reducing the ores on a hearth, comprising a smelting chamber *W*, with a hearth, an air heating chamber *N*, next below the chamber *W*, a fume chamber *M*, next below the chamber *N*, and connecting with the smelting chamber and the fume outlet, and a burner *K*, open to the upper part of the smelting chamber, furnace having also an air-space above the smelting chamber, air flues connecting space with the chamber *N*, and a hot air pipe *I*, connecting chamber *N* with the burner *K*.

RETORT DOOR AND MEANS FOR CLOSING SAME.—No. 638,122; J. B. Houston, Vancouver, Canada.



In a door of the class described, in combination; a frame 10 secured to the mouth of the vessel to be closed, a passageway for a door downward through frame, and a flexible seat arranged around the opening to be closed and designed to receive the rim of the door, hand levers 12 having devices thereon for drawing the door to its seat, and balance levers for raising door, a flap-door for closing the opening through which the main door slides when being opened, fulcra arranged to support flap and levers and weights for balancing the same and for bringing it to its seat. Means for closing the door, a vertical passageway for a door through the upper part of the frame, a rim carrying a packing forming a seat around the opening to be closed, a door arranged to be placed over seat and levers for raising and lowering the same, and means for drawing door on to its seat when closed, a flap-door for closing the passageway hinged or supported on fulcra, passing through glands on the opposite sides to the exterior of the frame 10, and levers and balance mechanism fixed on fulcra, and means for allowing the door to be pushed tight against its seat by the internal pressure.

CALCINING FURNACE.—No. 637,864; J. Godfery and H. J. Hayes, Swansea, England.



The combination of a rotating bed, a fixed roof in the form of a segment of a circle, leaving an opening in the roof, partitions along the radial sides of the opening in the roof, plows between the partitions below the opening and means for rotating the bed beneath the plows, the organization being such that the material is alternately heated and exposed to air out of contact with the products of combustion, and the plows are protected against undue heat. Devices extending to the outside of the furnace for adjusting the distances of the bottoms of the partitions from the bed, two sets of plows between the partitions below the opening, one fixed and the other pivoted, and means extending to the outside of the furnace for simultaneously adjusting the angle of the pivoted plows to the direction of motion of the bed.

Blasting by Electricity.*

By CLAUDE H. SMITH.

In taking this subject for discussion, I will confine myself of necessity to merely the applications of electricity to methods of discharging the ordinary explosives in use to-day; for, while experiments have been and probably are being conducted to-day for finding some compound which would explode only by the action of the electric current, I am not aware of the successful ending of any of these experiments. Their object is a worthy one, for such an ideal explosive would indeed minimize the dangers in rock working, and it is to be hoped that they may result in some practical discoveries ere long.

It is probably well at this point to describe briefly the essential piece of apparatus in the whole system, which of course is the electric fuse. It is of practically the same pattern in all makes, and the principle of action may be said to be exactly the same in all makes used in this country. In appearance the electric fuse might readily be taken at first glance to be an ordinary cap with fuse attached ready for insertion into the stick of powder; and indeed it consists of practically the same relative parts and is inserted into the powder in the same manner.

The copper shell is about the same size as the ordinary cap. The shell is about two-thirds full of detonating material. Two copper wires of about twenty gauge with a strip of platinum soldered across their ends extend a short distance from a cement plug which rests on the explosive material, and are thus imbedded in the explosive. This cement plug also serves to make the shell waterproof.

The passing of a sufficient current through the circuit will cause the highly resisting platinum wire to rise in temperature to at least a red heat, thus igniting the explosive material, which, in turn, by its detonation, explodes the charge in which the fuse is inserted. The wires are insulated by waterproof material, so that the entire fuse is waterproof and can be used in wet holes and even for a "water-shot," if desired, without further precautions. This is one of the points in favor of its use.

The machines for generating the current to be led to the shot holes have been various, but at present are nearly all of one practical type. A description of the general principles of these current generators, which are commonly called "blasting machines," may be of interest here.

They are a special type of the magnetic electric machine seen in the ordinary telephone set, being much larger and wound to deliver a much stronger current. The most common form used is enclosed in a tight box convenient for carrying. The mechanism for rotating the armature is so arranged that a current is short circuited until near the end of the stroke, when the short circuit is broken and the current sent out on the line at its maximum strength, thus insuring the simultaneous firing of all the fuses. If this scheme of sending out only the strongest current through the fuses was not employed, but the current allowed to enter the series of fuses from the starting of the current, the current would gradually rise in power until it was sufficient to fire the first two or three fuses in the series, when their explosion would break the circuit and the balance would have to be connected up again before their discharge could be accomplished, and even then probably not all the remainder would be fired in the next attempt. Thus one of the principal features, viz: the simultaneous discharge, would be lost. The shots are always connected up and discharged in series, for the difficulties in obtaining a uniform current through each fuse, thus insuring the discharge of all, are not offered in that method, which are present in the multiple method. The latter method requires each loop of the circuit to have very close to the same resistance, in order to receive an equal share of the current. This would require, first, great uniformity in making the fuses, and, further, calculating care in connecting up the shots at each blast, which would be a useless waste of time since the series method is available.

Having described briefly the way the various parts of the system perform their functions, it remains to discuss the advantages and disadvantages possessed by the system.

There are several precautions which are almost imperative to the proper working of the system. The lead wires should be frequently inspected and tested for imperfect insulation, through which the high voltage current would rapidly leak when touching the wet mine walls, thus possibly preventing the discharge of any of the shots. All connections between fuses and connecting wires must be well taped to prevent leakage to the earth, which might drop the current enough to prevent the explosion of the balance of the series. The circuit of each fuse should be tested before using, and the whole circuit, when ready to fire, should be tested by a low current to ascertain the existence of faulty connections. The blasting machine should be tested before each blast to prove its current to be full strength.

In order for the system to be an ideal one, it is necessary to assume that the best results from a series of shots is always obtained by a simultaneous discharge. But if in the same set of shots some are required to be discharged before the others, a third wire at least would be required in order to divide the shots, and the odds are very high that the flying rocks from the first discharge would break some of the remaining connections and a loss of time would ensue before the connections could be again made, owing to the necessity of waiting some time for the powder smoke to disseminate. But in the large majority of cases it is true that a simultaneous discharge gives the better result, and, rather than condemn the system on this one point, it would seem more logical to have common fuse and caps handy to use in such special cases, cutting the level out of the circuit for that particular instance. However, this case might arise so frequently in some kinds of rock that the usefulnsss of the system would be almost destroyed.

Another feature of the system would seem to overbalance the extra precautions belonging to it as heretofore mentioned; and that is the element of safety, as every man can be totally out of danger before the blasting takes place.

Again, in a well established mine the dangers to the circuit mentioned can be reduced to a minimum by stringing permanent okonite or other well insulated and waterproof wire in the different tunnels, levels and shafts, so that only the connecting wires to the fuses need be exposed to the possibility of leakage.

Lastly, owing to the detonation of these fuses being much greater than the ordinary caps, more work is gotten out of the same amount of powder; and, further, as much more and cleaner work is done in most cases by the same shots simultaneously discharged, than if in succession, the vantage for economy for work done would seem to be on the side of electricity. For, after the first cost for machine and lead wires, the fuses and small amount of connecting wire needed, cost but a trifle, if any, more than the fuse and caps of the old system, and are subject to practically no waste, which cannot be said of the old system.

While it is not wise to draw theoretical conclusions in a limited discussion like this, still my conclusion that electric blasting apparatus has the advantage in its favor, seems to be upheld in the fact that the system is in such general use throughout the country and rapidly replacing the old system.

*From a paper read before the Technical and Engineering Society of Golden, Colo.



SALT WORKS, CARMEN ISLAND, LOWER CALIFORNIA.

The Islands of Lower California.

Along the coast line of Lower California, both on the Pacific and Gulf sides, are numerous groups of islands. Some of these are large, others are small. Many of them are valuable for their mineral and other resources. On Cedros Island are mines of gold, silver and copper. San Jose island, forty miles northwest of La Paz, is twenty-one miles long and ten miles wide. The inhabitants are engaged in cattle raising and salt manufacture. There are also large deposits of marble and gypsum on this island, but they are undeveloped. In 1881 a vein of gold and silver ore was discovered, which was profitably worked for five years.

On Catalina island, eighty miles northwest of La Paz, there are undeveloped silver veins. There are on this island, as on a number of others along the coast, valuable pearl fisheries.

Carmen island is 125 miles northwest of La Paz. It is 130 miles long and eight miles wide. On this island are large deposits of salt, which are worked throughout the year, giving employment to a large number of men. There are said to be rich deposits of gold and copper on this island also, but they, like the others, are undeveloped.

The accompanying engraving from J. R. Southworth's *Lower California Illustrated* shows the extent and character of the salt lands of Carmen island.

Phenomena Attending the Accumulations of Bitumen.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, State Mineralogist of California.

Water.—Through its inferior gravity petroleum oil ascends through water from the depths of the earth and either forms bituminous springs upon the surface of the earth, or by its buoyancy floats upon the water and is stored in the uppper parts of porous or seamed strata. The movement of subterranean water is indicative of the movement of oil. Besides these offices, the influence which thermal waters holding silica and other minerals in solution have exerted in many rocks is a question closely connected with the accumulations of the bitumens. All deposi s precipitated from water, lime, silica, etc., may become the cementing substance of shale or sandstone; and, again, all substances cementing or composing rocks which are soluble in water are liable to be leached from the rocks by percolating water. There may be mineral springs without the presence of bitumen, but there are no springs of bitumen that are not accompanied by mineral waters.

Southwest of the metamorphic rock are sandstone strata and farther to the southwest is shale. The sandstone where it adjoins the serpentine is snow white. Hot alkaline and acid waters entered these shales and sandstones and dissolved the bases contained in them, also dissolving a quantity of silica. These waters cooled as they neared the surface. The silica would have been deposited had these waters not encountered a flow of meteoric water, which greatly diluted the hot solution. This increased volume of water made it possible for the silica and bases to be held in solution and be carried away to the sea.



FIG. 4.—CONTACT OF LEACHED SANDSTONES AND SERPENTINE

The shales become darker as they go from the altered rocks until they finally become the color of normal shale. In places these leached shales have a width exceeding one mile.

The arrows in the sectional views indicate the direction in which the water flowed and the general direction in which it now flows. The geographical configuration of the country shows that the waters flowed in this direction, as higher mountains lie to the north of the formation shown in the sectional views.

The finding of bitumen in the southern dip and the absence of the same from the northern dip of the anticline shown in section *C D* is additional proof that waters flowed in the direction shown by the arrows. (See Fig. 2.)

Near the serpentine all fossil shells are removed by the solvent action of mineral waters from the shales and sandstones, and the casts and molds are obliterated through the incoherency of said sandstones and shales, and also by the removal of the coloring from the darker material that usually replaces the part formerly occupied by the shell. At a distance of 1000 feet or more from the serpentine the same stratum that adjoins the metamorphic rocks contains casts and molds of fossil shells, while still farther away fossil shells exist.

The whitened shales have a porous structure and are very light compared with normal shales. They can be easily ground between the fingers, owing to the removal of soluble material which once occupied the pores.

Shales and sandstones leached of all bases, such as lime, magnesia, metals, etc., are but slightly coherent and are easily eroded.

Jaspers.—The metamorphic rocks shown in the sketch consist principally of jaspers, or shales, and sandstones partly converted to jaspers. They have a hardness of 7 and a specific gravity of 2 55, and break with a conchoidal fracture. Their prevalent colors are yellow and brownish red of various shades, sometimes nearly black in the seams and sometimes a greenish white.

The darker jaspers often have a resinous luster, but are generally dull.

The transition from shale to jasper is plainly visible; all gradations from unaltered shale to jasper will occur within a distance of a few feet. A portion of the jaspers retains the form of shales, with the exception that they are contracted and distorted by heat. Sometimes they are burned so as to form a solid mass.

After burning, they have been silicified with amorphous silica, filling minute cracks and spaces in the jaspers.

The brownish red jaspers show unmistakable signs of having been burned. They are warped, contracted, broken and vesicular, showing all the structural conditions that shale does when artificially burned in large masses.

The whitish green jasper does not show all these signs of burning, even when in immediate contact with the brownish red jaspers; but the shales, between which and the brownish red jaspers these whitish green jaspers lie, are contorted by heat, and next to the whitish green jaspers are discolored by oxide of iron.



FIG. 5.—OPEN SEAMS AT RIGHT ANGLES TO PLANES OF BEDDING.

The vesicular condition only occurs when the brownish red shales are apparently greatly burned.

In places these brownish red jaspers closely resemble the jaspers that are the most burned and which are produced by chemical heat near the surface of the earth, and probably are produced by the same metamorphic actions, but on a greater scale.

Pockets containing burned shales not exceeding 8 inches in diameter are found in unaltered shales near the surface which closely resemble some of the jaspers that are in the large mass of metamorphic rocks shown in the sketch.

It might be expected that, through metamorphic agencies, jaspers might be formed in a large space, but it is remarkable that they can be formed in a space 6 inches in diameter.

Overlying the serpentine and jaspers at *J* (See Fig. 2) are chemically burned shales; these burned and red shales are fully described in a former article.

In Santa Barbara county these red shales cover a large area.

Frequently in the jaspers seams and cracks approaching horizontally are closed, while those approaching vertically are open to the extent of the contraction of the rocks during burning. (See Figs. 5 and 6.) The closing of the horizontal cracks and seams may be due to the weight of the metamorphosed rocks, but it must have been augmented by superincumbent strata. The opening of the vertical seams and cracks must have occurred at the time they were metamorphosed, showing that there was no great lateral pressure on the rocks during or since their change.



FIG. 6.—OPEN SEAMS WITH PLANES OF BEDDING.

The open cracks and seams are either with, or at right angles with, the plane of bedding of the rocks. When the plane of bedding is nearly horizontal the open cracks are nearly vertical; when the plane of bedding is nearly vertical the open cracks are along the plane of bedding.

There are three important changes during the production of jasper, or chert, from shale, viz: leaching, baking or burning, and silicification, and these changes occur in the order given above.

The leaching of lime, magnesia and other bases by percolating hot waters leaves a light and porous rock, consisting principally of insoluble silica and alumina.

The porous condition of the rock permits the circulation of heat and hot gases; this circulation of heat and gases is also aided by the breaking of the formation through subsidence.

When burnt by chemical fires these shales are of many shades of pink, red, reddish brown, white and yellowish white, and are sometimes black, this color being caused by the presence of carbonaceous matter. Some of these shales are fused and are of a brownish red to black; by fusion they became impervious to fluids, while the remainder of the shales remain more or less porous.

Besides the cracks caused by earth movements there are numerous small cracks caused by the burning and breaking.

One layer of jasper is a bad misfit with the adjoining layer. Sometimes a piece of a layer of jasper a few inches in length will be warped in one direction, whereas an adjoining piece of a layer will be warped in a contrary direction; some are acutely bent, but the layers of jasper seldom fit perfectly with one another. Nothing but baking and burning could create this almost universal misfit in the layers.

After the jaspers are hardened they cannot be contorted and bent. They would break before bending, and if they were contorted and twisted when in a plastic condition they would probably exhibit slickensides and would have but few wide seams and seams of irregular width and would not be vesicular.

No slickensides are to be seen between the layers, the surface of these layers being nearly always rough. The greatly contorted, bent and roughly seamed condition of the jaspers must have been occasioned by heat which baked, burned, fused, contorted, cracked, warped and hardened them and made them vesicular.

Subsequently to their burning the small vesicles and cracks in them were filled with chalcedonic silica. On account of their burning and silicification they greatly resist weathering.

Subsequent to their leaching, burning and baking, in some of these burned shales the vesicles produced by fusion and the small cracks and pores and numerous minute round and oval areas have been filled with soluble silica deposited from circulating siliceous waters, forming jaspers and cherts.

These spaces are usually filled with silica which has a different color from the ground mass of the rock, the colors usually being white and of various shades of red or brownish red.

Sometimes these interspaces have been filled with bands of different colored soluble silica, the bands running parallel with the walls of the spaces.

The interstices in the strata of sandstone shown in section *E F* have been filled with soluble silica, making a hard, compact rock; whereas the same strata a short distance to the east and west consists of sand cemented with bitumen.

(To be Continued.)

The Divining Rod in Arizona.

TO THE EDITOR:—I have been treated to an exhibition of a new divining mineral rod by one who claims to have made a valuable discovery. I was conducted by the discoverer, an old man, to a barn on Sunday morning and shown a porous reed 3 feet long and as large as a pipe stem, and also a vial containing the secret combination of magical minerals which weighed about two ounces. This vial was tied to one end of the wand by a silk thread (the said silk was indispensable). Then he began prospecting for gold by putting a $20 piece in his mouth and taking hold of the end of the wand by both hands. It begun to rise with the vial attached at the other end until it stood straight up in the air. He then proceeded to prospect for copper by placing a copper cent in his mouth, in place of the gold piece removed, and standing to the east he again took the wand between his hands, when it commenced to rise over his head and pointed to the Old Dominion properties, situated due west. How it was done I am unable to say. The old man says he can find oil in the same way and says that it can be found within six miles of here. He wanted to organize a company, but I did not invest.

Globe, Arizona, Nov. 20th, '99.

A Wolframite Mine.

The Durango mine at Lead City, South Dakota, was originally located in 1876 for gold, the claim containing an extension of the noted conglomerate deposit which to the northeastward of the Homestake vein was rich in gold in a score of mines. As a conglomerate mine the Durango was not a success; the encroaching Cambrian sea piled up on that ancient beach heaps of cobbles, gravel and sand, but little gold, the source of supply, the Homestake system of veins, having been covered before the shore deposit

had reached the Durango. For years the mine laid in idleness, but recently it has developed a new source of wealth in deposits of wolframite (iron tungstate). Several shoots of this ore occur lying in the upper portion of the Cambrian quartzite, or just above it, the quartzite overlying the conglomerate bed. The wolframite is 14 to 18 inches thick and several carloads of the mineral have been shipped to Eastern steel manufacturers at good profit. The ore runs 40% to 55% iron tungstate. Otto Grantz, whose Hidden Fortune mine has made him suddenly rich, discovered the gold in his claim while prospecting for wolframite, where the mineral is also found. The quartzite contains gold associated with tellurium. These ore deposits have been formed in close proximity to dykes intruded from below, coming up through the underlying schists and intersecting the conglomerates, quartzites and overlying formations.

Motive Power at the Mines.

NUMBER IV—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. E. CHODZKO.

A few figures concerning the cost of operating a mining plant of a definite size by means of oil engines may prove of interest, as enabling its owner to establish a comparison with his present running expenses.

The distance of the mine from the nearest place where carload consignments of oil can conveniently be shipped and the means of conveyance therefrom are the first important points, which, when settled, will decide whether the use of this class of motors is to be considered at all; and when this subject is given close attention it seems reasonably safe to assert that in almost every possible instance this distance need not be considerable.

It must be remembered that a large mine situated very far from the railroad is in exceptional conditions in this respect; for if its location is particularly difficult of access, high-grade ore in large quantities will be the first requisite to justify the development of the property and the creation of a convenient power plant to operate it. When this point has been satisfactorily established, the question of first expenditure incurred in securing a steady supply of motive power becomes a side issue, even though this outlay may represent a large amount of money.

There has been occasion to state in the course of this article that such a concern will generally not depend upon a custom power plant, but will find it to its advantage to erect and to maintain its own power generating outfit.

So that if the possibilities in the way of steam or water power are found to be inadequate this company can afford, if need be, to establish a private oil pipe line of great length, even should two or more pumping stations have to be built alongside of it; or else, if the laying of pipes is for some reason objectionable, over a rugged country, a long distance ropeway may answer the same purpose.

Setting aside, therefore, the case of a large company, and directing our attention to a mine of moderate size, many miles away from the railroad—since no difficulty is to be overcome at a moderate distance, as is the case with a majority of the mines on the mother lode of California—we only can possibly be confronted by one of two things: either the mine is far up in the mountains, where timber and water are plentiful, and there is no use for an emergency plant, or else, as in southern California, Nevada, Arizona and Austra ia, long stretches of arid and comparatively level plains extend between the railroad and the mine. In such regions traction steam or oil engines have long since proved to be the very thing for hauling freight trains of carts with supplies of all kinds, which will most readily take in tow one or more oil tanks.

And, then, we must remember that there is no panacea that will cure all diseases. In some cases either because of high freight rates or for other reasons the oil supply cannot be secured with economy, and the conclusion is simply that something else has to be done.

Conditions not exceptional along the mother lode would obtain in a mine where hoisting has to be done from a shaft not over 1000 feet of vertical depth to supply a 10-stamp mill with rock breaker and four vanners.

An underground pump of the non-compound direct-acting type has to handle a maximum of 50,000 gallons in twelve hours, and air at seventy pounds gauge pressure, without reheating, is supplied to it by a compressor which operates three 3½-inch rock drills during the remainder of the time.

It is assumed that the working conditions are such that an oil engine can safely operate the hoist in the ordinary way, namely, by belting on a countershaft otherwise actuated by water or electric power.

The amount of crude oil required for the operation of this mine will now be estimated, and its cost based upon figures obtainable in California in the fall of 1898, when a special investigation was made by the writer of the cost of power from various sources, in a mining region located from twelve to fourteen miles from rail. Hauling over that distance has been assumed to be effected by means of teams, which would be more expensive than in the way previously suggested.

No comparison will be made with the cost of water and electric power in the same section, the interested reader being left to draw his own conclusions in this respect.

Without entering into useless details, a safe estimate of the required power would be:

Mill	30 H. P.
Hoist	10 H. P.
The volume of free air to be compressed per minute when pumping at the maximum capacity would be, twelve hours	480 cu ft.
The volume of free air required by the drills, supposed working together during twelve hours, which is also an extreme case, would be	240 cu. ft.
Giving an average of	360 cu. ft.
And assuming a mechanical efficiency of 0.8 for the compressor and an additional loss of 10% in the belting, the average brake H. P. of the motor must be	75 H. P.
Making a total of	115 H. P.

The oil consumption, at the rate of 0.8 pint or 0.1 gallon per brake H. P. per hour is, therefore, per twenty-four hours: $11.5 \times 24 = 276$ gallons, or 6.57 barrels, a day, so that a 54-inch by 16-foot plain cylindrical tank, of the size of a standard 70 H. P. boiler, would hold a week's supply of oil with continuous run at maximum capacity. As a passing remark, it might be stated that a cemented tank of masonry would be very convenient for that purpose, inexpensive to build, and easier to clean than a wrought iron tank.

The cost of oil, including haulage, was estimated at 5 8 cents per gallon, representing a daily cost of $16. The attendance would be the same as with the present motors, the oil engines being provided with very sensitive governors, and the pipe connections with the tank requiring no more care, and probably less, than water pipes under heavy pressure.

In the particular case considered it would be advisable, in order to work under the best economical conditions, to have three 30 H. P. motors—which in practice easily develop 35 H. P.—namely, one at the mill and two at the compressor, one of the latter working during half of the time, and then one 10 H. P. motor for the hoist, which could be stopped during the intervals between lifts, owing to the moderate capacity of the mill, thus reducing the slight oil consumption incurred when the engine is kept in constant motion without doing work. It must be understood that the figure here given of 10 H. P. would cover all the requirements of the mill supply and also of hoisting waste or timbers; it is likely, however, that in a mine like the one described, a somewhat larger hoist, say 15 H. P. or even 20 H. P., would be used intermittently. But what is here desired is the actual work, so as to arrive at the oil consumption.

These figures will suffice to give a fair idea of the results to be expected from a plant of this description. A precise estimate would require, in each particular case, a special consideration of the altitude, the above figures being given at sea level, for the sake of simplicity.

It is now in order to briefly substantiate a previous statement, to the effect that the use of compressed air in a hoist instead of the immediate action of an oil engine, while introducing an apparent increase of complication, was not really a cause of reduced efficiency.

It is almost obvious that this higher degree of safety and of elasticity of motion would hardly be justifiable in a case like the one just considered, where less than two tons of ore are to be raised per hour.

We will, therefore, cons der a hoist developing 50 H. P. effective, and built on the direct-acting Corliss type, with compound cylinders, single pipe system, the air being reheated to 300° Fahr. prior to entering the high power cylinder, and also on its passage from this one to the low power cylinder, expansion practically complete, with seventy pounds initial pressure and two pounds terminal, both effective.

To operate such a hoist will require the compression of 444 cubic feet of free air per minute, and the motor actuating the two-stage compound compressor will have an effective horse power of 76, showing an efficiency of 0.65, between motor and hoisting work performed, which is likely as well as could be done with a first-class geared hoist directly operated by an oil engine.

In concluding this already too long paper the writer may be permitted to express the hope that the preceding remarks will prove useful to some, at least, of the mine owners who have been depending, for the operation of their properties, on natural resources, which were almost unconsciously considered as unvarying and inexhaustible. It is a happy circumstance, indeed, when the remedy is found side by side with the evil which it has to cure, and in few cases would its application be easier and safer than in the present occurrence.

LARGE deposits of corundum have recently been discovered in the district of Carlow, Ont., which are to be worked by a syndicate of American and Canadian capitalists. The corundum is to be used in a variety of ways for abrasive purposes, and it is believed that aluminum can be produced from it cheaper than from any other source. The syndicate has leased 1200 acres of corundum lands from the Ontario Government, and has agreed to expend before 1902 not less than $100,000 in opening the deposits and in the erection of machinery.

Winter Navigation on the Great Lakes.

In view of the difficulty in shipping sufficient iron ore from the Lake Superior ports during the summer season, an effort is to be made to keep a channel open through winter. Concerning this the *American Manufacturer* says:

It is believed in many quarters that the first step toward ultimate all-year navigation of the great lakes has been taken, and will be experienced the coming winter in slight measure at least. The Great Lakes Towing Co. is having a powerful tug built at the Davidson yards designed to break 12 inches of blue ice at the rate of six or seven miles an hour. It is the intention of the towing company to put the new tug in operation on the Sault river during the closing days of the season if there is any necessity for her before the boats quit running. Agitation of the subject of all-year navigation on the great lakes has been started as a result of the extremely big volume of freight in both directions this season. But there seems to be a question whether winter navigation would be practicable if anything like the range of rates that has prevailed during the biggest part of this season is required to make it profitable. Even now, and for two or three months past, the rates via the lakes has been so high that grain has been diverted to the all-rail routes to the seaboard. The same is true of lumber. This commodity is now going to New York and other Eastern points all-rail. There is a growing belief, however, that the all-year navigation of the lakes is bound to come, and in the very near future. It is said that the growing demands of the Northwest are beginning to demand it. It would be comparatively easy, in times of high freights like the present, for the vessel interests to stand an additional cost that would likely be incurred in keeping the harbors and connecting waters open for at least thirty days on the end of the season. It is said that the open season of navigation can be extended to nine months a year at least by the use of a few first-class ice-breaking tugs heavy enough to stand the work of going through ice a foot thick. It is pointed out by a vessel man that the ice will not have a chance to form very quickly if the boats keep moving over the same channels frequently.

Starting a Blast Furnace.

Few people who have not actually run a blast furnace realize what it means to fill the capacious maw of one of those monsters. A stack of 200 tons daily capacity, running on 50% ore, must have delivered to it each day something more than 400 tons of ore, 250 to 300 tons of coke and over 100 tons of limestone, besides sand, coal and minor supplies—say 900 tons raw material. Add the 200 tons of pig iron product shipped out, and we have a daily freight movement of 1100 tons, taking no note of the disposition of the slag. The mining of the ore requires the labor of 150 to 300 men, the coal mining, coke making, quarrying of limestone and transportation at least 300 more. The furnace itself employs about 150 or more hands. Starting up a furnace of ordinary capacity, therefore, calls immediately for the labor of nearly 1000 men; for the use of at least 1000 railway cars and many locomotives; for perhaps several steamers and vessels on the lakes; for capital, from the mines to the pig iron, of one million to two millions of dollars and last, but not least, for a high order of managing ability.—Engineering Magazine.

Too Much Gold.

The following interesting statement appears in a technical paper on the mining regions of Peru, by Senor Manuel Elguera. The method employed is wholly novel and either the results or the wants of the operators are unusual:

In the north of Peru, about two years ago, I crossed the Maranon, the Chinchipe and other rivers, and gold is found in every one. In many of these the Indians have what they call a farm, which is made by paving the river banks with stones, and then leaving it till the next rainy season is over, when they return to these farms and remove the stones, washing the earth which has deposited itself in the crevices between the stones, and, by the aid of mercury, they collect the gold they need, and many of them throw the gold they do not need to carry back into the river.

LONG years of active life in the mines does not insure against the liability to accident. As a matter of fact, many old miners are injured or killed where novices would escape unharmed. Constant familiarity with danger has a tendency to make miners take unnecessary risks, with often fatal consequences.

Mining Summary.

ALASKA.

In the Ketchikan district, Gravina island, arrangements have been made by a number of companies to continue work during winter. Among them are W. H. Gilmore & Co., Deer Park and the Rossland M. Co. The latter company is putting in a steam hoist on the Dall property. They are down 55 feet and at 100 feet will crosscut. They are taking out copper ore, and are on the south end of Gravina island, six miles from Metlakahtla. Gilmore & Co. will begin work with two shifts and will keep it up all winter. They are one mile from Seal bay.

On Prince of Wales island the Lichtenstater mines, consisting of fifteen claims, have a large body of copper ore which is developed superficially.

On the Copper Queen, on Kassan bay, the owners are sinking a shaft and will operate all winter.

At Helm bay, Dyer & Johnson are building a 5-stamp mill. They are in 160 feet and have been taking out rich ore.

A strike is reported at Cape Camani, Cleveland peninsula, five miles from Helm bay.

At the Sea Level mine another body of ore has been found.

On Dall island, south end of Prince of Wales, E. E Wyman and partner are operating and report that they have struck high-grade copper ore. They have been at work all summer.

The new part of Ketchikan is building up and joining the old part. Thirty new buildings have gone up in the last month.

ARIZONA.

COCHISE COUNTY.

The Commonwealth mine at Pearce is running twenty stamps and two pulverizers. An addition of thirty stamps to the plant is about completed, which will give a daily capacity of 200 tons. Steam power, generated by coal, is used. Formerly the higher grade ore was shipped but the practise was discontinued some months ago, and hereafter all ores will be treated at the works. This mine was bought by R. A. F. Penrose for himself and friends, for $275,000, when the mine was in the prospective stage. The mine returned to the investors considerably above this sum within the first three months, without any outlay for machinery other than an inexpensive whim. Since then it has produced a very large amount. Mr. Penrose made an exhaustive geological report on the Cripple Creek district for the United States Geological Survey, and recognized the great value in the Commonwealth mine when a mere prospect.

GRAHAM COUNTY.

(Special Correspondence.)—From Globe to Clifton and Morenci, the Gila Valley, Globe & Northern Railway passes through the Gila valley. Although but twenty years old, the Gila valley is a prosperous farming district by reason of its irrigating canals and such markets as only live mining camps afford. Ranchmen live in handsome brick houses, and every village boasts a brick schoolhouse costing from $5000 to $10,000. The towns of Geronimo, Fort Thomas, Pima, Central, Thatcher, Safford and Solomonville are all prosperous, owing to the demand for productions of the valley at Globe, Clifton, Morenci and the new mines being opened on the San Carlos strip, the Graham mountains on the west and the Lone Star district on the east.

Clifton is the oldest and still one of the best copper mining districts in Arizona. The Gila river flows down through the canyon between immense cliffs, from which the town took its name. It is built upon both banks of the river and is connected by a wire suspension bridge for foot passengers.

The copper mines near here were discovered in 1872 by prospectors from Silver City, New Mexico. The Longfellow was the richest mine discovered, and it, together with some other properties, was subsequently sold to Lesinsky Bros., merchants at Silver City, who built the first furnace (made of adobe) and produced the first black copper made in Arizona. The ore, being self-fluxing, required nothing but fuel and blast. The copper was shipped by teams to Las Cruces, New Mexico, 600 miles, at that time the nearest railroad connection. It was no unusual thing for teams and drivers never to be heard of again, being raided by Apaches. It was here that the first tramway was built in Arizona, connecting Clifton with the Longfellow, and subsequently with Morenci. Its gauge is 20 inches.

In 1882 Messrs. Lesinsky sold their property to the present company, known as the Arizona Copper Co. and composed of Scotch capitalists. This company began the construction of a narrow gauge railway, which is seventy-one miles in length.

In the meantime water jacket furnaces had been constructed to treat the rich ores found in the limestone contacts, but made no provision for treatment of the low-grade ores, of which there were great quantities. The low price of copper and the exhaustion of the high-grade ore resulted in the building of a leaching plant in 1894, which was designed and perfected by James Colquhoun, the manager of the company. The process is secret, but a success. Every day, except when shut down for repairs, this plant treats 150 tons of tailings. This company also manufactures bluestone and sulphuric acid directly from the sulphide ores.

The mines of the company, which are from four to ten miles from the plant, contain ores which vary so much in character that different methods of treatment are employed. In addition to the leaching process a concentrator with a capacity of 450 tons per day is in operation, and the foundation for another concentrating plant is being laid. A Huntington mill, Frue vanners and Wilfley concentrating tables are also in use. Gas engines with a capacity of 600 to 700 H. P. furnish the power for the Bessemer plant and other machinery.

A large chimney or pipe is to be constructed up the mountain side to catch the small percentage of metal escaping in fumes, and the tailings which were obstructing the river are to be elevated and flumed farther down the stream. The altitude of Clifton is 3400 feet, the mines are 6000 to 7000 feet above the sea, the ore coming down a gravity tramway. While the low-grade ores yield only a little over 3% copper, the output at present approximates 1000 tons of metallic copper per month.

At Morenci, seven miles away, are the mines of the Arizona Copper Co. and also those of the Detroit Copper Co., owned by Phelps, Dodge & Co. of New York, and of which Prof. James Douglas is president.

Here a new concentrating plant with a capacity of 500 tons per day is nearing completion and will be in operation by Jan. 1st next. It is being built by the Detroit Copper Co., being the largest in the Southwest. Under its roof is machinery from San Francisco, Denver, Chicago and Pittsburg, and some built in England. There are thirty-two jigs and twenty-eight 6-foot vanners. It is constructed in such manner as to permit one-half of it to be shut down while the other half is running. The pump will bring the water from six miles away and lift 1400 gallons per minute to an elevation of 1500 feet. Below the mill tanks have been constructed to catch the waste water, which, after settling, is again pumped to the top of the mill and reused. G. E. Hunt is superintendent of construction of this new mill. When completed it will have cost $90,000.

The Markeen Copper Co., owned by New York capitalists and superintended by Leopold Balbach, is opening a promising copper property near the old Copper King.

Clifton, Nov. 29th, '99.

MOJAVE COUNTY.

The Tennessee mine at Chloride has 6 feet of 100 ounce silver ore.

In the course of development work on the Midnight mine at Chloride rich gold and silver ore is being found.

YAVAPAI COUNTY.

(Special Correspondence).—The American group of gold mines on a tributary of Castle creek, five miles southeast of the Ryland mine, is being worked by Eastern people under the management of Dr. Ford of Phœnix.

Col. Christie is in charge of the Whipsaw group on the west side of Castle creek, near the American group. Thomas Farish, who is interested in this property, says the company contemplates putting in a smelter.

The Mammoth group, formerly owned by Robert Groom, and the Swallow, at the head of Buzzard Roost gulch, the latter owned by Duncan & Heisey, of Pittsburg, Pa., and managed by Mr. Large, are also working.

K. Barrett is operating a mine in Buzzard Roost, a few miles west of the American mines.

Briggs, Ariz., Nov. 25th, '99.

Extensive developments at the depth of 2500 feet in the Congress mine are reported to have greatly increased the ore reserves in that mine,

A 20-ton mill run from one of H. T. Winston's mines at Placeritas, near Antelope Hill, averaged over $60 a ton.

A shoot of rich copper ore, carrying gold values, was encountered in level No. 2 of the Homestake mine, 120 feet below the surface. This mine is on the Big Bug and is owned by Block & Gray. The mine heretofore has been producing gold, silver and lead.

The mines, works and railroad of the United Verde Copper Co. at Jerome will be sold at auction in New York City Dec. 19. The sale will include all of the property of the company at Jerome and the issue of the stock and bonds of the United Verde & Pacific Railway, consisting of 300 shares of stock, $100 par, and 300 first mortgage bonds, $1000 par, payable Jan. 1st, 1920, with interest at 6%. The sale is for the purpose of a reorganization of the company under the laws of West Virginia with a capital of $3,000,000 stock and $3,000,000 bonds. It is now organized under the laws of New York.

CALIFORNIA.

Amador.

At the Oneida mine, between Sutter Creek and Jackson, the old 1000-foot shaft is being cleaned out and retimbered, while sinking in the new vertical shaft continues below 2100 feet.

A milling test of 357 tons of ore from the Central Eureka mine at Sutter Creek, made in the Zeila mill at Jackson has gone about $100 per ton. The shaft is down 1635 feet and 250 feet of this is in the ore shoot. Plans are being made for a new hoist and mill. W. R. Thomas, who was the active spirit in reopening the mine, is Supt.

An inclined shaft is being sunk by W. Stewart near Butte City to open the gravel deposit in Butte basin.

The Potazuba mine, at Sutter Creek, is to sink 500 feet deeper, and is reported will put in heavier machinery.

The Lincoln shaft, above Sutter Creek, is down over 1250 feet. A station is to be cut and levels run at the 1250.

Development at the copper mine at Ranlett, between Ione and Jackson, is progressing on the 100, 200 and 300 levels. The smelter will not be blown in until a large amount of ore is on the dump.

Calaveras.

The Royal Con. mine at Hodson, in Salt Spring valley, is dropping forty stamps. It is reported that a large addition is to be made to the mill, which is to be run by electricity.

The Ellen Vannan gravel mine, six miles northeast of San Andreas, is being worked with eighteen men. Mgr. Jackson has crosscut the channel and has commenced breasting. Four stamps are working and eight men are to be employed when sufficient ground is open to supply the gravel.

The Santa Ana mine, on Albany flat, three and a half miles south of Angels, has been opened to a depth of 900 feet and extensive development work done. It has been decided that the prospect does not justify further development, and the mine has been abandoned and the machinery is being removed. This vein occurs in massive diabase, which shows little of the effect of shearing and movement which is so pronounced a feature of the better mines of the gold belt in greenstone. The vein is variable in width and splits up occasionally, but was never heavily mineralized or rich. Whether this may be considered as an anomaly cannot be determined until other veins of similar character in the vicinity are opened. Its development proves it different at least from the mines which pay, though some of the veins possessing the characteristics supposed to be essential of a paying mine do not pay.

San Andreas *Citizen*: The new vein found in the 100-foot level of the Ford mine, at San Andreas, is being followed by Supt. Knight, and has been uncovered for 20 feet and is increasing in width. The vein is nearly 2 feet wide and rich in gold. Mr. Knight will crosscut for it on the 300-foot level. Later on the Ford will be opened toward the north, in which direction there has been no development in the past.

El Dorado.

The mill at the Oro Fino mine in Big canyon has been repaired and the chlorination plant put in order, preparatory to resumption of work on the mine, owned by Haywards & Lane. The shaft is to be deepened.

Inyo.

The sale of the Reward mine, near Independence, to H. H. Douglas and others of Los Angeles, Cal., is reported. There are 50,000 tons of ore blocked out. The fifty-ton cyanide plant now working Reward tailings will be bought by the new owners and maintained in operation. The mine has paid well heretofore. An air compressor and drills will be put in.

The Kearsage mine, near Independence, which has been idle a long time, is to be reopened. It is said that there is a large amount of $10 ore in sight, which will be treated by cyanide. The dumps containing 10,000 tons of ore will also pay to cyanide.

A 5-stamp mill and boiler have been moved from Randsburg to Pleasant canyon for the Radcliffe mine at Ballarat.

Kern.

(Special Correspondence).—The Kern river oil district is ten miles northeast of Bakersfield, in the edge of the Sierra foothills, and has recently come into prominence from numerous discoveries made there. The degree of its productiveness has not yet been determined.

The first discovery in the district was made by the Elwoods and George Wiseman. They had noticed indications of oil in the precipitous sandstone cliff on the north bank of the Kern river, and began a prospect hole with pick and shovel, about 50 feet from the edge of the cliff, and at a depth of 75 feet struck oil in limited quantity. Later—the 1st of last June—they began sinking a well at another point with crude apparatus, and struck oil at 46 feet. Continuing, they secured a better quality of oil at 200 feet. At a depth of 346 feet they struck oil sand and secured a flowing well. This is the pioneer well of the district. Its output is now about five barrels per day. It is a very heavy oil—specific gravity 15 Baume. It is too thick to flow readily, and is forced out of the casing in frequent gushes by gas from the underground reservoir. Locations and developments followed rapidly. The Petroleum Development Co., headed by Doheny, Butler and others, has three productive wells within 100 feet of the Elwood gusher. This company have just completed a tank of 1000 barrels capacity, their smaller tanks being full to overflowing. This company sells oil to the other outfits of the district, but as they have begun pumping from a new well within the past week they will soon be obliged to make arrangements for shipping their product. The Treadwell Oil Co. have finished sinking, and they will also begin pumping as soon as they have tankage facilities. The oil in these latter wells is lighter than that from the Elwood, and consequently more easily handled.

The Kern Oil Co., the Imperial Oil Co. and the Reed Oil Co. have two or more wells each in the order named, stretching northward from the locality above described.

In every case the workmen have struck sand permeated with oil, which shows that the oil belt extends at least three miles back from Kern river. Experts claim that the belt extends to and beyond Poso creek, several miles farther, and derricks are in position, waiting for outfits, along this entire hill territory. A. G. Newton has erected a derrick and has an outfit at work two or more miles from the hills, out upon the plains. More than ordinary interest attaches to his operations, and developments at this location are anxiously awaited. Thus far no great producing well has been struck in the Kern river district, but that oil exists in quantities to repay investment has been clearly demonstrated, and it will soon become an exporting section of fuel oil.

Bakersfield, Dec. 5th, '99.

The cyanide plant which has been operated at Cuddabock lake has been moved to the Black Hawk mine, where there are 1500 tons of tailings. Five more stamps are to be added to the Black Hawk mill when arrangements have been made to secure sufficient water.

At Randsburg the Red Dog mill has sufficient ore in sight to run continuously for three months.

Seventeen tons of ore from the Butte mine at Randsburg returned about $1800 in gold. The Napoleon is producing $100 ore, and the Wedge claim is sending up high-grade rock.

The new gasoline hoist of 130 H. P. has been installed at the Trilby mine. It is located underground 1000 feet from the mouth of the tunnel. Sinking is in progress, the shaft being down over 200 feet. The Trilby vein is 60 to 80 feet wide, and it has been opened 700 feet in length.

The Crœsus M. Co. has incorporated at Johannesburg; capital stock $10,000, all subscribed.

Congressman Needham says he has induced the General Land Commissioner "to suspend entry upon all lands which have been described in letters and telegrams," but does not vouchsafe information as to what "lands" those are.

Lassen.

The Golden Eagle mine is outputting eighty tons of ore daily. It is managed by Dr. Schloesser.

The Fairview Co. has built a steam hoist at its mine.

Mariposa.

Capt. A. H. Ward is again working the Pinon Blanco, three miles from Coulterville.

A mill is being built on the Alice Clark mine, near Coulterville.

Work has been resumed on the Quartz Mountain mine, two and one-half miles west of Hornitos.

Nevada.

The Pennsylvania M. Co. of Grass Valley have bought the Liberty Hill and Noon Summer mines, lying between the Pennsylvania and the W. Y. O. D. Veins of ore of good grade have been developed in a superficial way on the two claims mentioned. The purchase is said to add largely to the value of the Pennsylvania property.

It is reported Mr. Turner will build a 20-stamp mill at the Coe mine, near Grass Valley.

Placer.

A. Clarke has driven a tunnel into Georgia Hill, near Yankee Jim's, 500 feet, and finding he was too high to reach the channel he had started to reach, he has sunk an incline on the vein 60 feet deep and is still sinking, though contending with water. Hydraulic ejectors are employed in raising water from the slope.

The Boston & South Dakota Mining Co. have secured 1700 acres on the Forest Hill divide, near Michigan Bluff, including the Weske and Manhattan channels, which were rich when worked in former years. A channel which has never been worked has been discovered in an upraise from the Weske channel. The wash, though not large, is heavy and consists wholly of bedrock material, chiefly quartz and the harder metamorphic rocks. It is evidently one of the older channels. It will be developed and worked through the Weske tunnel. J. R. Scupham is in charge.

The recent connection of the workings of the Morning Star mine and the Big Dipper mine on the Morning Star channel near Iowa Hill, mention of which was made herein at the time, led to the belief that these mines were owned by the same company. The Morning Star property recently passed to the control of the Hidden Treasure Company, of which H. T. Power is superindendent, and the Big Dipper mine is owned by the Big Dipper Mining Co., of which Seymour Waterhouse it superintendent.

Plumas.

During the past season A. B. Summers has been developing the Peel mine, in the North Arm of Indian valley. Near the surface the ore has been prospected in a small way for many years. Last spring Mr. Summers and associates bonded the mine and began development. A shaft is down 450 feet, which shows a large ore body. Fifteen men are employed. The ore carries gold and copper, and a mill is being talked of.

Chapman & Macomber are developing the Johnny Bull mine, in North canyon, near Greenville. A double-compartment shaft is down 85 feet. A pipe line will be laid from Round Valley reservoir to secure water power under 400 feet head. The shaft will be sunk 500 feet. In the spring, it is reported, a 10-stamp mill will be built.

San Bernardino.

The Searles Borax Works, which have been idle for a long time, have been started up again by F. M. Smith of the Pacific Coast Borax Co. A large number of men will be employed.

The property of the Pacific Coast Borax Co. is in the east Calico district, about six miles east of the town of Calico. The borax deposits in the company's mines extend along the low hills for several miles, and the principal output is from a large vein of colemanite. The success of this enterprise led others to investigate the rock formations of the district, with the result that near Calico and at another place five miles northwest of Daggett large deposits were found containing borate of lime, not in the recognized form of colemanite, but as a mud shale, upturned by the dynamic forces which have elevated the rocks of the district, and indurated by pressure and weathering. These shales constitute an extensive formation and contain about 10% calcium borate in the form of minute crystals interpenetrating the finely comminuted material of the shales. Stevens & Greer, who own the Calico deposits, have made numerous successful experiments and have produced boracic acid from the shales, proving that the mineral is present in commercially valuable quantities. The deposits near Daggett are similar in character and have been developed to a depth of 200 feet. That this formation extends beneath the desert valley, between the Calico deposits and those near Daggett, there is no reason to doubt. It is reported that an extensive plant will be built at the Daggett mines to extract the boracic acid from the shales. Water will be pumped from Fish ponds on the Mojave river.

San Diego.

The new cyanide plant at Hedges will be in operation on the 15th inst.

A new mining district is being developed near Poway, and a number of claims are lo-

cated. It is called the Vallecitos district. The ore runs from $3 50 to $16 per ton.

The discovery of zinc ore is reported at San Vicente, and on Red hill between Julian and Stonewall it is reported a copper ledge has been discovered. In this vicinity are some interesting rocks similar to the "lustre mottled rocks" of Pumpeily and Irving, in the Lake Superior region. They are mostly norites, gabros and others of similar character.

A company has been organized to reopen and work the Helvetia mine near Julian.

Dr. Stephen Bowers, who has recently visited the kaolin deposits on El Cajon mountain, pronounces the material there to be nearly pure kaolin.

Santa Barbara.

Recently appeared herein an illustrated account of the pumping of oil from under the sea at Summerland. It is now reported from there that the Oxnard M. Co. has struck an asphaltum bed in the ocean while drilling an oil well 400 feet from shore.

Tuolumne.

The Arbona mill, at Tuttletown, recently completed, is running.

The App mine, at Quartz, is being run by electric power.

The Dutch mine, near the App, is run by steam. Twenty stamps are dropping.

Above Jacksonville, the Whitto-Stanley and Clio mines are being opened.

At the Draper mine, near Soulsbyville, a strike is reported. The ore in the new strike runs $300 to $500 per ton. The mine was worked down to the 300 level years ago, and was credited with a production of about $350,000. The shoot pinched and for years the mine remained idle. Three years ago it was reopened and explorations made some distance north of the old shoot, in the lower workings, but nothing of consequence developed. The new shoot has been found under the old one by sinking. Sinking is in progress. G. F. Dyer is Supt.

The new machinery for the Santa Ysabel, at Stent, is at the mine, and the management expect to have the mill in operation by Jan. 1.

A hoisting plant is being put on the Mississippi mine, at Big Oak Flat. The vein is at the lower end of the valley and cuts both slates and granite. It was formerly worked in a small way.

Sinking in the main shaft of the Goldwin mine, on the north fork of Tuolumne river, has ceased until machinery is put in. Under the present conditions it was necessary to bail the water. A new tunnel is being driven up the mountain to tap the vein, in what was originally known as the Philadelphia claim. Near the apex of the mountain there is a shaft 40 feet deep, and the tunnel will reach the vein 100 feet under this. Supt. McClintock expects to reach the vein with a 100-foot tunnel in twenty days.

Trinity.

The main adit of the Brown Bear mine is in 2500 feet. It has been turned from its former course with a view to reaching the ledge more quickly.

COLORADO.

ARAPAHOE COUNTY.

The discovery of placer-bearing ground within a short distance of Denver is reported. It is supposed to be in the former bed of Clear creek.

CLEAR CREEK COUNTY.

A strike is reported from the Newhouse tunnel at Idaho Springs. The pay streak is large and is concentrating ore of high grade. A milling vein is found continuously accompanied by these shoots of smelting ore. There is a question as to the identity of the vein, though it appears to be either the Seaton or the Tropic vein.

In the Chesapeake tunnel, in Yankee hill, the strike made some weeks ago has been opened for 125 feet and the vein still maintains its width and richness, and the pay-streak is now 4 feet wide. This vein is not known on the surface and was found unexpectedly.

GILPIN COUNTY.

Denver *Republican*: For the month ending Nov. 30th there were shipped from the Black Hawk on the Colorado road 5347 tons of ore, the production of this county for November of smelting ore, tailings and concentrates, shipped to outside smelters, and also concentrating ores shipped to the mills at Idaho Springs. During the month smelting ore shipments have fallen off, which may be accounted for by the fact that several of the biggest mines have not been producing their usual amount of ore, owing to improvements and developments under way.——At the Fisk mine on Bobtail hill a small force is working in the upper levels and another force is running a drift from the Gregory to cut under the Fisk shaft which will be completed about Jan. 1st. The drift will cut 90 feet below the shaft, now down 1010 feet, and will drain that property. After the first of the year Manager Stockbridge says they will give employment to a large force.——The Boston & Denver M. & M. Co. is putting in three 100 H. P. boilers and has completed a new building, 40x80 feet. The foundation work for the new 80-stamp mill has been commenced, under superintency of R. T. Owens. A retaining wall is being built, 181 feet long, 18 feet high and 4 feet thick.

GUNNISON COUNTY.

(Special Correspondence).—At the Continental mine a new gasoline hoisting engine is being installed with indicated 12 H. P. A boarding house has been completed at the mine and work is being hurried on shaft house and gallows frame. The shaft will soon be down 100 feet, sinking on one side of the vein, where hard rock has been encountered. This property shipped one car of ore of 9¾ tons that netted over $3000, being the only shipment ever made.

The Midland M. Co. are putting in a new steam hoist and will push work this winter. The mine has good ore, as shown by several shipments made.

At the Gunnison mine sinking is progressing and will soon reach the 300 station, where the vein will be crosscut. At the 200 station a fine body of ore was opened, there being 8 feet of $30 ore and 15 feet of milling ore, besides a 6-inch streak that runs up in the hundreds. The sinking is done with power drills. No work is being done on ore. The management will not work on ore until a depth of 500 feet has been attained.

At the Standard sinking is in progress and a body of good ore is reported to have been cut.

The Tom Boy is working, with plenty of water to keep them busy, and are finding fine ore.

Dr. Weiss of the Good Hope reports a streak of $1000 ore in the lower workings: it is about 3 inches wide, but there are several feet of lower grade ore. He is contemplating a new plant of machinery.

At the Vulcan they are doing a great deal of dead work and send out very little ore at present.

Word comes to-day of a rich strike at the Hathaway, on Cochitopa creek. A man just from the mine reports great masses of rock filled with free gold. The vein is about 5 feet wide.

A story comes to-day from the Lake Fork, near Gravioia, on the Lake City branch of the D. & R. G., where two prospectors are said to have found a vein, supposed to be the source of supply for the placers near by. It is said to be 2 feet wide, very rich and free milling. I am told they have been hunting for this vein for several months.

G. W. Greffey is about to put in a new power drill plant to work the DuBoise tunnel, which is now in 880 feet, and will cut the Pride of Denver vein in about 400 feet more, that being their objective point. The vein shows good values on the surface.

Gunnison, Dec. 2nd, '99.

LAKE COUNTY.

The Greenback mine in Graham Park is making a daily output of 125 tons of iron sulphides and is also shipping copper sulphides and lead ore.

The Resurrection mine is outputting 140 tons daily, which is below the capacity of the mine, but all that cars can be had to handle.

D. B. Jones is shipping the tailings from the Col. Sellers to Mineral Point, Wis., for treatment.

MINERAL COUNTY.

(Special Correspondence.)—The Nelson tunnel at Creede, now in about one and a half miles, is progressing at the rate of 100 feet per month. Thus far it has drained the lower levels of the Amethyst, N. Y., Chance and Last Chance, and is driving toward the grounds of the United Mines Co., still 800 feet away. It passes through the grounds of the Commodore, though the latter uses its own tunnel, which is 35 feet higher than the Nelson.

The water has been pumped out of the eighth level of the United mines, and the latter expect to begin shipping at once.

The Amethyst, Chance and Commodore are the principal shippers from Creede.

Creede, Dec. 4th, '99.

FREMONT COUNTY.

(Special Correspondence).—Dr. F. L. Bartlett, associated with H. L. Hollister of Boston, Mass., has purchased the interests of the American Zinc-Lead Co. west of Chicago, which include the zinc-lead smelter at Canyon City and various mining properties in Colorado and New Mexico. The smelting plant, which has been under the management of Dr. Bartlett for several years, is to be enlarged sufficiently to give it a capacity of 200 to 300 tons of ore per day.

Canyon City, Dec 2nd, '99.

HUERFANO COUNTY.

(Special Correspondence).—La Veta mining district has been organized in this county, taking in a portion of the eastern slope of the Sangre de Christo range. About 100 locations have been made, on some of which copper ores have been found. W. C. Fowler is developing a group of claims in the district for a California company.

La Veta, Dec. 2nd, '99.

TELLER COUNTY.

(Special Correspondence).—Specimens from the Lansing mine of the Pinnacle G. M. Co., on Bull Hill, assayed $102 to the pound, or at the rate of $204,000 per ton.

The Modoc has paid a dividend of 1% per month since August 15, 1899.

The Murphy workings on the Pharmacist recently shipped forty tons of ore valued at $20 per ton.

The Bonanza Queen lease on Iron Clad Hill is reported in ore worth $60 per ton.

For some time the operators of the Advance on Raven Hill have been sinking to catch the Jack Pot vein, opened lower down on the slope of the mountain. Last week a vein was struck at a depth of 432 feet, yielding high grade ore, but it is claimed to be a new vein instead of that of the Jack Pot.

Cripple Creek, Dec. 4th, '99.

Lessees working Eclipse No. 1, near Victor, are reported having made a strike. They have found a rich seam of talc.

At the Little Frank, on Raven hill, the lessees in sinking have struck telluride ore at a depth of 20 feet which runs $100 per ton.

On Beacon hill a strike is reported in the Janet W. mine, where a vein running thirteen ounces per ton has been cut.

The Alert G. M. Co., operating the Hardwood mine, has opened the ore body for 50 feet in width. The new shaft is down 175 feet and a new hoisting plant has been ordered, to replace the small electric hoist now in use. The new plant will be run by steam and have capacity for deep mining. A four-drill air compressor will also be put in.

The Mary Jane fraction of the Advance Co. is producing rich ore. It is black telluride of gold, the values being in the black streaks which are all through the rock. The ore is similar in character to that found in the Lafayette of the Princess Alice Co. and in the Lucky Guss. The ore body dipped into the shaft from the south and is 18 inches wide. The values are equally distributed across the entire 18 inches. Similar ore was found in the workings of the Jack Pot near the line of the Mary Jane fraction.

A new shaft is being sunk on the Doctor mine by the lessees. Upraising from the twelfth level is also in progress to connect with the shaft and another from the tenth to the seventh. These connected will make a rapid record in shaft work. A 6-drill air compressor will be put in to facilitate the work and to supply air to the raises.

Lessees working in a winze 40 feet below the tunnel level of the Mattie D. on Raven hill have struck $400 ore. The vein is 2½ feet wide. A year ago an electric plant was put in by the Ingham Co., which owns the ground and this was removed a few days since. The leasers pay 25% royalty.

The resident manager of the American Smelting & Refining Co. is reported to have notified the ore producers of Cripple Creek that hereafter only $19 per ounce will be allowed for the gold contents of their ores.

IDAHO.

IDAHO COUNTY.

(Special Correspondence).—There is no late news regarding the status of the Big Buffalo deal, although it is reported that Capt. John R. Wood has left Chicago and will take over the property. In the meantime Clark & Sweeny, having purchased the grub-stake suit interest, are standing in the door to see what the Woods Co. will do.

Interest in the Dewey mine, near Mt. Idaho, is growing. It is reported a company will be formed to work the property on a large scale. Sam'l I. Silverman is interested in the deal. The ore body recently struck averaged $70 per ton, and where sinking was commenced on the ore the vein was 25 feet in width. The ore is heavily mineralized, almost massive, fine-grained auriferous pyrites, chalcopyrite, and some free gold. The gangue is quartz. Gold is the principal value, with a nominal amount of silver and 4% copper.

An extensive placer enterprise is about to be inaugurated on Newsome creek, where surveys are in progress under W. H. Hill. A ditch will be brought onto a large tract of gravel lying hundreds of feet above the south fork of Clearwater river, and the main stream of Newsome Creek will be worked with a bedrock flume, and the south fork used for a dump.

Grangeville, Idaho, Nov. 25th, '99.

MICHIGAN.

HOUGHTON COUNTY.

Six hundred tons copper were shipped last week by steamer and navigation is closed. The next copper shipments will move by rail route. Atlantic produced eighty-two tons last week.

After a delay of two weeks, caused by an inflow of water from old workings, No. 1 shaft of the Isle Royale mine is again operating.

ONTONAGON COUNTY.

The Mass mine is raising rich copper rock from the Butler lode. Further development is awaited with interest.

NEVADA.

HUMBOLDT COUNTY.

C. H. Norton of Winnemucca has sold the Wandering Boy copper mine, near Winnemucca, for $75,000.

ELKO COUNTY.

The Young American Co. has equipped its mine with gasoline hoist, pumping plant and 10-stamp mill. The ores are low grade, but there is an abundance of them.

NEW MEXICO.

BERNALILLO COUNTY.

(Special Correspondence)—J. H. Montgomery of Denver, Colo, has investigated the proposition to erect a 100-ton smelter at Albuquerque, and is said to have made proposals to the business men of the latter place, in which he offers to organize a stock company to erect the plant and asks them to take 100,000 of a proposed issue of 300,000 shares of stock and furnish site for buildings.

Albuquerque, Dec. 4th, '99.

The Union Mining Co., of Milwaukee, Wis., has bought the Union mine, at Bland, for $20,000.

OREGON.

George K. Quine is shipping nickel ore from Riddles to the station East. He says there is a prospect for the resumption of work.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Hardin shaft on Two-bit gulch has been idle for a year and filled with water. When the mine was shut down the pump was left in the bottom. Last week baling was commenced, and after lowering the water to within 100 feet of the pump, a successful attempt was made to start the pump. The shaft is unwatered and mining resumed, the ore being hauled to Deadwood smelters.

The Tax Title (formerly Old Sam) mine at the head of Bobtail gulch, adjoining Grantz' Hidden Fortune mine, is to be worked by leasers.

PENNINGTON COUNTY.

Eight miles west of Rochford is a belt of siliceous manganese ores about 1½ miles in width. It carries values in gold from $3 to $8 and a small amount of silver. Development work is in progress.

UTAH.

JUAB COUNTY.

The Centennial-Eureka mine, at Eureka, is said to be netting $1000 daily on shipments of fifty tons of rock. Ore running less than $20 is left in the mine.

A suit pending between Stone et al. vs. the Silver City M. Co., involving title to the Jennie and Dubie claims, has been settled out of court.

A strike of ore rich in chloride of silver has been made in the Godiva shaft at a depth of 540 feet.

The Iron Blossom Con. M. Co. was recently incorporated to operate the Excelsior, Iron Blossom, Wild Winter, Little Chief and Little Giant mines, adjoining the Governor, Boss Tweed, Wolf and Santaquin, and is sinking a shaft. The Iron Blossom is an extension of the Dragon Iron ledge and embraces within its lines a large iron blowout almost identical to that of the Dragon Iron mine. Years ago the Iron Blossom and Excelsior shipped iron ore to the valley smelters for flux, the ore often running high in gold.

SALT LAKE COUNTY.

It is reported from Dry canyon that in the Mono mine the vein has been recovered. The ores assay 8 7% copper, twenty-seven ounces silver and 25% lead. The ore is principally galena, of which a fair body has been exposed. Matt Gisborn, who has owned the mine for years, was one of the original owners. At the time of its discovery the Mono was very rich. It was sold to a company by Mr. Gisborn. Then the vein was cut off by a porphyry dyke and disappeared. Two years ago it again came into possession of Mr. Gisborn. Since that time he has driven the main tunnel until, at a distance of 2240 feet, it has broken into the vein. Between the point at which the vein was recovered and that at which it disappeared is nearly 1000 feet.

TOOELE COUNTY.

J. B. Weimer has bonded the Queen of Sheba and Jumbo mines, in Deep Creek district, for two years. These properties consist of nineteen claims, located on the west slope of Ibapah range, and are about 1¾ miles apart. The Jessie Weimer group consists of eleven locations, which gives Mr. Weimer control of thirty claims, all of which are traversed by veins, in which are shoots, 4 feet in width, showing an average of $120 per ton in gold and silver. One ledge of considerable width for several hundred feet shows an average of $7 per ton.

UINTAH COUNTY.

Capt. J. A. Eade, representing the Leiter Co. of Chicago, Ill., says the shipment of elaterite will begin this month. During the last few days he has received instructions from the Eastern management to dispatch the material as rapidly as it can be mined.

WASHINGTON.

FERRY COUNTY.

(Special Correspondence)—A gasoline hoist has been installed on the Black Bear mine, on Palmer Mountain, raising ore from the 150-foot level.

Considerable work is being done in the comparatively new camp of Myer's Creek. A bond has been taken on the Copper Queen claim for $60,000, payments distributed over one year.

Assessment work has uncovered the richest surface showing of copper ore yet found in Belcher Camp, on a small fraction called Lucky Boy.

Copper King group of four claims, near Keller, on south half of the Reservation, has been bonded for $30,000, on one year's time, by J. P. Harvey, T. Clark and associates.

The Republic mine is preparing plans for a 200-ton mill, with possible later enlargement to 1000 tons capacity. In the meantime ore will be shipped to the Trail smelter as soon as the wagon roads are passable, in order to continue monthly dividends. The new mill will probably roast the ore and treat by cyanide leaching process. The old mill is being used for experimental work along this line. Canadian capitalists, who are largely interested in the Republic mine, have purchased control of the Quilp, and are negotiating for several other of the best properties of Republic Camp, all possessing large bodies of quartz, averaging $15 to $30.

The Golden Harvest has acquired two new claims, and will use them as a tunnel site for driving a new 600-foot tunnel, under the management of F. X. Gauthier.

A contract has been let and work started on a 200-foot shaft on the Merrimac, the south extension of the Mountain Lion.

The Liberty has started work again, having uncovered a new ledge crossing their ground from the Palo Alto.

Work on the new 100-ton mill for the Mountain Lion mine is almost at a standstill owing to the difficulty of getting heavy machinery hauled over almost impassable roads. The mill building and hoist are completed, and work in sinking to the 1000-foot level and drifting from the 500-foot level still continues.

The ledge on the Hillside has been cut by a tunnel. It is supposed to be the extension of the Mountain Lion.

The Tom Thumb has a shoot of ore assaying up to $300. Surface assays on this property never exceeded from $2 to $5 in gold.

The Bonanza mine, near Bossburg, and the Deer Trail No 2, in Cedar canyon, continue to pay small monthly dividends.

Republic, Wash, Nov. 28th, '99

OKANOGAN COUNTY.

The El Dorado mine on Douglas mountain has been incorporated The ore contains copper and gold. Development will be continued through winter.

WYOMING.

(Special Correspondence).—Battle Lake district is south from Fort Steele and about nine miles north of the Colorado state line. A number of properties are being developed, from four of which small shipments have been made. The ores are a copper and iron sul-

phide, carrying principal values in copper, which lie in a contact ledge.

Fort Steele, Dec. 3d, '99.

LARAMIE COUNTY.

The mines of the Hartville district are active. Two railroads are building into the district. The ores are copper and iron. The Colorado Iron & Fuel Co. is largely interested in the district.

CARBON COUNTY.

The Eureka copper mine near Grand Encampment has passed to the control of a syndicate of Denver, Chicago, Boston and Baltimore men.

FOREIGN.

AUSTRALIA.

The new shaft of the Mount Morgan Con. mine in Queensland is being sunk in serpentine. It is down over 100 feet.

The discovery of a new tin mining district in New South Wales, near Candl, is reported. Stream tin is being sluiced and the ore has also been found in veins of quartz traversing granite and porphyry.

The deepest shaft on the Broken Hill lode is 1000 feet deep. At that level the ore body is 40 feet wide and assays 13% lead, 17% zinc, 1½ dwts. gold and 69 ounces silver per ton.

A company has been organized to work the Macquarie river by dredging.

The directors of the Sulphide Corporation, Cockle Creek Works, near Newcastle, says the London *Mining Journal*, are following a very active policy. They own the Central Broken Hill silver-lead mine, and they are endeavoring to purchase copper and lead mines all over New South Wales. They are also going into coke making, and in two months expect to start operations with twenty-five new coke furnaces. Owing to the great development of smelting operations in Queensland, Tasmania and New South Wales there is a great demand for coke.

It is reported in Sydney that a find of gold and silver at Tabrabucca, midway between the Sofala and Mudgee gold fields, has been made. The lode is 14 feet wide, and assays ten ounces gold and thirty ounces silver per ton. A rush has set in and land is being pegged in all directions. The country is composed of schists and igneous rocks, and is very mountainous. It has been little prospected, although the rivers and streams taking their rise in it have for many years yielded large quantities of gold. The new find is approached either from Bathurst, via Wattle Flat and Sofala, or by the main road from Capertee, twenty-three miles northeast.

LOWER CALIFORNIA.

At the mining camp of Alamo a strike is reported in the Avalina mine, owned by J. Guyette. The claim is west of the main camp of Alamo, near the El Paso mill site, at the base of Mount Tomaso. Other good strikes have been made recently in the same locality.

A company of Pittsburg capitalists is working the San David, Telemaco and Ulysses claims, formerly owned by the Princesa Co., and have ninety men employed under Supt. G. P. Brown.

J. M. Albright and T. Kneale of San Diego are working the tailings of the Princesa mine by the cyanide process. The dump contained in the neighborhood of 5000 tons.

MEXICO.

The mining town of Mapimi, Durango, recently celebrated its three hundredth anniversary.

SOUTH AFRICA.

The output of 17,846 ounces of gold in October from the Transvaal mines, reported from Pretoria last week, compares with 400,791 ounces in the same month of 1898, with 274,175 in October, 1897, with 199,889 in 1896, and with 192,652 in 1895. The smallest output in recent years was in February, 1893, when only 93,252 ounces was produced. Last month's decrease in value of output, as compared with September, is approximately $8,000,000.

TASMANIA.

The Mount Lyell mine is producing 5000 tons of ore weekly. The cut from the Gormanston side of the Big Blow is through the top of the hill, and shortens the distance that overburden has to be trammed. At the reduction works from nine to eleven furnaces have been in operation. The railway extension to Strahan is completed.

Commercial Paragraphs.

THE Babcock & Wilcox Co. will build a $1,000,000 boiler plant at Bayonne, N. J.

THE Denver Engineering Works Co. of Denver, Colo., have a contract for a smelting plant for Carlos Reite, Mapimi, Mexico.

A HUGE Gates crusher has been put in operation near Truckee, Cal., by the S. P. Co. to make stone ballast for that section of the road.

THE Stilwell-Bierce & Smith-Vaile Co. of Dayton, O., recently shipped through its New York office a large Victor turbine water wheel to New Zealand.

MR. DORKS, representing the Hercules Gas Engine Co. of San Francisco, is installing a gasoline hoist and pumping plant for the Young America Co., at Tuscarora, Nev.

FRASER & CHALMERS have sold one of their patent adjustable Comet crushers to the Momence Stone Co., Momence, Ill. This crusher has capacity of 200 tons per hour crushed to 2½-inch ring.

THE Jeanesville Iron Works Co. have a telegraphic order from Red Bluff, Mont., for a 22x10x18-inch mining pump; also 16x10x12-inch from Salt Lake City, Utah. The company reports that the compound condensing 800-foot lift pump for the Vindicator mines at Independence, Colorado, was shipped last week.

Industrial Notes.

—Washington will mine 2,000,000 tons coal this year.

—Portland, Or., thinks it needs a dry dock and a smelter.

—Honolulu is importing hewed cedar ties from Washington.

—Rossland, B. C., expects to get a $100,000 Government building in 1900.

—About 600 coal miners have struck for increased wages at Diamondville, Wyoming.

—Mexico is monthly sending 15,000 pounds of rubber to the United States, at 40 cents per pound.

—A motor stagecoach is being built at Vancouver, B. C., to be operated on the Ashcroft-Cariboo road.

—In '98 Colorado coal miners were paying diggers 65 cents per ton; now they are paying from 75 cents to $1.

—The S. P. Co. is credited with intention to build a cut-off across Great Salt Lake, from Lincoln to Ogden, Utah.

—R. E. Moody of Portland, Or., has bought the Grants Pass, Or., Water Co.'s plant, and will spend $10,000 in betterments.

—The Chicago, Burlington & Quincy Ry. Co. has voluntarily increased the wages of its engineers, firemen and switchmen about 10%.

—American manufacturers are selling to the outside world over $100,000,000 worth of iron and steel in excess of any earlier year in their history.

—Liverpool, England, figures that the South African demand for horses therefrom will at last admit the operation of electric railroads therein.

—A $25,000 refinery has been put in at the Sunset Oil Co.'s works, Sunset, Cal., where the entire output will be refined and distillates manufactured.

—The Middle Terminal and Florence & Cripple Creek railroads, the La Bella Water, Mill & Power Co, the Metallic Extraction Works and the Colorado Trading & Transfer Co., of Cripple Creek, Colo., have consolidated.

—For years there has been a standing reward offered by the Nebraska Legislature of $4000 for the discovery of a marketable vein of soft coal, 26 inches thick, in that State. A discovery, on which the reward is claimed, is reported in Decotah county.

—The contemplated advance in Chicago-Atlantic seaboard rates of 15%, which is expected to become effective January 1, will not affect through freight rates from Pacific coast points, unless the Eastern tariff is revised by the Interstate Commerce Commission.

—Albuquerque, N. M., has the record of the greatest number of sunshiny days in the year of any town on the American continent. Santa Barbara, Cal., has the record of the most equable temperature, and Neah bay, on the Washington coast, the greatest annual rainfall.

—A bill has been introduced in the U. S. Senate for the construction of a Pacific cable by the Navy Department, to be operated by the Postoffice Department, and appropriating $11,000,000 for this purpose. It is to run from San Francisco to Manila, via Honolulu, the Midway islands, Guam and Iloilo.

—A pending amendment to United States coinage laws reduces the standard weight of the unit of value from 25.8 to 25⅝ grains in the gold dollar, 900 fine, and makes all gold bullion of equal quantity and quality legal tender, as though coined. The amendment degrades the greenback to the position of a warehouse certificate which can be exchanged for gold.

—Stockmen may file on 160-acre tracts of land for reservoir sites. The fee is $3 for each filing. One may hold the land for two years, at the end of which time a reservoir must have been built on each 160-acre tract. If the reservoirs are built, and contain water, then the holder of the land, without further fees, files an affidavit each year, and thereby holds the land.

—The Kaslo & Slocan Ry. Co. has 350 men at work on its line from the head of Kootenay lake, B. C. That road is now building up on one side of the Duncan river. The Canadian Pacific has been constructing a parallel line across the stream. The Canadian Pacific Railroad outfit has suspended work for the winter. The Kaslo & Slocan people are pushing steadily ahead to reach the summit.

—All but one of the Australian colonies have now given their adhesion to the proposals for federation and the establishment of the Commonwealth of Australia. The sixth —Western Australia—is about to take its referendum vote on the question, and as there is little doubt that the answer will be in the affirmative, hardly a year is likely to elapse before the election of a federal parliament.

—Years ago on the Mississippi was an unwritten law that allowed steamboats to take wood wherever it was found convenient when needed, if they compensated the owner. Railroads now appropriate coal on their line in transit the same way. A Kansas mine operator says: "I start a car of coal to Wichita and it is just as liable as not to turn up next morning, or what it left of it, in the tender of a locomotive in St. Louis." One road is said to have on its side tracks at Kansas City, Kansas, 1000 cars of coal which it has thus "commandeered" in the last thirty days, and other roads have their side-tracks crowded with coal.

Personal.

T. A. RICKARD has returned from London to Denver, Colo.

CHAS. WARD RAYMOND of El Dorado county, Cal., is in San Francisco.

E. BOYCE, Pres. Western Federation of Miners, is now in Butte, Montana.

F. W. BRADLEY has returned from Grass Valley, Cal., to San Francisco.

J. W. HANSON of the San Francisco Giant Powder Co. is in Tucson, Arizona.

C. H. MCINTOSH of British Columbia is examining mining property at Sumpter, Or.

DR. F. P. HICKS, a Tacoma, Wash., mining man, has returned from Ketchikan, Alaska.

CHAS. DYER is the new Mgr. of the D. & R. G. Ry., with headquarters at Denver, Colo.

HERMAN LANDAU succeeds Jas. Judd as chairman Associated Gold Mines of Western Australia.

L. S. J. HUNT, an American miner with large concessions in Korea, has returned to San Francisco.

W. H. HONNOLD, formerly of Calaveras Co., Cal., is now Mgr. Coronado mine, Metcalf, Arizona.

DUDLEY GRAY is collecting Cripple Creek, Colo., gold ore as specimens for exhibition at the Paris Exposition.

W. J. CLARKE, foreign Mgr. of the General Electric Co., expects to return from South America next month.

H. D. CRIPPEN of the Jackson Drill & Mfg. Co. of Denver, Colo, has returned from a trip through New Mexico.

J. G. B. HOLLINGSHEAD of Montana is examining California copper properties for the Butte & Boston M. Co.

G. H. KINGSWELL and W. H. Shockley have finished a mineral survey in the Chinese provinces of Shensi and Shansi.

G. W. BLOOD, formerly Supt. Big Dipper mine, near Iowa Hill, Cal., is now Supt. of the Ontario mills, at Park City, Utah.

D. JUTTON, formerly Supt. of the Royal Con. mine at Calaveras county, Cal., is to assume charge of the Womble mine near Royal.

JNO. M. WRIGHT succeeds A. H. Ricketts in the chairmanship of the Mineral Lands Committee of the California Miners' Association.

ARTHUR WILLSON, who left Radersburg, Montana, for Cecil Rhodes' South African kingdom, is now at the De Beers mine, Salisbury, S. A.

D. C. JACKLING, who for some time past has been Supt. of De Lamar's Golden Gate Mill at Mercur, Utah, has accepted the superintendency of the Republic M. Co. at Republic, Wash.

GEORGE W. DICKIE, of the Union Iron Works in San Francisco, recently in New York, at a meeting of the Society of Naval Engineers, predicted that within a few years would be built on the Pacific coast steel ships 1000 feet long.

E. D. PORTER of Joplin, Mo., Pres. Zinc Miners' Association, talking of the decline in spelter, says he sees no hope for an immediate improvement in the spelter market. He thinks that spelter, being a subsidiary metal, and 60% of it being used for galvanizing purposes, will have to suffer on account of the scarcity of iron.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC WEIGHING MACHINE.—E. Hanak, San Francisco, Cal., assignor to the Union Scale & Manufacturing Co., Sacramento, Cal. No. 637,989. Dated Nov. 28, 1899. This invention is designed to weigh materials such as coffee and other granular or powdered substances which will flow by gravitation. It consists in the connection with a source of supply of a measuring chamber into which the material flows by gravitation, said chamber having means for adjustment whereby its size can be regulated according to the density of the material to be measured. It is provided with alternately closing and opening inlet and discharge gates above and below, a weighing receptacle into which the material is discharged in bulk from the measuring chamber in quantities less than the exact amount to be weighed. In conjunction with this is a chute with controlling gate through which a small quantity of the material is allowed to flow after the main portion has been delivered until the scale which carries the weighing receiver tilts. A controlling electromagnetic device is actuated by this tilting, and incidentally closes the supply gate, and at the same time a discharge gate at the bottom is opened and the apparatus returns to its normal position. This breaks the electric circuit and the discharge gate is closed by a counterbalance weight and the supply gate is again opened to admit a new supply to the machine, which thus continues to operate automatically.

ELECTRIC LOG RECORDER.—L. T. Jones, Jr., San Francisco, Cal. No. 637,992. Dated Nov. 28, 1899. The object of this device is to transmit a record and registration of a log used in determining the speed of vessels to the pilot house, chart room, or other desired point or points. It consists of a make and break mechanism carried by the log, a distant counting mechanism with an electro magnet and connections between it and the make and break mechanism, ratchet wheels, pawls, and a spring-pressed fulcrumed lever whereby the indicators are caused to move over suitably graduated dials or surfaces from which the speed of the vessel can be ascertained at any time.

KNIFE AND FORK CLEANER.—A. Rantala, Navarro, Cal. No. 637,974. Dated Nov. 28, 1899. The object of this invention is to provide a means for rapidly cleaning knives, forks and similar articles. It consists of a roller revolubly mounted having a surface adapted to retain and carry cleaning material, an adjustable support for the article to be cleaned, mechanism by which it is advanced and retained in contact with the cleaning roller, and a means for disengaging and returning it after it has been cleaned.

SCREWDRIVER AND HOLDER.—George Hoepner, Sandwich, Ill. No. 637,990. Dated Nov. 28, 1899. The object of this invention is to provide a device for holding screws while they are being inserted and driven. It consists essentially of a clamp which is adapted to seize and hold the shank of the screw just below the head, a screwdriver with means for adjusting it with relation to the clamp, so that its point engages the slot in the screw-head so that the screw is held straight and can be entered and driven to a certain point, when the clamp mechanically disengages from the shank and allows the screwdriver to advance between the clamping jaws until the screw is properly seated.

ROTARY ENGINE.—J. H. Darragh, Oakland, Cal., assignor of three-fourths interest to J. H. Thompson of same place. No. 637,986. Dated Nov. 28, 1899. This invention relates to improvements in rotary engines in which a piston fixed to the periphery of a disk mounted upon a shaft travels in an annular channel in the casing, with means for applying the pressure of the steam to continuously propel the piston and rotate the disk. An abutment is provided which allows the piston to pass and incidentally closes behind it, this abutment being in the form of a rotary segment, the periphery of which contacts with the periphery of the piston-carrying disk at all times, except when the segmental portion momentarily coincides with the inner periphery of the case while the piston is passing. In connection with this are valves with means for adjusting them to admit the steam or other medium upon either one side or the other of the abutment to reverse the motion of the engine, with valves by which the exhaust is also correspondingly changed.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING NOVEMBER 28, 1899.

638,131.—FURNACE—J. B. Archer, Oakland, Cal.
638,194.—FISHING REEL—A. J. Arnold, National City, Cal.
637,759.—PUMP VALVE—T. J. Barbour, S. F.
638,168.—HEATER—A. W. Bessey, Orange, Cal.
638,087.—TOBACCO PRIER—D. M. Bonar, Plainview, Or.
637,763.—FLOWER POT—Rua E. Burke, Mount Tabor, Or.
637,986.—ROTARY ENGINE—J. H. Darragh, Oakland, Cal.
637,927.—GATE OPENER—M. E. Fassett, Ione, Cal.
637,960.—RAILWAY SWITCH—S. L. Foster, S. F.
637,989.—WEIGHING MACHINE—E. Hanak, S. F.
637,783.—ANIMAL TRAP—J. Herfert, Tucker, Wash.
638,116.—PRUNING TOOL—Herrick & Lonergan, Los Angeles, Cal.
637,990.—SCREWDRIVER AND HOLDER—G. Hoepner, S. F.
637,992.—ELECTRIC LOG RECORDER—L. T. Jones Jr., S. F.
638,182.—STOP MECHANISM—F. T. Leilich, S. F.
637,880.—SAW HANDLE—J. M. Mariner, Loyalton, Cal.
638,200.—LOOM—J. H. Northrop, Tustin, Cal.
637,831.—BICYCLE BRAKE—H. Paulson, Tacoma, Wash.
637,974.—KNIFE CLEANER—A. Rantala, Navarro, Cal.
638,142.—VALVE—P. H. Reardon, S. F.
637,997.—HINGED TELESCOPIC BOX—C. J. Russell, Santa Maria, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recently Declared Mining Dividends.

Swansea M. Co., Utah, $10,000; Dec. 9.

Breece M. Co., Colorado, 5 cents per share; Dec. 1.

Lillie M. Co., Colorado, 2½d per share; Dec. 1.

Alliance M. Co., Colorado, 7c per share; Dec. 4.

Yellow Aster G. M. Co., California, $10,000; Dec. 9.

Tomboy M. Co., Colorado, 1s per share; payable Dec. 15.

Bunker Hill & Sullivan M. & C. Co., Idaho, $21,000; Dec. 4.

Mead G. M. Co., California, quarterly 10%; payable Dec. 15.

Gold Coin M. & L. Co., Colorado, $10,000; payable Dec. 25.

Gwin G. M. & D. Co., California, $5000; payable Dec. 12.

Empire State-Idaho M. & D. Co., Idaho, monthly 3%; payable Dec. 15.

Stratton's Independence G. M. Co., Colorado, $488,000; payable Dec. 15.

Boston & California G. M. & M. Co., California, quarterly 1⅛%; payable Dec. 15.

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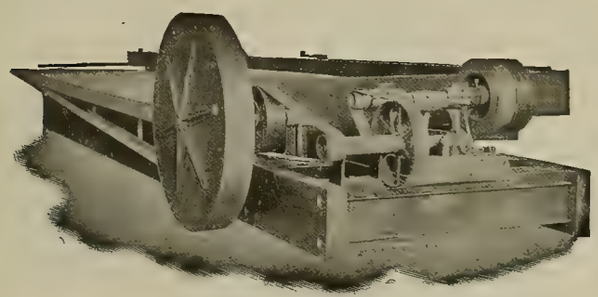
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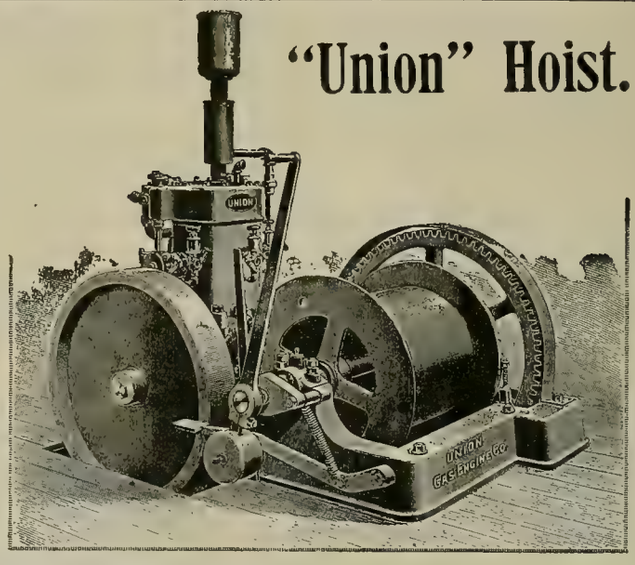
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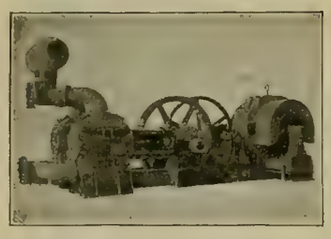
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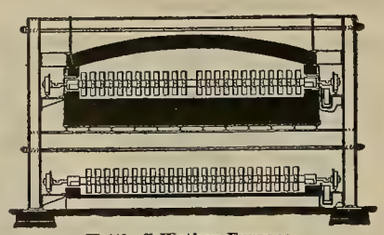
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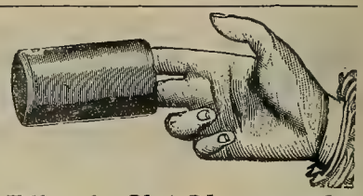
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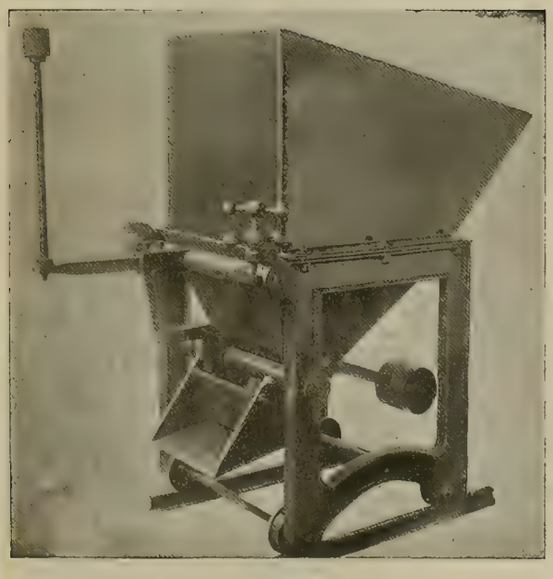
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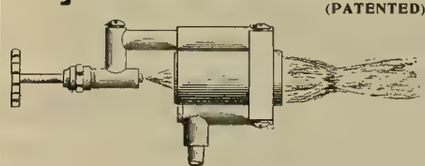
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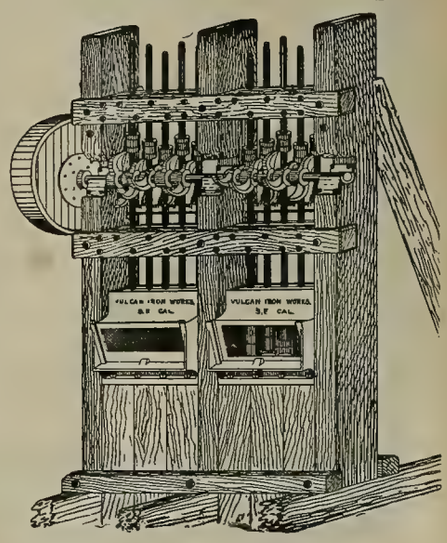
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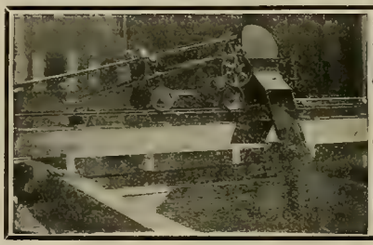


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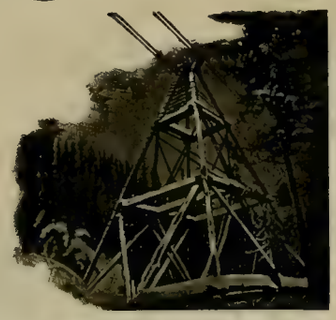
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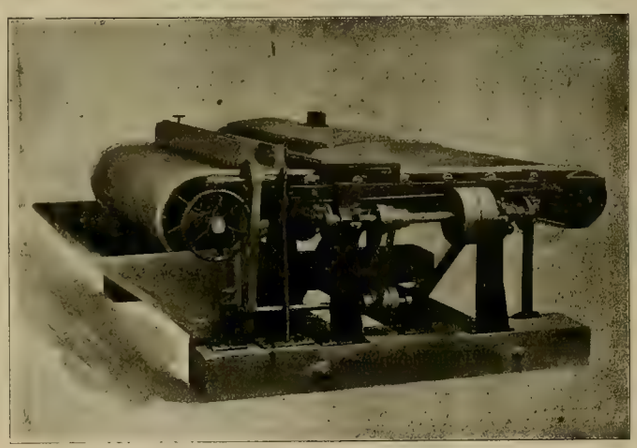
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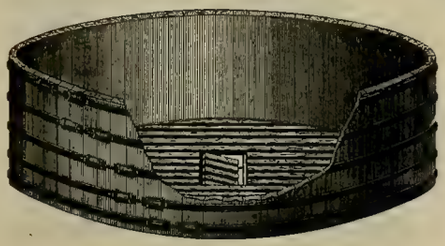
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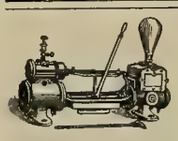
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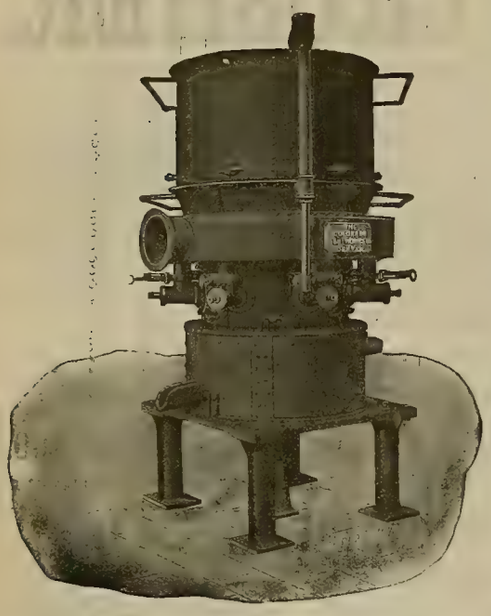
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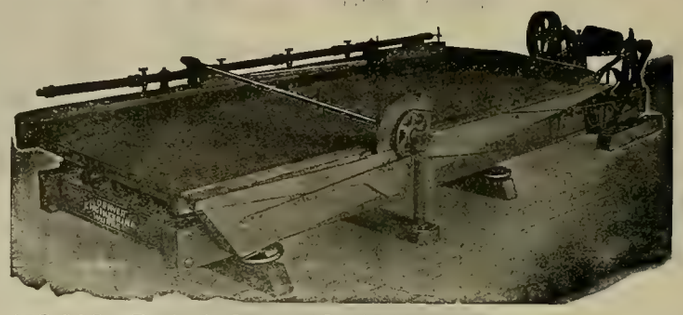
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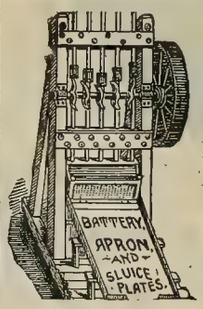
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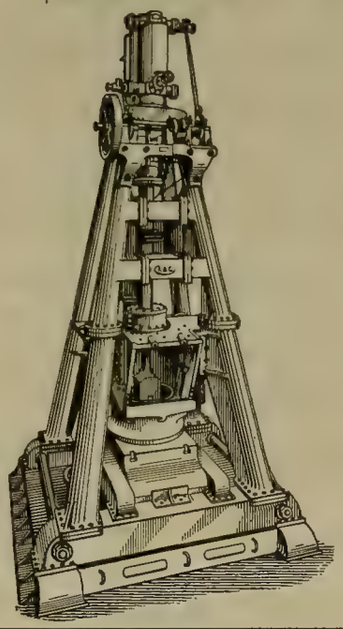
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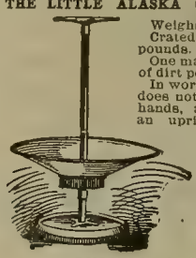
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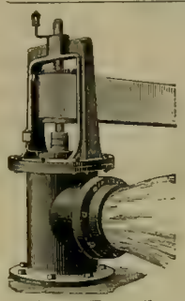
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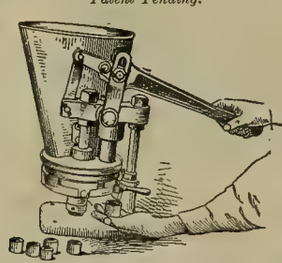


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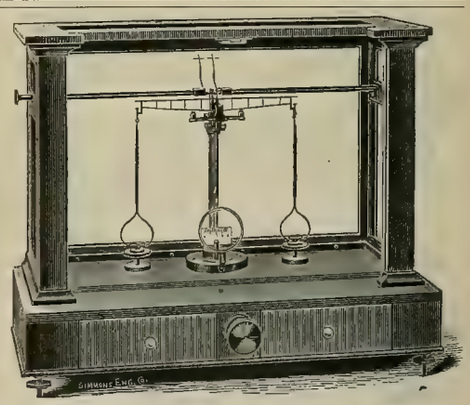
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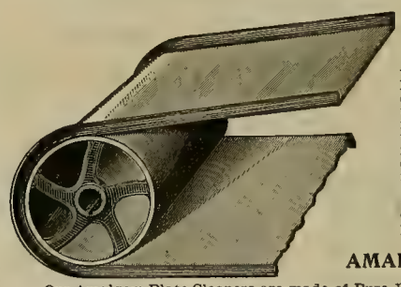
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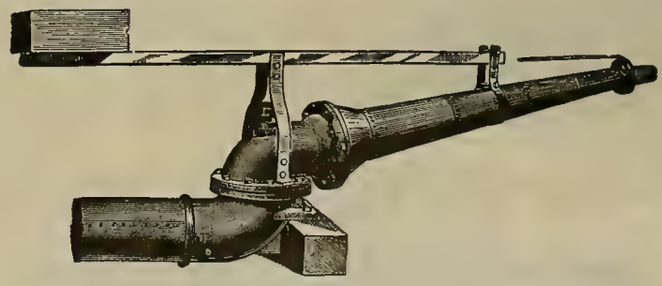
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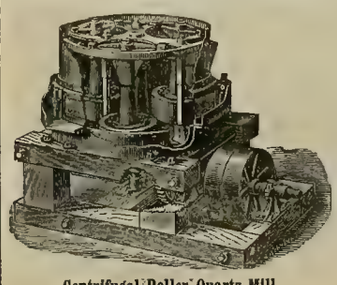
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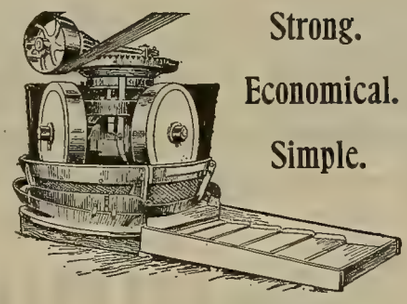
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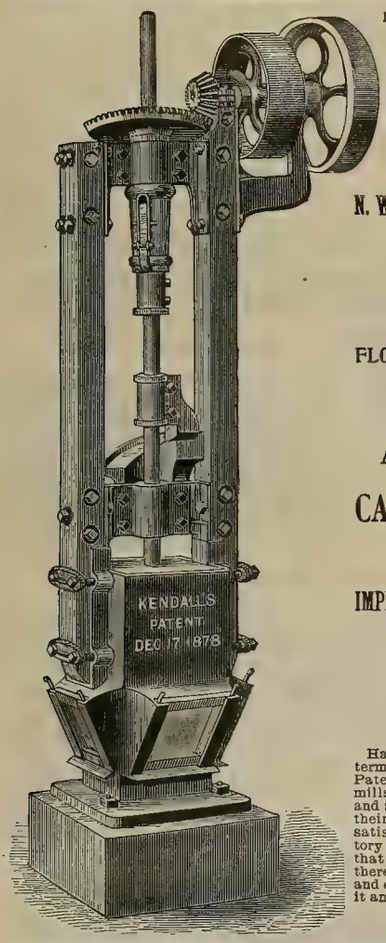
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Kendall's Patent Quartz Mills.

Having renewed our contract on more advantageous terms with Mr. S. Kendall for the manufacture of his Patent Quartz Mill, we are enabled to offer these mills at **Greatly Reduced Prices.** Having made and sold these mills for the past 16 years, we know their merits, and know that they have given perfect satisfaction to purchasers, as numbers of commendatory testimonials prove. We feel confident, therefore, that at the prices we are now prepared to offer them, there is placed within the reach of all a light, cheap and durable mill that will do all that is claimed for it and give entire satisfaction.

MARSHUTZ & CANTRELL

Send for Circulars and Price List.

Mining Pipe!



STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.

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The Truax Pat. Automatic **ORE CARS.**

SCHAW, INGRAM, BATCHER & CO., Hardware Merchants,

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California Vigorit Powder Co.

—Manufacturers of—

Dynamite High Explosives and "Vigorit Low" Blasting Powder.

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WORKS: Point Isabel, Contra Costa Co., Cal.

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THE COLORADO IRON WORKS CO.,

DENVER, COLORADO.

Manufacturers of HIGH CLASS

Ore Milling Equipments.



WE ARE THE ORIGINATORS

—OF THE—

Narrow Face, Large Diameter, High Speed

CRUSHING ROLLS.

ADAMANTINE SHOES AND DIES.

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CANDA Improved Self-Locking CAMS.



TAPPETS, BOSSES, ROLL SHELLS AND CRUSHER PLATES.

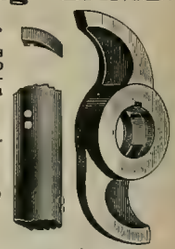
These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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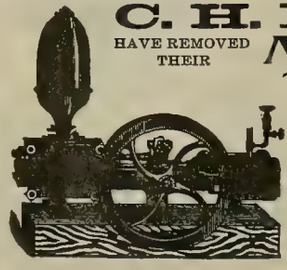
H. D. & H. W. MORRIS,

AGENTS,

Room 194 Crocker Building, San Francisco, Cal.



Canda Cam.



C. H. EVANS & CO.

HAVE REMOVED THEIR **Machine Works**

TO 183-185-187 FREMONT STREET,

Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of

Thomson & Evans Steam Pumps,

Deep Well Pumps, Power Pumps, Etc.,

Also Marine Engines, Ship and Steamboat Work, Pipe Cutting, General Jobbing and Repairing.



TANGENTIAL WATER WHEELS

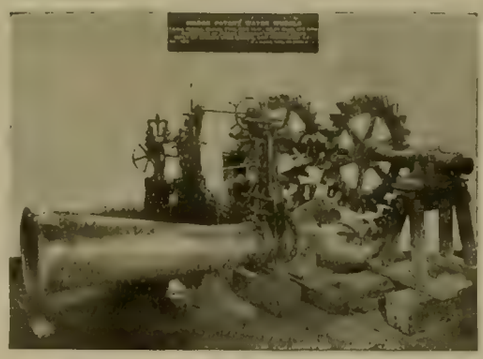
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We build Water Wheels for any head and for any power. Complete electrical power generator wheels a specialty. Large wheels up to 50 feet diameter for driving compressors.

Send for Catalogue No. 4.





REDUCES OIL BILLS

Our Cross Oil Filter is used by the largest mines throughout the entire world. Saves 50% in oil bills. All sizes, sent on approval.

THE BURT MFG. CO.
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Largest Manufacturers of Oil Filters in the World.

Send for Catalogue 38.

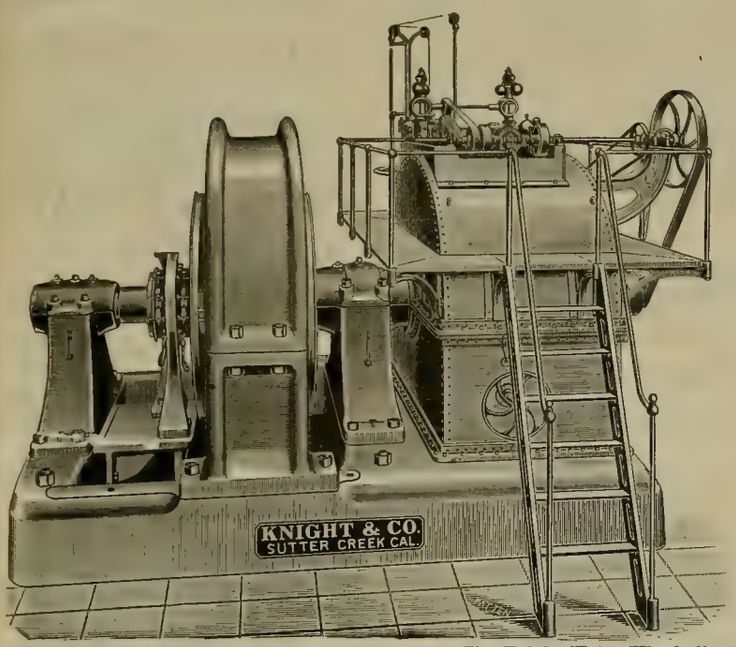
AIR COMPRESSORS,

Rock Drills, Coal Cutters, Lift Pump, Pohle and Stone Channelers.

Catalogues.

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San Francisco Agents, PARKE & LACY CO., 203 Fremont Street.

KNIGHT'S WATER WHEEL.



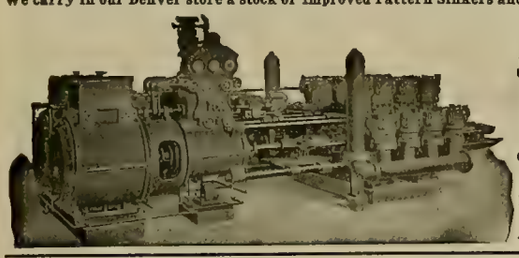
The accompanying cut shows the general arrangement of **The Knight Water Wheel**, direct coupled to a 750 kilowatt generator, with governor mounted on top of wheel casing.
These wheels are designed for **100 to 2500 H. P. Highest efficiency and regulation guaranteed.**
WHEELS FROM 6 TO 24 INCHES, ENCLOSED IN CAST-IRON CASING.
Wheels for mill and reversible hoisting works a specialty.

KNIGHT & CO., Sutter Creek, Cal.
For full particulars, send for descriptive catalogue.

The Best MINE PUMPS in the World.

COMPOUND CONDENSING AND TRIPLE EXPANSION STATION PUMPS.

We carry in our Denver store a stock of Improved Pattern Sinkers and Duplex Station Pumps, with duplicate parts for repairs.
Write for Catalogue and Estimates.



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Steam Shovels Dredges and Traction Dredges

Suitable for all kinds of **Excavating Work**, making a specialty of

PLACER MINING MACHINES,

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THE

Pelton Water Wheel Company

Gives exclusive attention to the development and utilization of water powers by the most modern, economic and improved methods. An experience of more than fifteen years, involving both the theory and practice of hydraulic engineering as relates to power development in its widest range of application, is at the service of its customers.

Nine Thousand Wheels Now Running,

Averaging some 700,000 H. P.

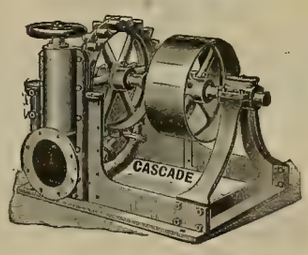
ELECTRIC POWER TRANSMISSION.

Pelton wheels afford the most reliable and efficient power for such service and are running the majority of stations of this character in the United States, as well as most foreign countries. Highest efficiency and absolute regulation guaranteed under the most extreme variations of load.

The Pelton Water Wheel Company,

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TURBINE AND CASCADE WATER WHEEL



Adapted to all Heads from

3 Feet to 2000 Feet.

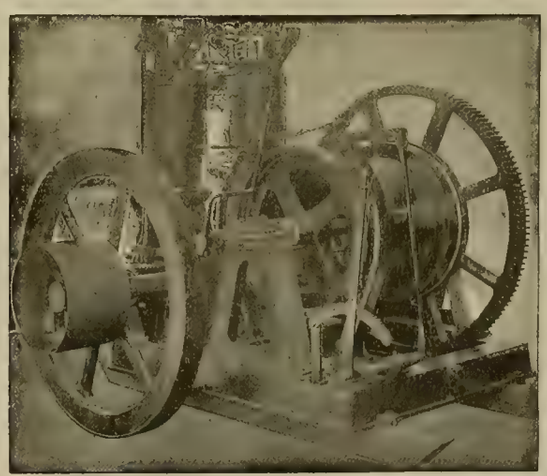
Our experience of **38 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

State your Head and requirements. Send for pamphlet.

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SPRINGFIELD, OHIO, U. S. A.



Improved Mining Hoist.



THE

Golden Gate Gas Engine

THE MOTIVE POWER.

Will Raise More Ore at Less Cost Than Any Other.

MANY IN USE
Giving Satisfaction.

Built for any Capacity and for any Purpose.

Pumping Water, Propelling Boats, Hoisting Ore, Machine Shop Power, Etc.

Send for Particulars and Catalogue.

ADAM SCHILLING & SONS, 211 & 213 MAIN STREET, SAN FRANCISCO, CAL.

Market Reports.

SAN FRANCISCO, Dec. 7, 1899.

SILVER.—London, 27 3-16d; New York, 59; San Francisco, 58⅞@59; Mexican Dollars, 47½@48¼; New York exchange, sight, 7½; telegraphic, 12½ cents premium.

The total metallic stock in the United States on July 1, '99, was: Gold, $962,865,505; silver, $639,286,743. The estimated production of the precious metals in the United States during the calendar year '98 is as follows:

	Fine Ozs.	Commercial Value.	Coining Value.
Gold.....	3,118,398	$64,463,000	$64,463,000
Silver.....	54,438,000	32,118,400	70,384,485

The estimated production of the precious metals in the world during the same period is:

	Fine Ozs.	Commercial Value.	Coining Value.
Gold.....	13,904,363	$287,428,600	$287,428,600
Silver...	165,295,572	97,524,500	213,715,400

The total coinage of gold and silver by the various countries of the world during the calendar year '98 was: Gold, $395,477,905; silver, $149,282,935. Total, $544,760,840.

LEAD.—New York reports steady, $4.70 bid, $4.80 asked; brokers' price, $4.40.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6½c.

COPPER.—New York reports Lake at $17 @17.25; brokers' price, $17@17.25. Local—Mill copper plates, 23¾c.

Copper has been quiet the past week and shows little strength. There is still a disposition in England to combat the American market, dealers refusing to believe that the present prices are not the result of demand and supply.

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

The amount of iron left in the open market for the first half of next year is very small. The only relief for those who have no iron contracted for is to depend on the new and small furnaces that are now being blown in.

STEEL.—11¼@20c per pound.

TIN.—Weak, $27 bid and $27.25 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@ 14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER. — Local, $51.50; export, $46.50@47; carload lots, special rates.

Within the week quicksilver has taken another upward bound of $1.50 for domestic and $1 per flask for export metal. Conditions previously described have not materially changed. The demand simply continues to exceed the supply, with a consequent rising price.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Firm; $4.67½ bid, $4.72½ asked.

Spelter shows a firmer front this week and prices have advanced accordingly. The smelters still refuse to pay the Miners' Association prices. Recent prices have been $32 50 per ton in the bin. Since Jan. 1st zinc ore sales in Joplin district have exceeded 460,000,000 pounds, the value of which was about $10,000,000.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½ @6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2½@ 2½c; California refined, 1½@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c per 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 50
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 00

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 56c; cs., 61c; raw, bbl., 54c; cs., 59c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 51c; cs., 56c; raw, bbl., 49c; cs., 54c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 19½c; Astral, 19½c; Star, 23¾c; Eocene, 21½c; Extra Star, 23¾c; Elaine, 24½c; Water White, bulk, in tanks, 13½c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¾c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 59c; cs., 64c; No. 1 bbl., 49c; cs., 54c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

A Chicago dispatch says: "Another sharp advance in crude petroleum was made by the Standard Oil Co. to-day, the Pennsylvania product being pushed up 3 cents to $1.64 a barrel and Indiana oil 2 cents to $1.11. Altogether, since the upward movement began four months ago, oil has risen over 40 cents a barrel. Production is said to be 20,000 barrels a day below the demand. Refined oil has gone up from 2½ to 3½ cents. To-day's quotation was at the highest point in years."

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 7, 1899.

9:30 A. M. SESSION.

900 Belcher	32c	500 Mexican	47c
100 Caledonia	62c	200 Ophir	98c
200	64c	200 Potosi	27c
100 Crown Point	23c	100 Sierra Nevada	59c
150 Mexican	48c		

2:30 P. M. SESSION.

250 Ophir	97c	550 Con. Cal. & Va.	$1 80
800 Mexican	44c	75 Gould & Curry	16c
900	43c	100 Challenge	21c

FOR SALE.

"Placer Property, which has been thoroughly explored and which shows it to be a paying property."

Address **E. N. BREITUNG,**
Marquette, Mich., U. S. A.

Cable address Edbee. Codes, Lieber's Bedford, McNiel's, A B C Universal Commercial.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. F. Keith and J. and Wm. Gannon, in the Sydney Flat Gravel Mine, near Jacksonville, Tuolumne Co., to deposit tailings in Woods Creek and Tuolumne River; from the Eureka Lake and Yuba Canal Co., Cons'd, in a portion of the Consolidated Placer Mine, at Columbia Hill, Nevada Co., to deposit tailings in Spring Creek; from F. M. Thomasson, in the Chalk Flat Mine, near Pike City, Sierra Co., to deposit tailings in Chalk Flat Ravine; from Walter Boire, in the Boire Placer Mine, near Railroad Flat, Calaveras Co., to deposit tailings in a ravine below the mine; from Paris Bean, in a branch of Coffee Pot Ravine, in Yuba County near Clipper Mills, to deposit tailings in Coffee Pot Ravine; from J. W. Pinder, in the Little Gap Mine, near Hamilton, Tuolumne Co., to deposit tailings in Streamless Valley; from J. M. Gilbert and A. M. Colwell, in the Ben Franklin and Davis Consolidated Mine, at Yankee Jim's, Placer Co., to deposit tailings in an old pit; from Jos. Williams et als., in the Williams Ranch Mine, near Ono, Shasta Co., to deposit tailings in Watson Gulch; from O.W. Henderson et als., in the Southern Cross Mine, at Yankee Jim's, Placer Co., to deposit tailings in Mexican Gulch; and from A. W. Mellon et als., in the Cherokee Mine, at Cherokee, Butte Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 26, 1899, at 1:30 P. M.

Quicksilver
For Sale in Lots to Suit.

REDINGTON & COMPANY, Wholesale Druggists, 23-25-27 Second Street, San Francisco.

GRAHAM, GARRETT & CO., PROMOTERS,
211-212 Peyton Blk., SPOKANE, WASH.

First-class mines and mining stocks for sale at all times. Correspondence solicited. Moreing & Neal and Clough's codes used.

FRED C. MILES,
CISCO, PLACER CO., CAL.
COPPER AND GOLD PROSPECTS.
A GOING GOLD PROPERTY.

Utah Mines.

The Utah mining camps are fast forging to the front. THE TINTIC DISTRICT, BINGHAM, PARK CITY, MERCUR, LA SAL AND GOLD MOUNTAIN are all located on the line of the

RIO GRANDE . . .
WESTERN RAILWAY.

Two trains daily from Denver via Denver & Rio Grande or Colorado Midland and RIO GRANDE WESTERN. For pamphlets, etc., write

GEO. W. HEINTZ,
General Passenger Agent, SALT LAKE CITY.

SITUATIONS WANTED.

MEXICO OR SOUTH AMERICA.

Assayer, Expert Accountant and English-Spanish Stenographer, some knowledge of surveying and general mining, experienced in ore buying, wants position as assistant to manager or otherwise with mining or smelting company, Mexico or South America preferred. Unexceptionable references. Address COAHUILA, this office.

Position Wanted

By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

WANTED.—Position as Superintendent or Foreman of Quartz Mine by practical all-round mining man. Could take full charge of quartz mill and mine. Would go to any part of the U. S., Mexico or Canada. Reasonable salary. Reference. Address PRACTICAL MINER, care of this paper.

AN EXPERIENCED MILL MAN

Desires position in mill, understands concentrators and assaying, capable of taking full charge if necessary. Address AMALGAMATOR, care of Mining and Scientific Press.

WANTED, A POSITION AS

ASSAYER or CYANIDE PLANT MANAGER

by energetic and practical man with five years' experience. Address POTASSIUM, this office.

Position Wanted by undersigned as electrician. Graduate of a leading technical college. Wide and very practical experience of ten years with various systems of lighting and power, including three years in charge of a plant for the leading steel company of America, and three years in charge of 3-phase plant for representative Colorado mine. Address RELIABLE, care Mining and Scientific Press.

WANTED—POSITION BY A MAN WHO IS expert in milling and concentration of gold ores. Understands assaying, retorting and melting. Highest of references. Address W. B. G., 626 McAllister St., San Francisco, Cal

WANTED.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Wanted—Superintendent

To take charge, under a general manager, of a reduction plant for argentiferous copper ores. Plant consists of concentration works and reverberatory smelting furnaces with a capacity of about 100 tons of ore daily. Applicants state references, previous position and salary expected. Address S. C., care of Mining and Scientific Press.

DIVIDEND NOTICES.

DIVIDEND NOTICE.

MEAD GOLD MINING AND MILLING COMPANY.—A regular quarterly dividend, No. 5, at the rate of forty (40) per cent per annum on the par value of the issued capital stock of the company has been declared, payable Dec. 15, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close Dec. 9, 1899

G. GALL, Secretary. J. C. JENS, President.

DIVIDEND NOTICE.

BOSTON & CALIFORNIA GOLD MINING AND MILLING COMPANY.—A regular quarterly dividend, No. 4, at the rate of six (6) per cent per annum on the par value of the issued capital stock of the company has been declared, payable Dec. 15, 1899, at the office of the company, 411 Claus Spreckels building, San Francisco. Transfer books close Dec. 9, 1899.

G. GALL, Secretary. J. C. JENS, President.

FOR SALE.

FOR SALE.

A 10-Stamp Mill, 950-lb. Stamps, Nearly New.

Inquire F. CHAPPELLET, 214 Pine Street, San Francisco, or GEO. McAULAY, Forest Hill, Cal.

100 STAMP MILL

FOR SALE, complete with or without water wheels, generators, dynamos, motors, electric locomotive, copper wire, about five miles of 56-lb. rail, ore cars and other machinery. Plant entirely new. Never operated. Of latest and most approved design. For information, address FRASER & CHALMERS, West 12th Street and Washtenaw, Chicago, Ill.

Mines for Sale.

A specialty made of developed properties in Mexico and the Southwest. Good mines and prospects are wanted. Bona fide correspondence of mine owners, capitalists and investors solicited.

H. B. RUNKLE, Mining Broker, El Paso, Texas.

FOR SALE.
Gold Properties in Various Stages of Development.

Single claims and groups. Large gravel properties, dredging and hydraulic. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

..CRIPPLE : CREEK..
FOR SALE—CYANIDE PLANT,

100 tons daily capacity; in first-class condition to handle Cripple Creek ores.

Plant in full running order, with all latest improvements. Address JOHN S. MACBETH, Equitable Building, Denver, Colorado.

FOR SALE CHEAP.

80 H. P. CORLISS ENGINE;
TWO STEEL BOILERS, 50 H. P. EACH;
HEATER AND STEAM PUMP.
All in first-class condition.

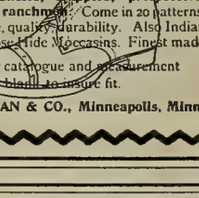
THE VISALIA MILLING CO.,
VISALIA, CAL

Group of Gold and Silver Mines for Sale.

For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery.

For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

PUTMAN BOOTS
—for Sportsmen



Hand Sewed Waterproof
Black, brown or straw color.
Leaders for 22 years among Western hunters, trappers, prospectors, miners, and ranchmen. Come in 20 patterns. Possess style, quality, durability. Also Indian Tanned Moose Hide Moccasins. Finest made
Send for catalogue and measurement blank to insure fit.
H. J. PUTMAN & CO., Minneapolis, Minn.

WEST COAST OF MEXICO.

WÖHLER, BARTNING Suc's, Mazatlan (Sinaloa), Mex.
Bankers, Importers, Exporters and Commission Merchants.

Representatives and Agents of the principal Mining Companies in the State of Sinaloa and the dependencies of the Pacific coast in the States of Durango, Chihuahua, Sonora, Lower California and Jalisco.

ORE BUYERS AND EXPORTERS. - MINING SUPPLIES.

FOR SALE.

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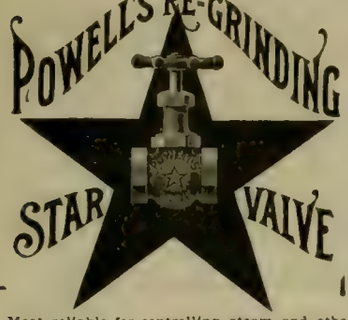
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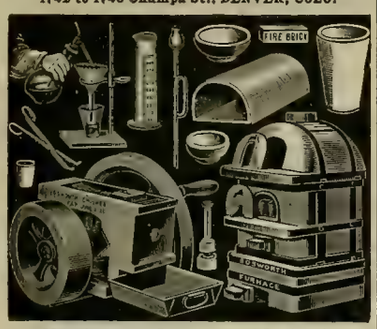
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Assessment Notices.

ARRASTRAVILLE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of November, 1899, an assessment (No. 4) of Ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 213 Jackson St., San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 11th day of December, 1899, will be delinqdent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 3d day of January, 1900, to pay the delluquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

J. MIDDLETON, Secretary
Office—213 Jackson St., San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 10) of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.
Office—632 Sacramento street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 14) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.
Office—320 Sansome street, room 24, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of November, 1899, an assessment (No. 21) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of salo.

By order of the Board of Directors.

CHARLES BOYONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras county, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of November, 1899, an assessment (No. 3) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 20th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary,
Office—Heald's Business College, 24 Post Street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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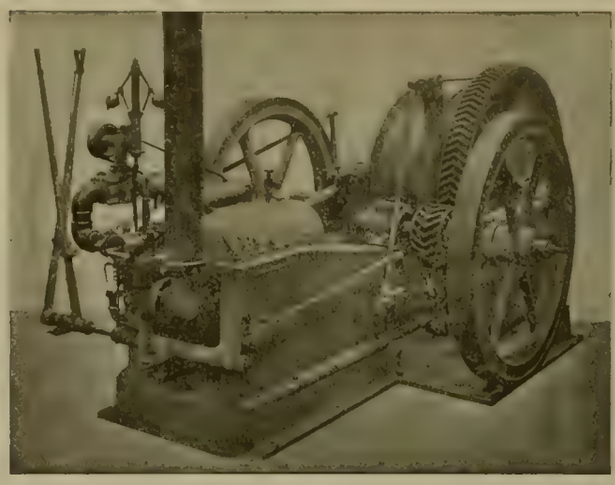
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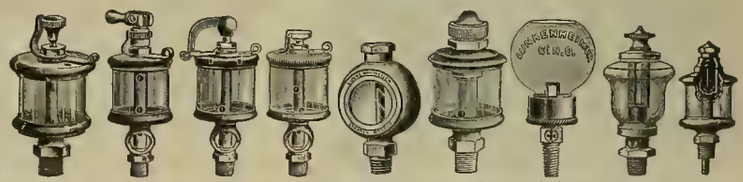
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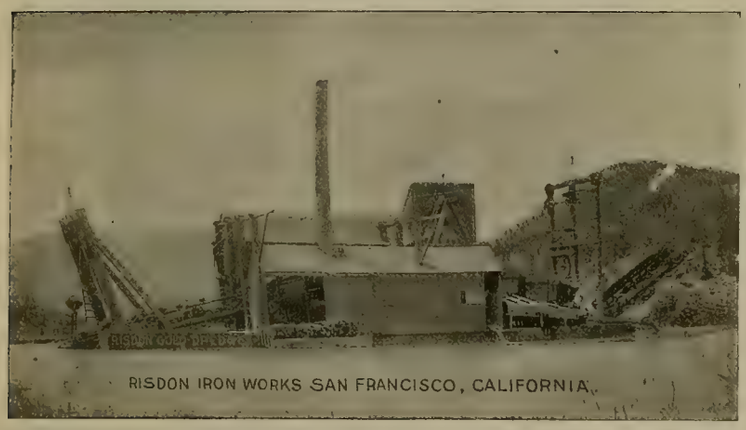
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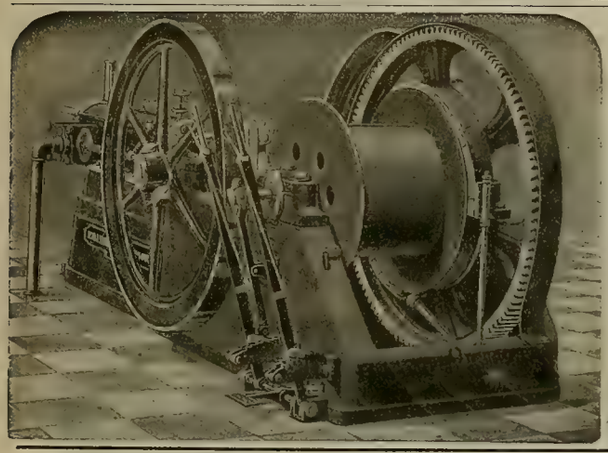
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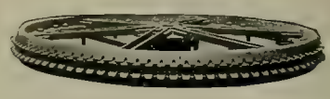
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No. 2058.— VOLUME LXXIX. Number 25. SAN FRANCISCO, SATURDAY, DECEMBER 16, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Co-Operative Milling

Throughout the mining regions of the world are many districts where the mines are small and the ore shoots narrow, short and irregular, but of good grade. In such mines these shoots often follow each other as a succession of accumulations of ore, and as a whole the mine, though less satisfactory than one having a continuous ore shoot, is capable of development and successful operation if proper facilities obtain.

Mines of this class are not confined to any particular geological formation, but are most commonly found in regions of mica schist and mica slate, where dykes and fissure veins are absent or at least not abundant and where the ores occur as lenses in the schists following along a line approximating the strike of the formation. Not infrequently the mines of this character in a district are numerous and as a whole will supply sufficient ore for one or two mills located at central points, to which all the ores of the district may be taken for treatment; but unfortunately it is not at all uncommon to find a dozen mills for as many mines, and not one of them running continuously.

Miners commonly object to custom mills on the ground that the charges for milling exceed the cost, overlooking the fact that interest on invested capital and the deterioration of the plant render this additional charge necessary, and as custom mills are not run as philanthropic institutions the mill owners make an additional charge for profit, and not infrequently the charges are higher than they should be, being determined by the richness of the ore and the natural result of competition if there be more than one mill in the camp or district.

In districts of this kind the miners would do well to associate themselves into a co-operative company for the treatment of the ores from the mines of shareholders, those who are not shareholders being charged an additional price for the treatment of their ores. The mill should be equipped with all modern devices for the economical handling and treatment of the ore and should be in charge of careful, competent men who thoroughly understand the treatment of the ores of the district, in order that the greatest possible saving may be effected at the lowest cost. Ore from the mines could be treated in such an establishment at a stated cost per ton, the amount to be determined by the actual cost of treatment, to which should be added a sum sufficient to cover the deterioration of plant and repairs. In this way the owners of stock in the mill could have their ores treated at as low a cost as though each mine owned a mill, and probably with better results by reason of superior direction and treatment. An arrangement along these lines would result in keeping the mines interested constantly working and the mill would find continuous employment.

There is no intention to go into the details and minutiæ of such a proposition as that suggested, as in each district these matters would naturally suggest themselves. In California there are several districts where this plan should be successfully introduced, where at present there are few mines at work and only idle mills or no mill at all, but where are found numerous small mines having veins of moderate size but of good grade, and where the individual owners are too poor to build a complete mill unaided, but where, by co-operation, the desired result may be attained along the lines suggested.

The mills now in these districts, or formerly there, were built for custom work or were erected by owners of mines which failed to supply the necessary ore, and were shut down. In some cases they also were run for a time as custom mills, charging a rate higher than the value of the ore could stand.



IRON MOUNTAIN MINE, SHASTA CO., CAL. (See page 690.)



SMELTING PLANT OF THE MOUNTAIN COPPER CO., KESWICK, CAL. (See page 690.)

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MINING AND SCIENTIFIC PRESS.

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Iron Mountain Mine, Shasta Co., Cal; Smelting Plant of the Mountain Copper Co., Keswick, Cal., 685. Plan and Section Showing Geology of Cripple Creek, 688. A Dyke in Granite; Granite Altered to Ore, 689. An Outcrop of Copper Ore; Heap Roasting, Iron Mountain Smelters, Keswick, Cal., 690. Alteration of Jasper to Serpentine; Coal Washing Machine at Carbonado, Wash., 691. One-Year-Old Zebroid Lordello, Out of the Mare Stael by the Zebra Canon, 691. Latest Mining and Metallurgical Patents, 692.

EDITORIAL.—Co-operative Milling, 685. Gold Output of the World; A National Necessity; Annual Assessment Work; Auction of Mining Lands in Siberia; Miscellaneous, 686.

MINING SUMMARY.—694-695.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 710.

MISCELLANEOUS.—Concentrates, 687. The Cripple Creek Gold Field, 688. The Upper Coffee Creek Mining District; The World's Pig Iron and Steel; Minerals in the Philippines, 689. The Copper Belt of Shasta County, Cal.; Report of United States Geological Survey; Next Year's Ore Rates, 690. Phenomena Attending the Accumulations of Bitumen; Prevention of Freezing in Compressed Air Pumps; Some Salaries in British Columbia; Coal Washing in the State of Washington, 691. The Discovery of Gold-Bearing Conglomerate in British Columbia; The 20th Century Mule; Zinc Roofing Plates; New Method of Slimes Treatment, 691. Latest Mining and Metallurgical Patents, 692. Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends, 696.

DESPITE the repeated warnings and constant caution from various sources, miners still persist in taking desperate chances in handling nitro powder, particularly in thawing it when frozen. Last week men employed in a Shasta county, Cal., mine laid a quantity of giant powder on top of a boiler in the hoist for the purpose of thawing it. Fortunately the powder did not explode—it took fire, and as a result the entire plant was destroyed.

GENERAL LAND COMMISSIONER HERMANN has decided that the tide lands of Alaska are not public lands which are subject to disposal or sale to individuals, and that no statutory provision exists giving the Government authority to grant concessions to individuals or associations. This is important to the beach miners of the Cape Nome and other districts in Alaska, as it leaves equal rights to all and no one can contest a miner's right to a claim excepting the Government itself. Local rules made by the miners will doubtless define the size of claims and the rights of locators.

Gold Output of the World.

The production of gold is now greater than at any time in the history of the world. At one time, when the production of the mines of California swelled year after year until it reached more than $80,000,000 in a single year, some apprehension was felt lest gold become too abundant and that the metal would be demonetized, as silver now is. The output for the present year of the South African mines alone is about $100,000,000 and still no fear is expressed that it will overreach the requirements of civilization. On the other hand, effort is being directed to increase the output very materially as soon as political conditions will permit. The recent report of Director of the Mint Roberts is of unusual interest in regard to increasing gold production. In closing his report he says:

The production of gold in all of the important gold fields of the world is increasing rapidly, and with prospects of continued gains for years to come. The yield in the world in the calendar year 1898 was $387,000,000 against $338,000,000 in 1897. The production in Australia to date in 1899 has shown a gain of 25% over the corresponding months of 1898, which indicates a probable gain for the full year of $16,000,000. The United States, Canada and Mexico will doubtless increase their production $18,000,000. In South Africa the production in the first half of the year was 35% above the yield of the same months in 1898, and if the industry had been undisturbed the gain for the year would probably have been above $20,000,000.

A National Necessity.

The Calaveras Co., Cal., Miners' Association has turned its attention to excellent, practical work—the improvement of the roads in Calaveras Co. It is most commendable enterprise. The condition of some of the "roads" in some of the California mining counties is a direct and continuous injury to the prosperity of those counties and a constant hindrance to their mining industry. It is unnecessary to discuss the causes, usually inertia, political complications, local inability to understand the necessity of good roads. As a business proposition nothing in the way of public utility pays better than a good road. It is the poorest kind of business to put up with the miserable makeshifts found in some parts of California, and the matter has often aroused the just indignation of mining men, especially when they see more public money annually fooled away than would build good roads. Miners have repeatedly written us, and personal inspection has often showed that what they said was underrated rather than exaggerated. It is no unusual thing to note $40,000 worth of mining machinery "stuck in the mud" along the "road" for weeks, in transit from the railroad to the mine. If the Calaveras Co. Miners' Association can awaken local public opinion, can induce the supervisors to realize that the annual gain to their county would be many times what a system of good roads would cost, and can keep at the idea till they get it in practical shape, they will have done a great work. Without belittling advance in mining methods, it may be said that no progress in mining, no "revolution" in the science or art of economically treating ore, is so important an item in the cost and profit of mining as cheap travel. Bad roads keep out investors, kill enterprise, make costly all movement, and keep a community behind the times.

This is not intended to apply solely to Calaveras county, Cal. The commendable action of that local mining association is a text to direct attention to what is a national neglect, and the existence of a natural need. Everywhere is apparent the need of good roads—roads that a horse can draw a load on or carry his rider without undue effort. A horse can draw on the worst kind of road about four times as much as he can carry on his back. On a good macadamized road he can pull ten times as much, on a wooden road twenty-five times as much, and on a tramline fifty-eight times as much. It is a trite subject but an important economic one to every investor in the mining regions. Bad roads are a terrible tax on the mining industry, and one that ought not to be borne. The gold yield of Cripple Creek district, Colo., for the current year of '99, will be $20,000,000. Cripple Creek has splendid gold producing properties — so have other districts. Cripple Creek also has the best system of "getting around" that the writer ever saw in any mining district. Cripple Creek's transportation system cuts some figure in its great gold yield.

Annual Assessment Work.

The time for completing annual assessment work on unpatented mining claims for the year 1899 is nearly at an end and it is an appropriate time to call attention to some facts in the matter. After discovery the locator is allowed certain periods to perfect his location, and the period of one year from the first day of January next succeeding the date of location in which to perform his $100 worth of assessment work. Failure to perform the assessment work does not of itself invalidate the location, for it remains intact until relocation is made by another party, when the rights of the prior locator cease immediately. The only way in which an original locator may save a claim upon which he has failed to perform the required annual labor is by resuming work before any other person claims the ground by virtue of relocation—and the assessment work so commenced must be completed, the claim holder using reasonable diligence in its performance. A locator who has allowed his claim to become subject to relocation by reason of failure to perform the assessment work cannot save it by relocation, as this would permit him to hold his claim the same as though it were the original location and by repetition he might thus hold the claim indefinitely, and as the law does not limit the number of locations a person may take, a single individual might locate and control a large number of claims in a single district and hold them to the exclusion of all others without performing any work, and this is contrary to the purpose and intent of the law. As an original locator cannot treat his own failure to perform or resume work as the basis of a new and valid relocation, it necessarily follows that one of several locators seeking to obtain the entire title by reason of the failure of any of them to fulfill the requirements of the law, is likewise prohibited from making such location.

Auction of Mining Lands in Siberia.

The Russian Government has recently been offering to lease its mining lands in eastern Siberia, and will auction the privileges for working the alluvial deposits of certain river systems to the highest bidder. A circular issued by the Government, and which has been translated by the American Minister at St. Petersburg, sets forth the conditions under which the successful bidders may operate. Among these many requirements are the deposit of a guaranty of $51,500 (100,000 rubles). The term of lease is fifteen years. The inhabitants, with their reindeer, have the privilege of roaming at will over the leased tract, hunting, fishing or otherwise employing themselves; the preliminary prospecting must be completed within the first three years of the term of the lease; the lessee must maintain at the works an assistant surgeon, with all necessary medicines, and to pay the Crown annually $515 for the maintenance of a physician; he must maintain a police force in proportion to the number of workmen employed in the ratio of 1 to 30, and to furnish the police with food, clothing, comfortable lodgings, etc., and to pay to the Crown, as wages for each policeman, 600 rubles, and $1030 for an assistant engineer and police inspector. These officers must be provided with comfortable homes, transportation, and even luxuries, and a justice of the peace must be maintained and supported. Foreign employes are allowed only by particular sanction of the Governor-General in each case. As security for certain duties and taxation $15,150 will be retained from the deposit of $51,500 made on the auction day, and in case of non-fulfilment of the terms of the contract the $15,150 will be forfeited. The lessee is subject to all the existing mining laws of the Russian Government, and will also be subject to all laws which may hereafter be enacted.

The above and many more provisions are found in the circular, the most of them imposing such conditions as would seem to seriously affect the successful outcome of what may be considered an extra hazardous proposition, to say nothing of the uncertainty of the character of future legislation.

Beside this the laws affecting the mining industry in the Transvaal are generous. It is not likely that much American capital will seek such investment. Doubtless, the mountains of eastern Siberia have valuable mineral deposits, and the streams of that region are known to be gold bearing, but it is doubtful whether, with the uncertainty which attends all new mining ventures, and the rigors of the long winters in eastern Siberia, the conditions justify investment under the terms imposed by the Russian Government.

THE fluctuations of silver from day to day or month to month are so small as to attract little attention. Any considerable rise in price would be the signal for a largely increased production. This is evident from the fact that silver mines, closed several years ago when the price fell rapidly, have recently resumed operations and are again being worked at a profit, made possible by modern methods and improvements in metallurgy. Among the noted silver producers which were closed for a time and are again producing are the Ontario, at Park City, Utah, and the Granite Mountain–Bimetallic, at Phillipsburg, Mont.

Concentrates.

BLACK tellurium found in Colorado is telluride of mercury.

KEROSENE introduced drop by drop into the boiler is recommended as a scale preventive.

A LODE claim can not legally be recorded until a vein, or lode, has been discovered thereon.

THE shaft of the Old Abe, White Oaks, is the deepest mine working in New Mexico—1150 feet.

RIGID government tests of Pacific coast fir and Eastern oak show the decided superiority of the former.

ON its trip of 17,156 miles of sea voyage from the Pacific to Cuba, the boilers of the battleship Oregon consumed 4155 tons of coal.

SO FAR as can be learned, there is no standard or unit of illumination. Common experience seems in this case to be the only criterion.

PRACTICAL men usually make the best theorists, as they know when a theory is required and the purpose it is intended to accomplish.

STEAM at 100 pounds pressure above the atmosphere does 4780.8 foot-pounds more work than that at 15 pounds pressure above the atmosphere.

THE strength of a man for continuous work, maintained for eight hours a day, is estimated at one-tenth of a "horsepower," or 74.6 watts.

FLASH POWDER for photographic purposes may be made by mixing 40 parts magnesium, 40 parts permanganate of potassium and 20 parts peroxide of barium.

A TWO-PAGE, fully illustrated account of the proposed "magnetic" reduction of gold ore by T. A. Edison, in New Mexico, appeared in the issue of April 30th, '98.

BOOKS on mining and metallurgy are free of duty. This office will send, postpaid, anywhere that mails are delivered, any required work, procurable, at publishers' prices.

ACCURATE underground mine surveying is essential as a preventative of fatal accidents, is important as a measure of economical working, and is often of great value in case of litigation.

WHERE the weight of a full car is 4200 pounds, the weight of the empty car is 1600 pounds, and the weight of the rope 2000 pounds, the grade per cent at which single cars will run is 32.5.

THE dangers arising from inhaling the fumes of potassium cyanide are declared to be as dangerous as to drink a solution of the chemical. Peroxide of hydrogen is said to be an antidote in either case.

THE introduction of steam traction engines at the Grand Reef mines of J. W. Mackay in Arizona is said to have reduced the cost of transportation between the mines and the railroad from $8 to $3 per ton.

EXPERIMENTS are in progress with a view to making aluminum from corundum—the oxide of that metal. It is thought that it will prove cheaper than that made from bauxite, cryolite or other aluminous minerals.

So far as known the largest pump is at Lake Linden, Mich., pumping water for the Calumet & Hecla M. Co., at the rate of 2,500,000 gallons per hour, a triple expansion pumping engine, requiring 1500 H. P.

SHIPMENTS of lead ore in the shape of sulphates are very unusual. Smelters usually receive lead ore shipments in the form of sulphide (galena) or carbonate, the former being largely in excess of the latter.

AMBROINE is an insulator made of amber, asbestos, mica and other silicates. It costs considerable, but is worth all it costs, and is largely used for accumulator retaining cells, and overhead fixtures for railway lines.

IN accordance with the mining laws, discovery and appropriation by locating are recognized sources of title to mining claims, and their development by working is the condition by which they may be held until patent is obtained.

FROZEN NITRO POWDER is not positively dangerous, but when thawed rapidly its tendency to explode without apparent cause has often been demonstrated. The season of the year when warnings of this kind are in order has arrived.

A RANCHMAN in Nevada put a blast in the debris beneath the old copper smelter at Mason Valley recently and exposed nearly 8000 pounds of metallic copper, worth $1200, that had leaked from the furnace, which was a crude affair when new.

YES; a mine inspector would be a good thing for California; but, were the office to be created, the man competent to fill the position would stand little show of selection. It would be just one more office for the politicians to gnaw and snarl over.

THE ore from Forest Grove, Or., is chiefly chrysocalla (silicate of copper) with the common brown garnet crystals of the variety grossularite—a calcium aluminum garnet. There is also a small amount of copper carbonate (malachite) in the specimen.

ALL mail matter passing between the United States, the Philippine archipelago and Guam, or between these island possessions of the United States, are subject to the United States domestic classification, conditions and rates of postage.

ON the dumps of the Minnie Moore and Queen of the Hills mines at Hailey, Idaho, there is said to be a large quantity of ore which assays $5.50 per ton, to recover which no method has as yet been discovered. The quantity is said to be 200,000 tons.

HYDROGEN has lately been liquefied. It is a limpid fluid, clear as water, with one-fourteenth of that liquid's specific gravity. A piece of cork dropped into liquid hydrogen goes to the bottom like so much lead. It is most intensely cold; air freezes and sinks in it.

THE bureau of the U. S. Mint is under the Treasury Department; the General Land Office and Geological Survey are under the control of the Secretary of the Interior. The latter is in intimate connection with the mining industry of the nation and has done good work for the miner and prospector. The U. S. Geological Survey is always up to and often a little ahead of the requirements of the miner and furnishes a vast amount of necessary information at the minimum of cost.

AT the present rate of output, it is estimated that it will require thirty-five years to exhaust the copper conglomerate still remaining within the boundaries of the Calumet & Hecla property; but the Osceola and Kearsage lodes also pass through the company's holdings.

MINING MEN in every capacity are constantly and cordially urged to take notes of facts within their observation, and furnish them for publication. Practical workers can thus greatly add to the common stock of knowledge with resultant public benefit and individual gain.

TRACTION ENGINES have been found to be more economical in operation than an eighteen-mule team. An example is afforded by one hauling daily thirty tons of ore in two trips to Globe, Arizona, from a mine three miles distant, at a cost for labor, fuel and oil of 27 cents per ton.

ANY mining man when visiting San Francisco can have his letters addressed to the headquarters of the mining men, office of the MINING AND SCIENTIFIC PRESS, 330 Market St., San Francisco. Letters thus sent will be promptly delivered upon application, or forwarded as required.

A PUMP cannot, with economy, be run at a higher velocity than that at which the water, entering under the pressure of the atmosphere, attains—a velocity equal to that of the piston speed of the pump. The law, in common with that of all fluids, is that the velocities vary as the square roots of their pressures.

GOLD coated with a sulphide film is largely protected from the solvent action of cyanide. Where a 1% solution of pure cyanide dissolved a given weight of gold in ten minutes, the addition of 1-100,000 part of sulphur (as a sulphide) to the 1% solution of cyanide, caused it to require two hours to dissolve the same weight of gold.

TO CALCULATE the speed of a pulley, knowing the diameter of the driven, multiply the diameter of the driver by the number of revolutions and divide the product by the diameter of the driven; the quotient will be the number of revolutions of the driven, e. g.: 24 in. diam. of driver × 150, number of revolutions,=3600 ÷ 12 in. diam. of driven=300.

JOPLIN, Mo., ore averages 15% zinc and 4% lead. The average cost of mining and hand jigging free ore that needs no crushing is 81.1 cents per ton. Thirty tons of ore make 4.5 tons zinc contentrates and 1.2 tons lead, making the cost per ton of clean ore $4.27. The present price of standard 60% zinc ore at the mine is $35 per ton, lead ore $53 per ton.

THE influence of the mining industry is seen and felt in all branches of mechanic arts, and its impetus on the mechanical and engineering progress of the country is second to none in the development of the nation. To the mining industry is due in a great measure the present advancement and prosperity of this country in everything that inures to national wealth.

TO FIND the number of board feet in a stick of timber 4x4 at one end and 8x8 at the other—24 feet long—add the areas of the two ends to four times the area of the center section and multiply by one-sixth of the length; or, multiply the areas of the ends and extract the square root: to this add the areas of the two ends and multiply by one-third of the length. The answer by either process is 74⅔ feet.

DURING the sixty days ending Dec. 5th, there were received at the business office of this paper the names of 353 new subscribers, west of the Mississippi river. Of these, 73 were from Colorado, 41 from Arizona, 39 from California, 31 from Montana, 29 Utah, 27 Idaho, 24 Oregon, 19 Washington, 18 Mexico, 17 Nevada, 14 British Columbia, 10 South Dakota, 6 China, 4 Japan, 1 Honolulu.

THE relative merits of stamps and other devices for crushing ore have been freely and fully discussed herein. Each system has its zealous adherents, and each has just claim to preference in individual cases. The general tendency is to supersede stamps, yet in steadiness, capacity and general economy those old stand-bys have a practical record that will not speedily allow them to be eliminated from universal use.

WHILE endeavor is made in this column to correctly reply to inquiries for specific and technical information, it is not a matter of "questions answered while you wait," and at times an interval must necessarily elapse between the receipt of the inquiry and the appearance herein of the desired information. It may also be noted that it is much easier to ask questions involving correct information than to answer them.

AN agent, trustee or other person having confidential relations with the original locator of a mining claim will not be permitted to relocate such claim and secure to themselves advantages flowing from a breach of trust obligations. Where, however, such confidential or fiduciary relationship has terminated, the rule no longer applies and a subsequent location by such former agent or trustee has been upheld by the courts.

A WIDE-AWAKE Arizona prospector recently announced the discovery of rich platinum deposits on a high plateau near Cataract canyon, in Coconino county, and has some of the best claims in the district. As a result, a stampede set in and a village of tents, called Platville, has been established. Conspicuous among the business establishments is a boarding house, owned by the discoverer of the mines, who knows how to embrace an opportunity. The whole thing is deemed a fraud.

CASSEL'S method of chlorination by electrolysis employs, for dissolving the gold from roasted ores, chlorine produced by the electrolysis of a solution of common salt, adding caustic lime to neutralize the objectionable hydrochloric acid produced by secondary reaction. The same apparatus serves for the generation of the chlorine, the chlorination or conversion of the gold into chloride, and the precipitation of the gold in the metallic form. It consists of a large barrel, capable of being revolved on a horizontal axis, which is hollow and serves as the cathode for the collection of the gold as precipitated. The anodes are a number of plates of retort carbon. There is the customary manhole in the barrel for charging and discharging. The axle is covered with a filter of asbestos cloth, and inside is an archimedean screw, working in properly packed boxes, to remove the gold as formed and convey it to the boxes at either end, exteriorly to the barrel. The charge is about two tons of roasted ore, and sufficient solution of salt to make the pulp fluid, together with the necessary quantity of quicklime. The barrel is given eight or ten revolutions per minute, and the current from the dynamo turned on.

OZONE has been recently liquefied by H. G. O'Neill of Philadelphia, Pa. It is heavier than liquid air, is an antiseptic and anæsthetic and is expected to supplant ether, cocaine and chloroform. Its discoverer prepares it by first passing a supply of pure oxygen through tubes immersed in liquefied air, reducing its temperature, then subjecting it to a heavy pressure in specially devised chambers and passing discharges of electricity at high voltage through it, thus producing ozone. This mixture is then compressed gradually in a series of cylinders immersed in liquefied air; and by combining a very high pressure with an intense cold, liquefied ozone is produced.

THE California mining law passed in '97 required that within twenty days of the location of a claim a preliminary notice of location should be filed with the County Recorder, and that within sixty days of discovery and date of location $50 worth of work must be performed in developing the discovery, and must also file with the County Recorder a certificate of location, etc. This law was in full force and effect in '98, but failure to comply with it does not work a forfeiture. The Supreme Court of California has ruled that noncompliance with local law does not work forfeiture unless the law or rule provides that failure to comply shall work a forfeiture, and this the California State law does not do. Bell vs. Bed Rock T. & M. Co., 36 Cal. 214.

NO CLAIM is made in these answers for absolute accuracy or perfect expression of technical fact, but it is believed that the statements weekly made herein in answer to many questions are as nearly correct as any similar collection can be. That, at least, is the intent, and that these condensed answers to current queries are received with favor is manifest by the constant stream of inquiries and the equally constant commendation from so many readers. Of course, it is easy to decry and detract; much easier than to essay the task itself, the critic always having a lighter duty than the one whose effort is criticised. Usually, however, the carping critic carefully refrains from exercising other than his iconoclastic faculties.

THE twelfth census of the United States in 1900 officially embraces all manner of statistics relating to all industries—except mining. Everything in connection with all trades has official, preliminary statistical notice — except mining; all classes and conditions of men are to be noted—except miners. The great basic industry of the nation, the one business that underlies all else, and on which all else depends, is not represented by any official notification of the intents or purposes of the twelfth census in the closing year of the century. The insane, the deaf, the dumb are worthy of note, but there is no more mention of the mineral industry in the bill providing for the taking of the twelfth census than if such an industry did not exist.

MOST of the veins of Gilpin county, Colorado, have two distinct zones of ore, one, the heavy sulphide concentrating or shipping ore, the other the milling rock. Gouges are not uncommon, but not always present. The smelting ore is chiefly pyrite, with some copper sulphide. The milling ore is feldspathic material, with some quartz. In these mines the value rather than the mineral composition determines the smelting ores. In these ores calcite is of rare occurrence, which has been explained on the hypothesis that the country rocks contain no lime-bearing feldspars. In the veins occurring in the granite areas of California calcite is a common constituent of vein filling, and also in the greentone formations, each having lime-bearing feldspars in abundance.

THE diamond mines of South Africa at Kimberly, which were originally worked by an extensive open cut system, which became eventually very expensive and dangerous, are now worked by levels through vertical shafts sunk back from the rim of the pits. The system of mining is similar in some respects to that at drift mines in California. But one level is worked at a time, which, when worked out, is abandoned and another level is opened. The De Beers mine is opening the 1400 level. The main levels are 200 feet apart. As the workings proceed downward the excavation fills from the surface by caving of the rim of the crater-like excavation. At the Kimberly mine the skip is filled, hoisted 1520 feet and dumped in forty-five seconds. The skip contains four tons of diamond-bearing earth.

BY "slip of the wheel" on a steamship is meant the difference between the actual distance run and the distance that would have been covered had the steamship's propeller acted upon a solid substance instead of a fluid. The expression may be understood as the lost motion of the propeller. It is usual to allow a certain number of revolutions to the propeller or paddles to the mile, and at the end of a stated time the estimated distance run by the ship, according to the number of turns made, is compared with the actual distance run by the ship according to observation of the heavenly bodies or by the patent log, and the difference between these two records is expressed as a percentum, and entered in the log book as "slip of wheel." Retardation by reason of head winds and high seas comes under the head of slip. Suppose the distance run according to revolutions is 100 miles, and the actual distance run is 75 miles, the slip of wheel is 25%.

THERE is a limit to the depth of possible ore formations, as that formation is dependent on the presence of water. As one sinks into the earth, temperature increases 1° F. for 48 feet descent. At this rate, the critical point of water would be reached at 34,704 feet, or 6½ miles deep. Where the temperature is that of the critical point, 773° F., water can not exist as a liquid, no matter how great the pressure, but becomes disassociated into its gaseous elements. The thermometrical gradient becomes more rapid at depths beyond these reached by human observation, because of decreased conductivity in rock. It may be expected, therefore, that the circulation of water ceases at 20,0000 feet. But at maximum depth maximum pressure and temperature obtains. It must be a horizon of solution. Precipitation would hardly begin till a lowering of temperature and lessening of pressure permitted. Deposition of ore is the direct result of precipitation, hence actual ore formation is limited to 15,000 feet.

The Cripple Creek Gold Field.*

Written by T. A. RICKARD, State Geologist of Colorado.

In 1892, when Cripple Creek began to be talked about as a new locality where important discoveries of gold had been made, the name seemed only provocative of derision. It is said to have originated from the fact that at a certain point on the course of the little stream there was a morass in which straying cattle wandered and, in their efforts to extricate themselves, were occasionally lamed. However, the name needs no apology to-day, the magic baptism of golden discovery has made it sound as alliterative and impressive as the most exacting historian could demand.

Physical Features of the District.—The gold-bearing portion of the district covers an area four miles long by three miles wide, occupying a group of hills which rise from 300 to 1000 feet above the general surface, and have a general altitude of 10,500 to 11,000 feet above the sea. The drainage of the region flows into the Arkansas river, whose gateway into the plains is at Canyon City. The general slope is southward, and the sunny aspect incident to this configuration of the surface has caused the hillsides to be clad with grass, and rendered them, at one time, despite the high altitude, a good pasturage for cattle.

The physical condition of the surface had much to do with the chequered history of the district. Owing to the southern exposure and the comparative absence of a protecting growth of trees, the rocks, which mostly protect a fissile structure, have been shattered by frost so as to overspread the solid formation with a thickness of debris to which the tufted grass has given a further covering. Water, owing to its expansion between 4° C. and the freezing point, is a ceaselessly destructive agent. When it penetrates the cracks and crannies of the rocks it serves as a wedge, shattering their stony substance with a resistless power. The heat of day and the cold of night, the warmth of summer and the snows of winter, alike aid this disintegrating process. A high altitude and a south slope afford the conditions most favorable to such action. Thus it came about that the district of Cripple Creek is largely covered with shattered rock fragments which, if not in place, are not far from their original position, having slid down the hill slope in obedience to the laws of gravity. This shattering of the rock surface has caused one important and, in Cripple Creek's case, far-reaching result. There are no outcrops. Ordinarily, veins of gold ore stand above the surface with that boldness which caused the Australian miner to call them "reefs," and the Californian to call them "ledges." The ore is essentially mineralized and enriched rock, comparatively devoid of the quartz composing the typical lodes of other districts in America or Australia, and consequently it shares with the rock the tendency to undergo easy shattering. Solid veinstone, therefore, rarely survives amid the general disintegration, the outcrop of the Independence being a very notable exception.

The first discoveries in mining are usually due to the finding of outcrops; in the absence of them, deep explorations are rarely undertaken. Deep ravines often afford good natural sections of the rock formation. The Cripple Creek district was as deficient of the one feature as the other. The absence of steep declivities and consequent rock faces was characteristic of the pastoral landscape, and the angular debris covering the rounded hillsides made digging difficult. For these reasons, although the district was traversed by many thousands of prospectors at successive epochs, the existence of rich lodes was not surmised until a very recent date, and many experienced miners failed of success at first because they encountered conditions unfamiliar to them. Among the early arrivals, in '91 and '92, were miners from Gilpin, Leadville and Aspen, men of knowledge in their own habitat, but unable to understand the peculiar vein structure which they saw at Cripple Creek. It was the adverse opinion of these men, rather than the views of geologists or scientific observers, which injured the reputation of the gold field in the beginning of its development.

The Geology of the Gold Field.—The intimate relationship between geological structure and ore occurrence has nowhere been more forcibly emphasized than in Colorado. This is largely due to the labors of the United States Geological Survey, whose monographs on Leadville and Cripple Creek have been of inestimable assistance to the mining industry.

The dissemination of accurate knowledge regarding the geology of mining districts has been aided by the increasing simplicity and clearness of the language employed to convey it. The application of science to commerce, of geology to the industry of mining, has led to the recognition of the fact that to talk to business men in a hybrid Greek-Latin jargon is only an impertinence. If mining be not a business, it is a vain delusion. The language of technical science, when it bears upon business, must be made intelligible to business men, otherwise it will remain a mere abracadabra of speech.

The mines of Cripple Creek are situated in a complex of volcanic rocks, occurring amid the mass of granite whose culminating point is Pike's Peak. These volcanic rocks found a passage through the underlying granite in the comparatively recent period known to science as the Miocene, an early part of the last of the three great subdivisions of geological time. The granite is the basal rock of the region and at one time probably formed the floor of the ancient seas which received the sediments now composing the sandstones and limestones flanking the Front range. The granite is of a particular type, known, because of its prevalence in this locality, as the Pike's Peak granite. It is coarsely crystalline and its three ingredients, the minerals quartz, mica and feldspar, are easily distinguishable by the unaided eye. A beautiful red tint, mainly due to the color of the feldspar, characterizes it and renders it recognizable by the least observant.

Long subsequent to the formation of the granite and the sedimentry rocks which were laid down upon it, there began an elevatory movement. Accompanying this movement there occurred a general fracturing of the rocks thus affected, so as to permit volcanic matter to force a way upward. The volcanic rock thus brought to the surface of the granite slowly filled the hollows of its uneven surface, and spread over a large area since then diminished by the forces of atmospheric erosion, which, during the long period of time separating the Miocene from the present day, have sculptured the hills and valleys of the district.

A glance at the colored geological map of the gold field exhibits a great variety of volcanic rocks. The principal of these is andesite breccia, a name derived from Andes, the mountain range where this rock is specially prevalent. The very nature of the breccia suggests the violence of the volcanic action which brought it to the surface of the granite. The miners call the breccia "porphyry" from its apparent resemblance to the rocks of that class with which they were previously familiar in the Leadville and in the Gilpin county mines. The porphyry of Leadville is quartz-felsite, that of Gilpin is quartz-andesite. Porphyry refers to the structure rather than to the composition of a rock, so that there is "granite-porphyry," "diorite-porphyry," "andesite-porphyry," etc., the term being applied to rock of igneous origin in which particular minerals are distinguishable amid the ground mass of the rock so as to give it a speckled appearance. The Cripple Creek breccia has this appearance, but it is due to the fact that it is made up of a heterogeneous mass of rock particles of every size, from the most minute powder to fragments as large as a man's head. These consist mainly of andesite, but the other rocks are included, especially near the edges of the volcanic vent. Some of this material is volcanic dust, called tuff, which, when consolidated under pressure and cemented by siliceous waters, becomes compacted into a dense hard substance difficult to distinguish from a true crystalline rock; so that it is not to be wondered that the miners often label it with an incorrect name.

The breccia lies in the uneven hollows of the ancient surface of the granite, and probably fills a large part of the vent through which it was ejected. The thickness of the breccia has not been proved, nor has the exact position of the vent been discovered. The mine workings have shown the thickness of the breccia to be over a thousand feet in several places; but as these are for the most part near the edge of the mass there is every probability that the maximum depth of this formation is several times one thousand feet in the vicinity of the point of extrusion.

The accompanying sketch, Fig. 1, of the Cripple Creek volcano is largely diagrammatic, but it will serve to convey a general idea of the geological structure of the district.

The breccia is penetrated and traversed by later volcanic rocks, of which phonolite is the most important in its relation to the occurrence of ore. The phonolite occurs for the most part in dikes, which traverse the older formations, the granite and the breccia, in various directions, and are probably united, at depths far beyond the reach of human exploration, to larger masses of rock having a similar composition.

These dykes follow such lines of weakness in the older rocks as were developed into fractures during those periods when the rocks underwent strains, the latter being considered to be the result of the slow wrinkling of the earth's crust due to its readjustment over a cooling and shrinking interior. The phonolite rose in a mobile, if not molten, condition, through the fractures thus formed after the manner of water rising through the cracks in the overlying ice. The structural conditions thus created gave a direction to the subsequent circulation of underground waters. The deposition of ore is the result of such circulation, the mineral-bearing solutions being the vehicle by which the metals are leached out of the rocks and laid down elsewhere in such a concentrated form and within such a distance of the surface as to render them valuable to man. The place of origin is surmised, but vaguely, as being deeper than our deepest mines. Lines of weakness, healed and strengthened by the cementing effects of hot igneous rock, in the form of dykes, afford new lines of lesser resistance, parallel to the old ones and along the contact of the two rocks of

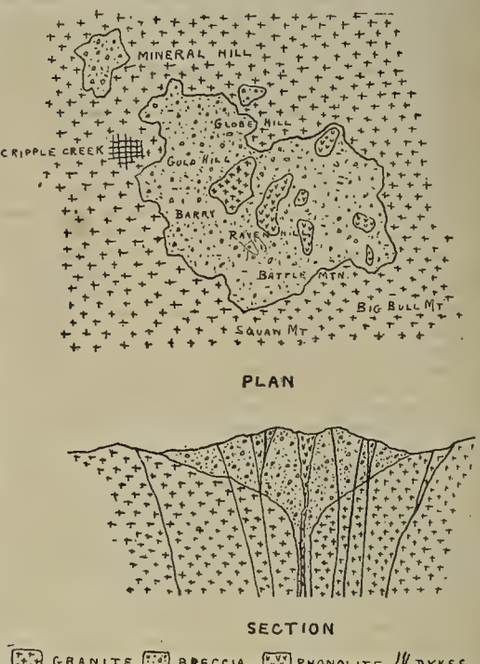


Fig. 1.—Plan and Section Showing Geology of Cripple Creek.

unlike hardness and texture. For this reason ore-bearing veins so often accompany dykes. They do so at Cripple Creek.

The mines of Cripple Creek afford excellent illustrations of the teachings of modern geology, and emphasize the incorrectness of the hasty generalizations of Sandberger and others before him. It is, of course, foolish to deride even theories which are now laid on the shelf, after they have served the purpose of quickening the researches of scientific enquirers. A working theory is needed in order to give some sort of direction to observation, because without an intelligent idea of what may be the possible fact one certainly will be unlikely to discover the real one. During later years the lateral secretion theory of Sandberger became accepted by certain distinguished geologists, and was as vigorously combated by others, notably Posepny, with the result that a great impetus was given to observation, and a large mass of new facts has been collected, bringing the scientific explanations of ore occurrence another step nearer the knowledge of things as they are. The unthinking sneer at the faltering steps of science, and the working miner is apt to belittle the aid which geology gives him. Each intelligent observation is one step nearer the attainment of truth, and those who direct the working of mines will get more aid from geology when they contribute the necessary data without which the occurrence of ore will remain merely a maze of tangled phenomena.

Nature does not recognize the definitions of the technical dictionary and in mining practice it has been found that regularity of structure is the exception rather than the rule. The geologist of fifty years ago, when the science was more the product of the library and the laboratory than of actual observation underground, conceived the ore as having filled gaping fissures in the rock, comparable to the crevasses of a glacier, and when he had noted the dissimilarity between the ore and the encasing rock, he imagined the former to have been due to an upwelling of molten metallic matter. The ideas of the present day are still slightly tainted by the imaginations of the past and the terms of an obsolete philosophy continue to cling to our nomenclature.

Modern investigations, based on accurate chemical knowledge, as well as geological observation, have all gone to prove that gold ores are not the product of direct volcanic action, but that they have been conveyed to the place where the miner finds them through the medium of water, the metals having been dissolved, in various chemical combinations, by underground solutions, and precipitated along those fractures in the rocks which have been first lines of least resistance, and then lines of maximum circulation.

In a railway cutting between the towns of Cripple Creek and Anaconda, there is a bit of nature's testimony which will be of service in getting a clear idea of the essential characteristics of gold-bearing veins as compared with dykes of volcanic rock. The accompanying drawings will help the description. In Fig. 2 there is afforded an illustration of simple dyke structure. The dyke in this case is composed of basalt; it is from 9 to 15 inches in width, and can

*Condensed from a paper recently read before the Institute of Mining and Metallurgy.

be traced as an irregular dark band traversing the coarse-grained pink granite. The dyke is well defined, exhibiting clean-cut lines of demarcation from the enclosing granite, and it is evident from the contour of the walls that it occupies a fault fissure. The outline of the east wall corresponds ex-



Fig. 2.—A Dyke in Granite.

actly to that of the western one, the movement of the latter having been upward, causing a displacement equal to about 14 inches. It is a clean-cut fissure of granite, filled with foreign material, a basic volcanic rock, which probably welled upward in a mobile condition, filling the fissure as it was formed, so as at no time to permit of a vacuity. Compare



Fig. 3.—Granite Altered to Ore.

this with Fig. 3, which is a sketch of a gold-bearing vein, a few yards from the dyke illustrated in Fig. 2. The country is the same, viz., granite, but in this instance the vein filling is not foreign matter, but essentially rock in place; it is granite, altered, indeed, but easily recognizable, in spite of the kaolinization of the feldspar, and the partial removal of the mica. There are no clearly defined boundaries between the decomposed vein matter and the enclosing country, nor is there any evidence of faulting. The lines of fracture shown in the granite are the joints of that rock, and those which are observable in the vein itself are not continuous, but rather a closely knit series of little breaks, which have afforded a passage for a liquid more subtle than basalt. The vein occupies a line of maximum porosity along which water has found a way, decomposing the soluble ingredients of the rock and depositing a minute quantity of gold insufficient to make the decomposed granite of the vein differ essentially from the outer country, but rendering one gold-bearing ore and leaving the other barren rock.

The faulting along the fissure followed by the dyke is easily seen, but no evidences of such movement can be discerned along the seam of altered granite, which forms the gold vein. Nevertheless there must have been some movement, however slight, because a crack or break is not made evident, can be considered only as latent, until the two faces of it are caused, by that very shifting, so to disagree as to produce the irregularities which, when linked together, form the visible line of fracture. Even the joints in the solid granite require such an explanation, and however insignificant the shifting may be, it marks the adjustment of the rock to the effects of stresses, traceable in this case to the volcanic energies which extruded the large masses of breccia forming the characteristic feature of the geology of Cripple Creek.

(*To be Continued.*)

The Upper Coffee Creek Mining District.

Written for the MINING AND SCIENTIFIC PRESS by OSCAR H. HERSHEY.

One of the most promising undeveloped mining districts in the State of California is that of the upper Coffee creek region in Trinity and Siskiyou counties. It is situated in the western part of the Sierra Costa mountains, of the Klamath system of northwestern California. Occupying a north-south belt along Hardscrabble, Hickory, Union and Pine creeks, tributaries of Coffee creek, thence southward, following the divide between Swift creek and the south fork of Salmon river, the mineral belt has been traced throughout a distance exceeding ten miles, with a width of one-half mile to one mile. The country is high and broken, with bare, rocky peaks and deep, narrow gulches, except in the heads of the glaciated valleys, which are broad and open.

It has been only half prospected. The mines already opened date mainly from the "Coffee creek boom" of two years ago, which, although based on misrepresentation, has directly resulted in the discovery of this district.

The formations represented are mainly serpentine, mica and hornblende schists, which are cut by huge intrusions of granite and granodiorite, and by dykes of a great diversity of igneous or trappean rocks, including granite-porphyry, quartz-porphyry, diorite-porpyrite, and diabase. The metamorphic strata outcrop in long, narrow belts trending nearly due north to south. Their normal dip is westward, but this is interrupted by two great faults or breaks in the strata, situated about one-half mile apart, and traceable for a distance of ten miles. In both cases the upthrow is on the east, and the average dislocation is between 1000 and 2000 feet. The block of strata (mainly mica and hornblende schists) between them has been compressed and tilted to the eastward so as to reverse the dip. The minerel belt lies mainly between and including these dominant faults of the district.

There is here a great diversity of gold-bearing deposits. Some mines yield an abundance of free gold in white ribbon quartz, others in bluish-gray granular quartz, while some of the best present no regular quartz veins, but have an abundance of free gold and sulphurets in broad strips of talc and serpentine schist, and in belts of crushed hornblende schist. A certain system of dykes of white quartz-porphyry in places carry enough gold in seams and manganese-filled cavities to make them milling propositions, while gouges along the walls yield ore whose tenor is $4000 to $6000 per ton. There are places on the 300-foot granite-porphyry dyke which follows the western of the two dominant faults where prospecting has demonstrated the presence of considerable free gold within the body of the porphyry, and schistose bands along its walls are the site of some of the best mines.

The question is universally asked of all new districts, "Will the mines go down?" It is the purpose of the writer to argue that those of the upper Coffee creek district are of a permanent character.

1. All the mines and "prospects" are connected with faults or dislocations of the strata. Even the belts of talc schists are merely strips of the massive serpentine given a schistose structure by shearing and metasomatic action. The breaks in the strata always occur along pre-existing lines of weakness, which often happen to be the walls of dykes or the contact between dissimilar formations; hence the close relation between the porphyry series and the gold-bearing veins.

2. The planes of the faults are nearly vertical, and they must go down to a great depth—at least several thousand feet. In the case of those mines situated at the contact between a dyke of igneous rock and the metamorphic series, it is beyond question that this contact, at least, will go down many thousands of feet. The problem narrows itself to one of determining whether the pay shoots go down also, or are confined to certain levels along the faulted belts.

3. The presence of gold in certain systems of dyke rocks, notably in that of quartz-porphyry, suggests that the origin of the auriferous minerals was in the dykes of melted material injected into fissures. However, the weight of evidence indicates that the gold was deposited from hot alkaline solutions coming up from great depth along the dislocations or faulted fissures in the rocks. It is certain that the country rock of the metamorphic series is practically barren of gold except where crushed, through faulting, and locally mineralized from below. Hence the gold-bearing solutions must have traversed the faulted belts from profound depths, and the question of the permanency of the mines is narrowed to that of whether deposition occurred at one or many levels.

4. The occurrence of rich ore in the upper Coffee creek district is not confined to one level, but ranges in altitude from 4500 feet to 7500 feet above the sea. Even on a single claim the ore bodies may be traced on the mountain slopes through a vertical height of 500 feet. (The present valleys, being deep ditches excavated by the streams and glaciers in the rocky strata since the mineral veins were formed, are equivalent to shafts sunk on pay shoots in a more level country.)

In short, all the evidence indicates that the ore bodies of this district are of great vertical extent, and in all probability descend below a workable depth. The geological conditions are similar to those in the Grass Valley and Nevada City districts of the Sierra Nevada region.

The future of this district is bright. At present it is in an undeveloped condition, and the attention of capitalists has not yet been attracted toward it. It is within eight miles of a wagon road up Coffee creek to the Nash mine store, and all supplies have to be carried in by pack train over a rough trail. There is not a mill in the district, and most of the ore worked is treated in arrastras. The past season the owner of the Dorleska mine was sacking ore for shipment to Denver, Colo., containing free gold and a sulpho-telluride of lead and gold (nagyagite) up to a value of $5000 per ton. Such rich ore as this is always of very localized development. It is the low-grade ores that make the great mines. The upper Coffee creek region contains great bodies of $10 to $15 rock, some in free gold, and all cheaply workable by the cyanide process. At present the low-grade propositions are ignored, as all the prospectors are searching for rich streaks, from which they can gain their livelihood with the pick, shovel and pan.

This early stage of the district's history is destined soon to end. There are known to be a large number of "traces" (free gold in the soil on the mountain slopes) along the mineral belt, which have not yet been panned to their sources in the veins. A few more summers' prospecting will greatly increase the number of mines in course of exploitation. Then capital will find its way into the region and the transportation problem be solved by the construction of good mountain roads, and another rich camp be added to the list of California mining communities. The great bodies of low-grade ore will be economically worked by power furnished by electrical plants established at such points as the falls on the south fork of Salmon river and a series of cascades midway of the course of Swift creek.

Bragdon, Cal., Dec. 9th, '99.

The World's Pig Iron and Steel.

In the following table is given the production of pig iron and steel in all countries in '98. English tons of 2240 pounds are used for Great Britain, Canada, the United States and "other countries," and metric tons of 2204 pounds for all other countries, metric tons being used as the equivalent of English tons in ascertaining the total production for all countries. The statistics of steel production for the United States, Great Britain, France, Belgium, Austria-Hungary, Sweden, Spain and Canada embrace ingots and direct castings, but for Germany and Luxembourg, Russia and Finland and Italy complete ingot statistics are not available, and the statistics for finished steel have therefore been used:

Countries.	*Pig iron, Tons.*	*Steel, Tons.*
United States	11,773,934	8,932,857
Great Britain	8,809,719	4,665,986
Germany and Luxembourg	7,232,988	5,779,570
France	2,534,427	1,473,100
Belgium	979,101	653,130
Austria and Hungary	1,308,423	880,696
Russia and Finland	2,222,469	1,145,758
Sweden	531,766	265,121
Spain	261,799	213,015
Italy	8,393	63,940
Canada	68,755	21,540
Other countries (about)	125,226	15,287
Totals	35,657,000	24,110,000

Minerals in the Philippines.

In a report to the Interior Department on the geology of the Philippine islands, Geo. F. Becker of the U. S. Geological Survey gives some interesting information regarding the mineral resources of the group. Mr. Becker says, while gold exists in both Luzon and Mindinao, it is comparable rather to that of the Carolinas and Virginia than to the Western gold fields of the United States, and a rush to the Philippine fields, he predicts, would result in disappointment. The report says: "The copper deposits of Lepanto seem rich and extensive, but very expensive roads will be needed to render them available. The high quality of some of the iron ores of Luzon is beyond question, but the lignite of the islands is not adapted to iron smelting. The so-called coal is a good lignite. Its heating effect is from two-thirds to three-quarters of that of the best steaming coal. There are great quantities of this fuel, and much of it will probably be delivered at a profit on vessels at $2 50 Mexican per ton."

The Copper Belt of Shasta County, Cal.

The extensive operations of the Mountain Copper Co. in Shasta county, Cal., has drawn attention to the copper belt of that section, which lies in a crescent-shaped area, with the Iron Mountain group at its southwestern limb and Furnaceville near its southeastern end, Copper City, Bully hill, the Afterthought mine, the Balaklala group and others of less importance lying at intermediate points along the arc of the circle.

The Afterthought mines occur near the contact of slate and porphyry. The ores contain copper, zinc, gold and silver. The deposits near Copper City are in feldspar porphyry, which occurs in large massive intrusions. The ore is also of irregular occurrence in the porphyry. This district properly includes the Bully hill properties. In these latter the ore is gray copper with antimony, zincblende, pyrite and galena, with gold and silver. A heavy red gossan is characteristic of these mines. In their early history the Excelsior mine produced many handsome specimens of native silver from near the surface. The gangue minerals are chiefly heavy spar and calcite, quartz being of rare occurrence.



AN OUTCROP OF COPPER ORE.

Bully hill, two miles north of Copper City, is a mineralized feldspar porphyry, the red gossan being a marked feature of the landscape. Early placer miners took considerable gold from the gulches heading in these deposits. J. R. De Lamar is developing this group.

The largest and most extensively developed deposits in the county are those of the Mountain Copper Co. at Iron mountain, near Keswick, between Boulder and Slick Rock creeks.

Near the latter creek is an outcrop of gossan 300 feet in width. The principal ore bodies of this group occur as large lenses or masses, which near the surface are oxidized, forming the familiar gossan, and in depth pass into the normal sulphide ores. It is seldom the gossan extends below 100 feet from the surface, that being the depth to which meteoric agencies have penetrated.

A large deposit of iron ore on what was formerly the Lost Confidence mine is separated from two silver-bearing veins by 300 feet of porphyry. The two silver veins are divided by a dyke of quartz porphyry from 1 to 3 feet in width. The foot wall vein is from 10 to 30 feet in thickness and contains large amounts of copper sulphide, which carry 20% to 30% copper and ten to thirty ounces silver per ton. The hanging wall vein consists almost wholly of pyrite, with little copper. It is 80 to 150 feet in width. It also contains silver and a small amount of gold.

The great ore body from which the Mountain Copper Co. is now drawing its supply has approximately a width of 300 feet, a length of 800 feet, and is about 250 feet in depth. This mass is the lower portion of what was evidently at one time a huge lens, the upper portion of which has been removed by erosion. This ore shoot is estimated to contain more than 1,500,000 tons.

The first attempts to reduce the sulphide ores by pyritic smelting was a failure, and preliminary roasting with subsequent smelting in a cupola furnace was then tried with more satisfactory results. The stall roasting resulted in concentrating such large volumes of sulphurous gases at one place that it was abandoned for heap roasting at a large number of places along the railroad from the mines to the smelters at Keswick. These heaps are formed about piles of wood, provision being made for draft. The wood is fired and the sulphur in the ore igniting it continues to burn until the sulphur has been burned out, which requires usually about two months. The ore is then reloaded upon the cars and taken to the smelters, where it is charged with the necessary fluxes to the furnaces, which have a daily capacity of about 200 tons.

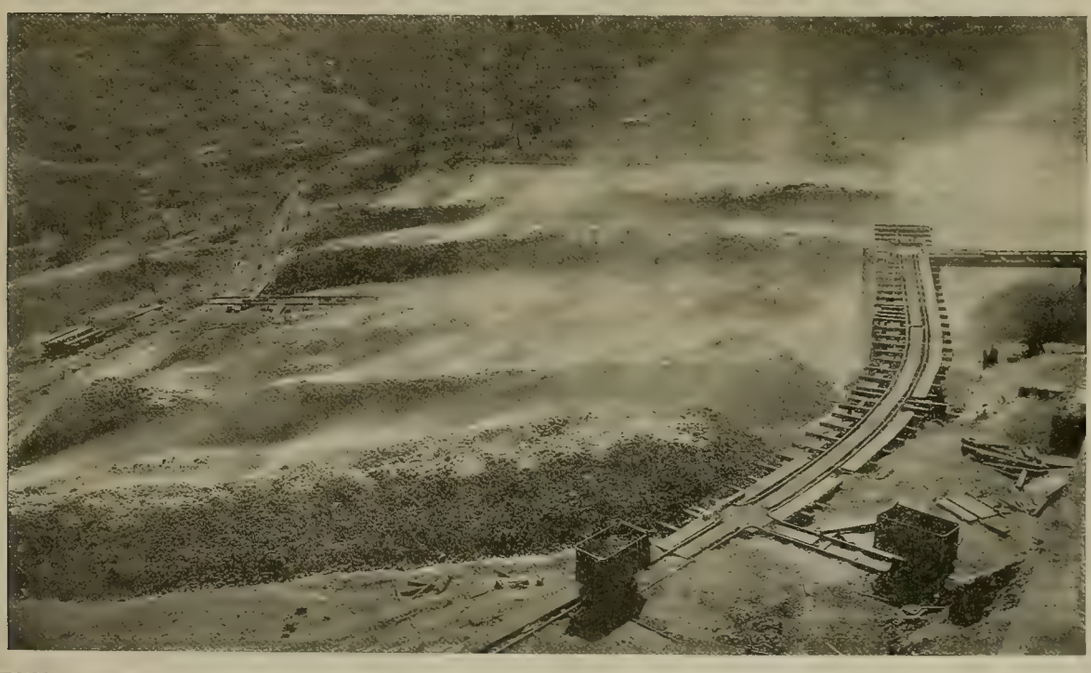
An official report states that during 1898 there were mined 221,895 tons of ore, containing an average of 8.42% copper. Of this 168,541 tons were smelted, resulting in 10,721 tons of metallic copper. It is said the net profit on this output was $815,000.

The company buys ore from the mines of the surrounding districts and has proven an important factor in the general development of the mineral resources of the county, affording an immediate and convenient market for the high-grade base ores which would otherwise remain unworked. As has been pointed out above, the ores of the Mountain Copper Co. contain but a small amount of silica—insufficient to make them self-fluxing—and the purchase of the siliceous ores from other mines of the district is of advantage to the Copper Co. as well as to the mine owners.

In the Backbone district, along Squaw creek, the same porphyry is found, and in it the copper-iron ore bodies. The Squaw creek mines are located in about the center of this porphyry belt and contain gold instead of silver. Moreover, they are defined veins, and not irregular deposits, like those previously referred to. These Squaw creek mines are found in an acid quartz-porphyry, and, though often called quartzite, they are of eruptive origin.

In the Balaklala mines the surface of the deposits is oxidized, containing gold and silver, and is low in copper; but beneath are found large masses of copper-iron sulphide ore.

There are in the copper district large undeveloped deposits, the extent and value of which cannot be determined without exploration, and as the fact has already been established that the heavy surface gossans do not always cover the richest copper deposits, and that rich copper shoots are found where no surface indication of their existence appears, the possibilities of the district may be considered as unknown in the present stage of development. The use of the diamond drill for prospecting in a region of this character is to be highly recommended, as the ore deposits are large, though erratic, and much valuable information could be gained by their use at a minimum cost. The diamond drill has been employed to a limited extent in the district with satisfactory results.



HEAP ROASTING, IRON MOUNTAIN SMELTERS, KESWICK, CAL.

Report of United States Geological Survey.

TO THE EDITOR:—Part II of the nineteenth annual report of the U. S. Geological Survey contains five papers. The first, Physiography of the Chattanooga District, in Tennessee, Georgia and Alabama, by C. W. Hayes, sets forth the results of a study of a region in which several distinct types of land surface are characteristically developed. It traces the process of drainage development and the origin of the present land forms upon rocks of diverse erodibility and diverse structure.

The second, Principles and Conditions of the Movements of Ground Waters, by F. H. King, contends that the water which occupies the interior of the earth's crust is, like that of the ocean and of the atmosphere, constantly in motion. These motions are at once numerous, extended and very complex, and are brought together and discussed under three categories—gravitational, thermal and capillary.

The third, Theoretical Investigation of the Motion of Ground Waters, by C. S. Slichter, relates to an investigation of the general problem of the flow of water through porous soils or rock.

The fourth is entitled Geology of the Richmond Basin, Virginia, by N. S. Shaler and J. B. Woodworth. The Richmond area is important from the economic as well as the scientific point of view. It contains the only freely burnable coal lying immediately adjacent to tide water in the eastern portion of the United States.

The final paper, The Cretaceous Formation of the Black Hills as Indicated by Fossil Plants, by L. F. Ward, with the collaboration of W. P. Jenney, W. H. Fontaine and F. H. Knowlton, presents a brief historical review of the investigations of earlier explorers, followed by specific chapters on the Minnekahta, Blackhawk and Hay Creek regions, general observations on the Cretaceous flora, fossil cycadean trunks, fossil forests, lower Cretaceous plants other than cycadean trunks and silicified wood, and the flora of the Dakota group proper.

CHAS. D. WALCOTT, Director.

Next Year's Ore Rates.

Blast furnace operators have been notified by the Bessemer Ore Producers' Association, which held a meeting in Cleveland, of an advance in the price of old range iron ores for the season of 1900, says the *American Manufacturer*. The rate has been raised from $2.90 to $5.50 per ton, a figure which was hardly expected. Many users thought the price would be placed at $4.50 or $5.

The Mesaba ores, which are not controlled by any association, have been raised in sympathy with the old range ores, the rate now being quoted at $4.25, an advance of $1.25. Heavy purchases of Mesaba ores were made by the Pittsburg and Valley furnacemen before the high notch was reached in prices.

It is not thought that the sharp increase in rates will affect the demand, and many operators are of the belief that every ton of ore mined under present plans will readily find a market.

Phenomena Attending the Accumulations of Bitumen.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, State Mineralogist of California.

Serpentine Rocks.—On the periphery of the jaspers, and between the jaspers and unaltered rocks, are serpentime rocks; also resting upon the jaspers are isolated bodies of serpentine rocks. All gradations from shale to serpentine rocks can be seen. Shales having a slight bluish green tint can be obtained; also pieces of the shale partly converted to serpentine rock, one part being serpentinous and the other shale. The serpentine rock lying on the surface of the jaspers would have a tendency to prove that the said serpentine is not eruptive, but metamorphic. Serpentine is seen in every stage of passage from argillaceous sandstone, shale and jasper to perfect serpentine itself.

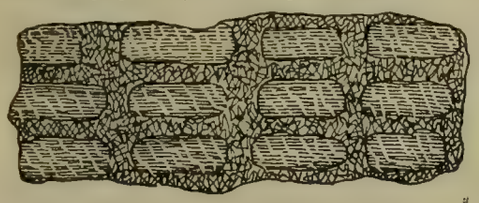


FIG. 7.—ALTERATION OF JASPER TO SERPENTINE.

The spaces between the irregular but somewhat cubical fragments of jasper which are arranged in rows after being converted to jasper from shales are filled with serpentine rock, and these fragments are frequently partly rounded by the alteration of the jaspers to serpentine rock. The lined portion of the figure indicates unaltered jasper and the remainder serpentine rock. The rounding of the cubiform fragments of jasper represents an incipient decomposition of the same.

The serpentine rock being next to the unaltered rocks which at one time was saturated with mineral water, the said unaltered rocks would permit the circulation of water bearing these minerals. The decomposition of jasper and shale to serpentine rocks seems to be more the action of hydrothermal than dry heat.

In places the spaces between the frgments of shales and serpentine rocks are filled with quartz carrying a notable amount of copper pyrites and a small amount of gold and silver. By an examination of the sectional views and sketch it will be seen that the northern side of the metamorphic rocks cuts the strike of the unaltered rocks diagonally, and that on the south side they run parallel with the strata of the unaltered rocks, sandstone being in contact with the serpentinic rocks.

A sectional view shows that the unaltered rocks on the south are part of the same strata as the unaltered rocks lying on the north of the metamorphic rocks. The unconformity of the metamorphic rocks with the sandstones and shales on the north and their conformity with the sandstones and shales on the south, taken with other phenomena described in this article, clearly demonstrate the fact that these unaltered rocks were not deposited on the altered rocks after they were metamorphosed. The unaltered shale underlying a sandstone is of great thickness, whereas at a point a half a mile east of this sectional view the metamorphic rock is nearly in contact with the same sand stratum.

Northeast of the metamorphic rocks are alternating beds of shale and sandstones. The shales are highly silicated. Silica dissolved in hot waters slowly ascended through the unaltered rocks lying north of the metamorphic rocks. The metamorphic rocks acting as a dam for its retention, as these hot waters cooled they were incapable of holding the same amount of silica in solution as when hot; therefore silica was deposited in the interspaces of the porous rocks. When siliceous waters flow upwards through a formation the rocks are silicated, and when the water flowed or flows downward through a formation the rocks are leached.

There are several reasons why this occurs. When waters flow upwards their flow is generally very slow; when coming from the depth of the earth the waters are generally hot, cooling as they approach the surface, and as they cool silica is deposited.

Silica is soluble in cold water. Under pressure and heat the solvent power of water is greatly increased. Upon the relief of the pressure or the cooling of the hot silicated water silica is deposited. A solution of silicate of soda, when undisturbed for a year or more, will deposit silica; if frequently disturbed no such deposition takes place. The deposition of silica from such a solution is quickened by the presence of carbonic acid. Petrified wood is often found in rocks that are not silicated. This is owing to the fact that the capillary tubes in the wood are much smaller than the interspaces in the circumjacent rock. Water filters through the wood and these rocks more or less quickly in proportion to their permeability; consequently circulation of fluids is slower in the wood than in the adjoining rocks. (*To be Continued.*)

Prevention of Freezing in Compressed Air Pumps.

The odd appearance of some of the "Concentrates" on the third page is due to the fact that those "Concentrates" are mainly boiled-down answers to questions technical and otherwise. To print the questions and answers in full would transcend the limits of this paper; but, ordinarily, the inquirer can get from the answer a good deal of information, and the general reader can usually get a fair idea of the matter.

Occasionally, however, a question is received which does not admit of extreme condensation, as, for instance, the following:

"E. J. R.," writing from Utah, asks:

Is there anything in practical use among mine operators that prevents the freezing up of pumps operated by compressed air, where inadequate ventilation prevents the use of a reheater near enough to the passage to give it any practical value? In my case, air is carried through 3500 feet of a tunnel, then down a shaft 200 feet more to the pumps—station and sinking pump having to handle 300 gallons of water per minute, while the nearest surface connection for ventilation is 1500 feet back towards mouth of tunnel from the shaft station. Present trouble is through freezing of pumps, though we use three receivers—the last at the shaft station—to give us as nearly dry air as possible.

In the case specified any one of three methods may be successfully used: First, where compound pumps are used, a device, noted some time ago as furnished by E. A. Rix, 507 Market St., San Francisco, would obviate the difficulty. This apparatus reheats the compressed air, and, incidentally, increases the efficiency of the pump, besides preventing its freezing up; or, second, the main discharge pipe from the pump can be tapped with a quarter-inch pipe, which may be led to the final exhaust of the pump. The end of the quarter-inch pipe should be drawn down and closed, so that there is a hole one-sixteenth of an inch in diameter at the end. Introduce this jet into the exhaust of the pump as far as possible and let the water squirt freely therefrom. This is a sure cure and will always keep the exhaust passages at a temperature that will prevent the formation of ice, and is simple and inexpensive. The small amount of water which is lost by this jet amounts to nothing. Third, submerge the pump entirely in a tank of water.

Some Salaries in British Columbia.

The Rossland, B. C., *Miner* says that the highest paid man in the mining business in British Columbia is Major W. J. Collins, general mining manager and consulting engineer for the British America Corporation—$50,000 a year. W. A. Carlyle, who recently resigned the position of general superintendent and mining engineer for the British America Corporation, was paid $10,000 per annum, and resigned to accept a similar position with the Rio Tinto Copper Co, in Spain, where the salary is $25,000 per annum. W. H. Aldridge, manager of the Canadian Smelting Works at Trail, is paid $15,000 a year. James Breen, who built the smelters at Trail and at Northport, and who is the manager of the latter, receives a salary of $15,000 per annum and one-fourth of the profits. H. C. Bellinger, at the Northport smelter, receives $10,000 per year. Major Leckie, manager of the Republic mine at Republic, and consulting engineer B. C. mine, Boundary, receives $7500 per annum. W. B. Wilson, superintendent Le Roi, receives $5000 a year. Frank Robbins, general manager Mann & McKenzie's mining properties in Canada, is paid $7500 a year. Carl Hand, in charge Payne mine, Slocan, is paid an annual salary of $7500. George Hughes, in charge Idaho mine, Slocan, is paid $10,000 per annum. W. Y. Williams, general manager for the syndicate owning Mascot and California, Rossland, Knob Hill and Old Ironsides, Boundary, receives $5000 a year. Paul Johnson of the Boundary Copper Co., who has charge of the Mother Lode and the erection of a smelter at Greenwood, receives $7500 per annum. J. B. Hastings and E. P. Kirby each receive $10,000 per annum.

Coal Washing in the State of Washington.

The accompanying illustration is a view taken in the coal washery of the Carbonado Coal Company, at Carbonado, Wash. This plant is equipped with two Jeffrey coal washing tubs, each having a capacity, under ordinary conditions, of 400 tons each in ten hours. The coal is brought to the washer by a system of conveyors located immediately over the washers. From this conveyor system the coal is fed into the washer by means of chutes. This washer is of the Howe type; it is made of heavy boiler plate, cone shaped; at the lower end is a slate chamber with two valves; immediately above the slate chamber there are four inlets, through which the water is forced into the washing tub. In the center of this washer is a heavy shaft upon which stirring blades or paddles are fastened. These rotate, keeping the coal in a continuous state of agitation. In operation, the coal is fed into the washing tub at the center. As this material settles in the tub it is met by the upper current of water. This then carries the coal or lighter products to the overflow at the top, while the refuse or heavier material sinks below, being withdrawn from time to time through the slate chambers.



COAL WASHING MACHINE AT CARBONADO, WASHINGTON.

In operating the slate chambers the upper valve is open and the lower closed; and in discharging the upper is closed while the lower valve is open. The water is supplied through pumps. By the use of this system the coal is freed from impurities, thus enhancing its value. The simplicity of this washer is manifest, there being nothing to get out of order, a great point in its favor, especially when located in isolated places. The manufacturers say that the cost of washing by this method is as low as three cents per ton, including cost of maintenance and operating. The manufacturers of this washer, the Jeffrey Manufacturing Company of Columbus, Ohio, will be pleased to give further information to interested parties.

GENERAL LAND COMMISSIONER HERMANN has decided that title to none of the oil lands of Kern, Kings, Tulare and Fresno counties, Cal., is to be given by the Government without a full investigation as to the character of such land.

The Discovery of Gold-Bearing Conglomerate in British Columbia.

Written for the MINING AND SCIENTIFIC PRESS by K. LUDLOFF.

During the progress of recent geological investigation made in the Fraser River district I have discovered what I believe to be the principal source of gold of the Fraser river placers, which has heretofore been a matter of doubt. The locality is that part of the Fraser river between Quesnelle and Fort George, about seventy miles south of the last-mentioned place, above a group of islands called the Woodpecker or Red Rock islands, the Indian name for which is Tselken-nuh.

The formation consists of the crystalline slates of the Archæan, which form the country rock and the bed of the river. These slates are overlaid in certain limited areas by the uppermost strata of the Tertiary, but the whole surface almost everywhere in this part of the province is covered by immense masses of glacial drift consisting of boulders, gravel and sand. In the formation where the gold has been found in place, true veins between regular walls and irregular silicious dykes, both of greatly varying width, intersect and interlaminate, like a network, extensive masses of conglomerate of different structure but similar composition. They are accompanied by chloritic and hydromica schists, the whole irregularly imbedded in the clay slates by the Archæan, forming a belt about one and a half miles in width.

The gold occurs in the form of a fine dust almost everywhere in these rocks, but predominantly in the bright yellow, red, orange or brown-colored parts of the rocks, superficially decomposed and in their cleavages. The decomposition extends down many feet under the surface; boulders readily crumble to pieces under the blows of a prospecting hammer. Hundreds of thousands of tons of this decomposed ore lie on the surface. In this locality these rocks appear on the surface at many places, forming cliffs, steep walls, round knobs, or hogsbacks on the river banks and attract the eye of the traveler by their color and grotesque shape; they extend on both sides of the river into the unknown wilderness, how far is unknown as yet.

The deeper strata of this formation are rich in fine-grained iron pyrites and traces of gold. There are only faint indications of the presence of other metallic compositions.

The gold is easily detected by using a powerful lens at bright daylight. It can not be seen by the naked eye or a poor magnifying glass. The surface of certain parts of these rocks, also their interior, is speckled with gold grains. Their shape is mostly globular, only exceptionally flat or flaky pieces are seen. Their distribution is irregular.

It is well known that the gravel beds of the Fraser river are rich in placer gold, renewing themselves every year by inundations, and gold washing is carried on annually along the river by numerous Chinese, using the rocker.

Placer mining will undoubtedly pay at many localities here by hydraulicking out the irregularities of the surface of the bedrock underlying the gravel beds. The broken strata of the slates standing out from the surface, slanting or perpendicular, form holes and caves in which the gold is caught. Some of the creeks emptying into the Fraser river will furnish a limited amount and sufficient pressure of water by their natural fall to be used for the above-mentioned purpose.

Fine gold occurs abundantly, but coarse gold is rarely found. Rocker washing pays at the average about $3 a day. The working season is about five months of the year, the balance of the time being taken by overflows of the rivers, snow and frost. The gravel bar below the above-described discovery, and covering about sixty acres, contains much fine gold, seemingly originating principally from the conglomerates and brought there by a creek, crossing them in a deep gulch.

About twelve miles distant from the conglomerates, directly in the river bank, I have discovered a huge outcrop of red hematite and micaceous iron.

The nearest railway station is Ashcroft, on the Canadian Pacific Railroad. A wagon road built and sustained by the provincial government leads to Quesnelle. There is regular stage service between Ashcroft and the northern placers. The Fraser river is navigable between Soda creek and Fort George and farther, but it needs improvement. A horse trail leads from Quesnelle to the eastern shore of the river opposite Woodpecker island; distance about fifty-five miles. Traveling on the river is carried on in canoes and boats up to nine tons capacity. A canyon eighteen miles north of Quesnelle forms an obstacle against navigation by steamers.

The Indians at Fort George and the Chinese along the river furnish a limited number of workers at $1.50 to $2 a day and board.

The climate is comparable to that of eastern Ontario or southern Wisconsin. The winters are about six weeks shorter than there.

This part of the province is entirely unsettled, although it contains large tracts of good farming land.

The country is abundantly timbered by Douglas firs, spruce, balsam firs, bull pines, red cedars, cottonwood, etc.

Quesnelle has about 1500 inhabitants, a telegraph and postoffice, a post of the Hudson Bay Co., stores, hotels, schools, churches, etc.

A number of claims have been taken up on the conglomerates and recorded, and many more may be taken up next spring.

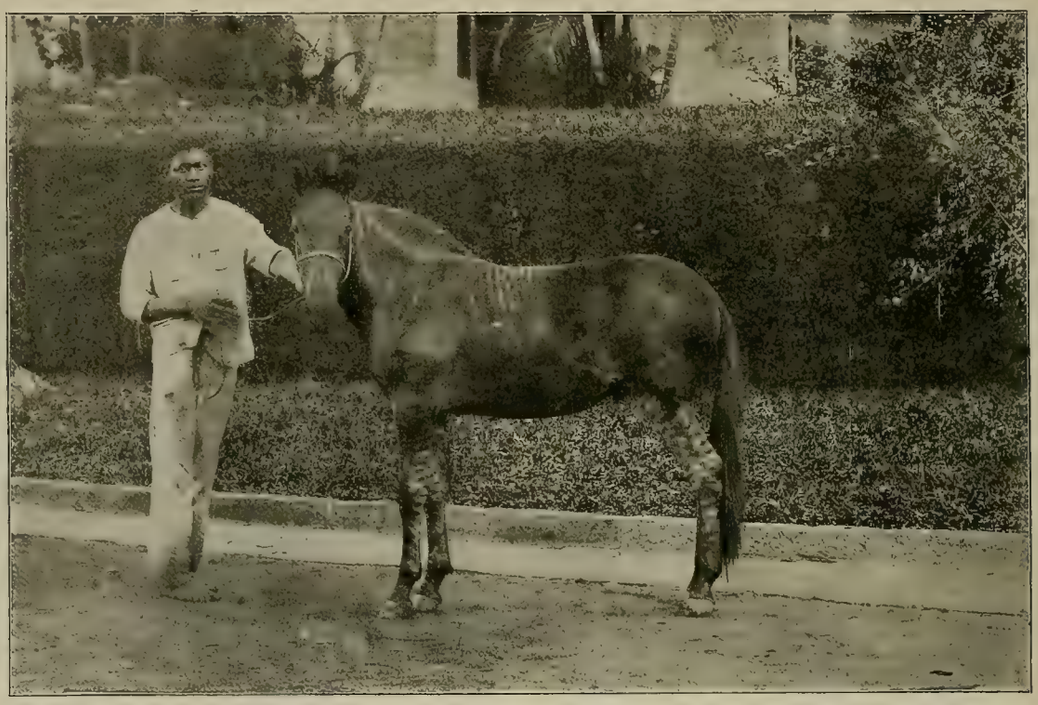
Quesnelle P. O., B. C., Nov. 18th, '99.

The 20th Century Mule.

In this age of progress it may interest the mining and scientific world to note that it is proposed to improve upon an humble ally of many a miner, and furnish an improved mule. The mule of the 20th century is to be styled a "zebroid," which is the name given the new animal depicted on this page, representing a one-year-old "zebroid," who, like his brother mule, appears to have no pride of ancestry and no hope of posterity. He is the result of crossing an ordinary mare with a zebra. The year-old zebroid illustrated herewith is the property of Baron de Parana of Brazil, S. A.

The Baron says that they are very sprightly, but are at the same time gentle and become very docile with kind handling. They feed as well from the manger as on the pasture and are possessed of great muscular strength. Their size, slenderness, pace and disposition depend upon the dam, and they may therefore be bred for heavy or light draft. Crossing upon draft mares gives zebroids large and strong, but not so thick set as their dams. Crossing with lighter horses gives tall and slender zebroids, which Baron de Parana claims are fully as strong as the horse, but more tractable and suitable for work which requires quickness rather than strength alone. The Baron is convinced that the zebroid will prove of great economic importance, and he believes that the zebroid will displace the mule—in fact, will be the mule of the twentieth century.

Many have been the services of the mule to mankind. In war and peace the mule is the motive power of important enterprises. He does not figure largely in parade and display; but when it comes to steady going, persistent and intelligent effort and unyielding endurance, the mule has stood for generations without a rival. It seems unjust that a servant of mankind having undergone such labors and achieved such successes should have to brook a rival at this late day; but why indeed should the mule escape the hardships which the demon of change inflicts even upon mankind? Doubtless the mule will not murmur, although he is a kicker.



ONE YEAR OLD ZEBROID LORDELLO, OUT OF THE MARE STAEL BY THE ZEBRA CANON.

Zinc Roofing Plates.

A company has been organized at St. Louis to manufacture zinc roofing plates. Plates of zinc have been used for roofing in Europe, and are said to be indestructible. The plates withstand the air along the coast as the moisture contains more or less chlorine from the sea. No effort has ever been made to utilize zinc plates in this country for roofing, tin and slate being the products used to a greater extent, with here and there a few tile. The price of zinc plates as compared to tin plate is said to be favorable to the zinc on account of its lasting qualities, and because it does not need to be painted. The present output of zinc at Joplin, Mo., has had much to do with the venture, and the plant is to be erected in the vicinity of a zinc mine.—American Manufacturer.

New Method of Slimes Treatment.

A new method of treating slimes in Australia is thus described in the North Queensland *Register:*

The slimes are trucked to the works, and there the required quantity of quicklime to neutralize the acid contained in them is added as the trucks are emptied into a hopper discharging into a disintegrator. The lime required per ton of dry slime varies from twenty to sixty pounds. After passing through the disintegrator, the powdered mass is raised by a bucket elevator to a top hopper, which discharges into side tip trucks running over the tops of the vats. Over each vat is a 6-inch centrifugal pump, the suction pipe of which descends at an angle to within 2 feet of the bottom of the vat, while the discharge pipe is continued down to the floor of the vat, where it is terminated by a right angle bend on a swivel point, so that the flow can be directed across to any part of the vat. The vat, being filled with solution of cyanide, the centrifugal pump is started, and in a few minutes the whole mass of liquor is in violent agitation. Into this agitated liquor the powdered slime is dropped, truck by truck, until the whole charge, amounting to ten tons, is delivered, the agitation being maintained the whole time. A few minutes after the last truck is dropped in the pump is stopped and the whole mass allowed to settle; this occupies some twenty minutes, the solution being left absolutely clear on top. A pipe, mounted with swivel joint, and connected with the pipe service leading to the zinc extractor boxes is then gradually lowered till the whole of the supernatant solution is drawn off. The vat is then filled with the weak solution, and the pump is once more set in motion; in a few minutes the whole mass is once more stirred up and the first process repeated. After the second solution has been drawn off clean water is added, and when the mass is worked into a slurry a plug in the bottom of the vat is opened and the thin slurry run off in wooden launders, whence it is raised and delivered away by a large centrifugal pump. Up to the present time 174 tons have been treated with the following results: Here is the result of the first extensive trial on Croydon Quartz Crushing Co.'s slimes: Average value before treatment: Gold, 9 dwts. 11 grains; silver, 2 ounces 17 dwts. 4 grains; gross value, £2 5s 10d. Average assay of residues: Gold, 2 dwts.; silver, 1 ounce 12 dwts., giving a value of 11s 8d. The bullion banked was 198 ounces 4 dwts. 12 grains, of a value of 16s 3½d per ounce. In addition to this, there is another 104 ounces 10 dwts. in the unsmelted precipitates, solution and zincs; this will come in next cleanup. The recovery is thus £1 8s per ton. As near as can be estimated, when working continuously, the total cost will not exceed 13s per ton, and may possibly be reduced below that figure. The necessary lime is procured in the shape of sea shell, and burned in a kiln at the works, the total cost of the pure lime amounts to £5 per ton.

Latest Mining and Metallurgical Patents.

Patents Issued Dec. 5, 1899.

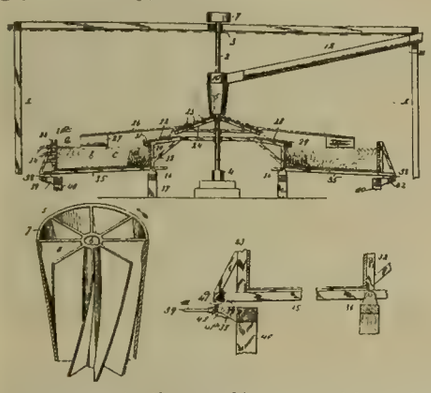
Specially Reported for the MINING AND SCIENTIFIC PRESS.

FEED CHUTE FOR SEPARATORS FOR ORE, COAL, ETC.—No. 638,062; F. Pardee, Hazleton, Pa.



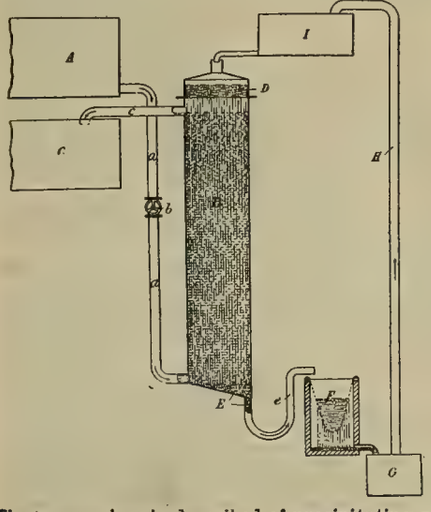
A feed chute for spiral separators, comprising two inclined main chutes and a bridge plate connecting the inner ends of chutes and formed with a laterally extending incline, and a lower chute arranged under the main chutes on a plane parallel therewith, and formed with a laterally projecting wing to receive and direct the material discharge from the lateral incline of the bridge-plate into the lower chute, and a third chute under the second chute formed with a laterally extending wing arranged to receive and direct material discharged from the other lateral incline of the bridge plate into the lower chute.

ORE CONCENTRATING MACHINE.—No. 638,276; T. S. Ridge, Kansas City, Mo.



An ore concentrating machine, comprising a shaft, a motor or wheel mounted thereon, embracing a rim or casing and spiral spokes or flukes extending inward of rim or casing, a stationary hood surmounting wheel and provided with an opening to receive the ore-laden water, a vat, an annular table arranged above the inner edge of the vat, a check rail surrounding and projecting slightly above the outer edge of table and a slight distance therefrom, and a conical distributing disk amalgamator mounted upon the shaft below motor or wheel. An inclined valve-controlled flume communicating with the upper end of motor or wheel, a circular vat provided with faucets or cocks at different altitudes, a distributing disk amalgamator *24*, secured to shaft below the motor or wheel, a circular table projecting inward from the inner wall of the vat and having its inner edge overlapped by disk amalgamator, brackets secured to the vat, a check rail *29* carried by brackets, and sweeps *27* operating in the vat and secured to the distributing disk amalgamator.

PRECIPITATION OF PRECIOUS METALS FROM THEIR CYANIDE SOLUTIONS.—No. 638,372; M. B. Zerener, London, England.



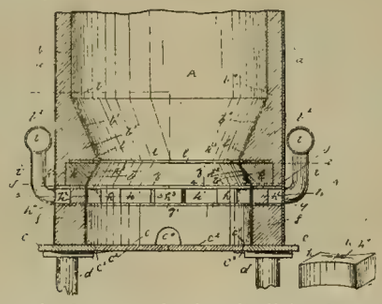
The process herein described of precipitating gold and silver from cyanide solutions, consisting in causing the solution to move in one direction and during such movement passing through it, in the opposite direction and in the form of a spray or a number of fine streams or films, mercury charged with alkali metal.

MINING APPARATUS.—No. 638,285; P. Schnetter, San Francisco, Cal.



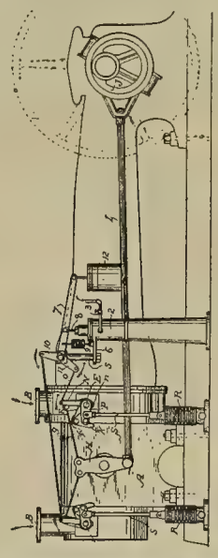
In mining apparatus for frozen ground, a stationary combustion chamber wholly open at bottom adapted to rest directly upon the frozen earth, a removable grate therein having upturned extension *35* at the rear, a removable bridgewall at the rear of grate, a downtake flue behind bridgewall, extending to the ground on which the combustion chamber rests, and a removable ashpit bottom *14* beneath grate, at such distance from the bottom of the chamber as to form a passageway for products of combustion along the surface of the ground, connected with downtake flue combustion chamber of rectangular form, provided with grates *10*, bridgewall *13*, downtake flue for surface working, a series of open-bottomed sections *2*, *3* and *4* hinged and forming an articulated flue to fit over the surface of the ground, means to hold the sections rigidly when adjusted, and links or eyebolts on the combustion chamber and on the sections composing the open bottom flue, so the whole apparatus can be slung and adjusted by lifting tackle.

CUPOLA FURNACE.—No. 638,541; M. Zippler, Allegheny, Pa.



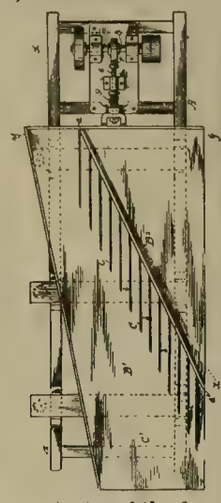
A cupola furnance having its lining formed with an inclined firebrick or clay portion extending downwardly toward the interior of furnace at the base thereof, a metal ring under inclined portion, series of metal bricks forming an outwardly flared lining under metal ring under metal bricks, a series of metal blocks forming air spaces between them, and a metal ring between metal blocks and the base lining.

AIR COMPRESSOR.—No. 638,460; J. H. Hopps, San Francisco, Cal.



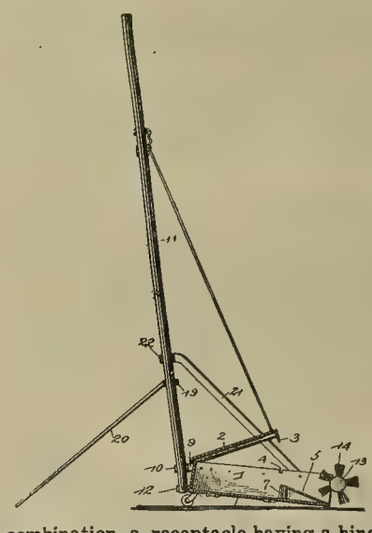
In an air compressor, a fixed arm the spindle of the inlet valve; a gripping device mounted loosely on the spindle and adapted to grip the outer end of the fixed arm; means for operating the gripping device from the motor or engine to move the inlet valve; a tripping device mounted loosely on the spindle and operated by the air pressure in the receiver or reservoir to disengage the gripping device from the fixed arm of the spindle when the supply of air to the receiver exceeds its exhaust; and a weight or spring connected with the fixed arm by which the valve is thrown wide open when the lever arm is disengaged from the gripping device. Means for automatically disconnecting the spindle of the inlet valve from the mechanism and power that drives it when the air supplied to the receiver exceeds its exhaust; means for throwing the inlet valve wide open when its spindle is disconnected from the driving power, and an automatic gripping device that couples and connects the valve spindle with the power driving mechanism when the air supplied to the receiver is below the draft upon it.

CONCENTRATING TABLE.—No. 638,324; W. G. DODD, San Francisco, Cal.



In an ore concentrator of the described class, the combination with the concentrating table, of an overflow riffle or rib arranged diagonally across the working face thereof, and of a series of parallel riffles or ribs joined to diagonal riffle rib extending longitudinally toward the foot or tail of the table. In an ore concentrator of the described character, the combination with the concentrating table, of an overflow riffle or rib arranged diagonally across the working face of the table and extending from its upper end to its lower side portion, riffle or rib decreasing in height from its upper to its lower end, and of series of parallel riffles or ribs extending from the diagonal riffle or rib longitudinally of the table or toward the tail or foot of the table, ribs or riffles being of a height corresponding with the height of the diagonal riffle or rib at the junction of ribs therewith.

MINING SHOVEL.—No. 638,681; F. D. Koch, Conchohocken, Pa.



In combination a receptacle having a hinged top and bottom, a metallic strip arranged on the sides of the receptacle, a loop formed from a strip in the rear, bearings formed on the extremities of the strip, a shaft, arranged transversely at the mouth of the receptacle, a brush on the shaft, means for driving the shaft, a handle and a connection from the hinged top to the handle. In combination with a receptacle adapted to be submerged, a hinged top having a depending flange on its front end, adapted to seat in recesses in the sides, a flexible connection for raising the cover, a scoop at the front of the receptacle having a rear inclined wall, an amalgamating plate in the rear of the scoop, a strip surrounding the receptacle on three sides, loops connected with the receptacle, a handle held by the loops, a brace rod pivoted to the collar on the handle, a sprocket wheel secured on the handle, a shaft arranged transversely of the scoop, a sprocket wheel thereon, a flexible band having recesses to receive the sprocket teeth.

Mining Summary.

ALASKA.

An important question has been decided by Commissioner Hermann of the General Land Office. The Commissioner decides that tide lands in the district of Alaska are not public lands, subject to disposal to individuals, under any of the existing land laws of the United States, and that the department has no statutory authority to make concessions to individuals of any mining rights pertaining to such tide lands. A citation is made by the Commissioner to the case of Stively vs. Boalby, decided by the United States Supreme Court, in which it was held that the United States, upon acquiring a territory, whether by cession from one of the States or by treaty with a foreign country, or by discovery and settlement, takes the title and the dominion of lands below high-water mark of tide waters for the benefit of the whole people and in trust for the future States to be created out of the territory, and it was further held that Congress had not undertaken by general laws to dispose of lands below high-water mark of tide waters in a territory, but, unless in case of some international duty or public exigency, has left the administration and disposition of the sovereign rights in such waters and lands to the control of the States, respectively, when admitted into the Union.

ARIZONA.

COCHISE COUNTY.

(Special Correspondence).—The altitude of Wilcox is about 5000 feet, and it lies in the heart of an immense valley, fringed by mountain ranges in the distance. It contains several large stores, and is the depot for supplies for a number of outlying mining districts, distant from fifteen to fifty miles. Among them are Dos Cabezos, Cottonwood, Dragoon, Pearce, Turquoise, Buckhorn, Chiricahua and Aravaipa, where Jno. W. Mackay's Grand Reef mine is situated. In all of these districts more or less work is going on, and a number of sales have been made to people with capital, who are doing systematic development work, and the outlook in most instances is promising. All these districts, as well as others of Arizona, have been retarded by men who have long held good mining claims, without doing more than assessment work, or, still worse, relocating from year to year and doing no work. An interesting feature in the Dragoon district came under my notice in connection with the discoveries of quartz carrying tungstic acid, used in hardening steel. In this particular instance the ore is known as hubnerite. It is situated in a canyon two to six miles wide and is found in placers which are worked dry and also with rockers, the output ranging from pebbles the size of a pea to large boulders. Geo. S. Mulkey, the owner of these placers, during a period of five months, with three Mexicans at $1.50 per day, took out over $5000. It is said that when Mr. Mackay begins to put out a large amount of mineral a railroad will be constructed to Aravaipa canyon.

Wilcox, Dec. 4th, '99.

MARICOPA COUNTY.

Copper ore is being shipped from the Cave Creek mines to the El Paso smelter.

MOJAVE COUNTY.

W. Weston and J. D. Murphy are arranging to sink a deep shaft on the White Hills mines, in the northern part of this county. The ores carry silver.

PIMA COUNTY.

The new Helvetia 175-ton smelter is in operation. Basing an estimate on 5% ore, it is said the smelter will net $1000 a day. The copper will contain about $35 in gold and silver. The metal will be refined electrolytically.

YAVAPAI COUNTY.

A diamond drill is in use on the Bosworth mines on the Agua Frio in prospecting, with good results.

A new shoot of ore has been found on the foot wall of the Lone Pine mine, 80 feet from the large sulphide bodies near the hanging wall. At a depth of 200 feet G. Rohpeter, the original owner of the mine and now superintendent, started a crosscut and 10 feet of concentrating ore has been cut. The mineral occurs in a white quartz and shows yellow sulphides with streaks of gray copper. It averages 6% copper and $12 in gold and silver. The Arizona Eastern & Montana Co. are preparing to increase their force on the property to 100 men.

CALIFORNIA.

Amador.

A wagon road is being built along the north bank of the Mokelumne river, two miles above Big Bar bridge, by the Stardard Electric Co., to a point four miles above the old location, near the Quartz Gem mines. A right of way across a piece of property was secured from W. T. Robinson, who owns the Electric mine. The cropping of the lode had to be cut into, and hundreds of tons of ore were uncovered. It is rich and the roadbed is a mass of quartz. Colonel Robinson will build a mill on his property. In the sixties a claim known as the State of Maine was worked near there, but the flood of 1861 washed the mill away and it was not rebuilt. The quartz at that time, it is said, milled $25 to the ton, but the sulphurets were not assayed.

Butte.

The Magalia mine has been dismantled and closed down, the workings of the mine having penetrated to such a great distance from the shaft as to render its further operations unprofitable under the numerous adverse conditions. A complete description of the mine appeared in the issue of April 8th, '99.

The Klora dredger is operated by electricity from the Yuba Power Co. Electric power costs $8 per H. P. per month.

Calaveras.

It was originally supposed that the large cash capital with which the Melones Co. began business would be sufficient to thoroughly equip the property. As an additional precaution, 32,423 shares of the original 200,000 shares capital stock were left in the treasury. The shortage of capital is due to two accidents which occurred when arranging for the mill. A ledge, supposed to reach across the creek, had been selected for the foundation of the dam. After the dam had been partly built, it was discovered that the ledge ran into quicksand, and during the delay a flood swept away that part of the dam already completed. The foundation for the 120-stamp mill was insecure and had to be reinforced and renewed at considerable cost. The necessary money is to be raised by sale of preferred stock, bonds and an assessment. It is reported that the mine is looking well.

The Calaveras G. M. Co. has filed articles of incorporation in the County Clerk's office at Salt Lake City, Utah. The capital stock is $100,000. O. P. Posey is Pres. The company owns a group of mining claims near Mokelumne Hill, which until recently was worked by Major Lucas.

Inyo.

Bishop *Register*: J. Enloe will run a 100-foot tunnel on his mine near Bishop. The hill in which the claim is situated is a mass of the chalky substance found in his workings, as he has found no walls in cutting across, and prospect shafts show the same material. Nearly all of it shows colors in horning.——T. W. Hill and J. H. Coe are working on the old Montezuma mine, southeast of Big Pine. They will run a 300-foot tunnel to tap the present workings. The deposit of ore is extensive. A switch has been put in at that point. The ore nets about $20 per ton, across a 7-foot ledge. Five carloads were shipped last week.——A. Cruse and L. B. Killion have five locations twenty miles northwest of Bishop, called the Granite Mountain group. The ledge on which they are working is 8 to 10 inches wide and its ore free milling. They have sent ten tons to Storey's mill to be worked.

Kern.

Representative Needham, on the 12th inst., went to the Interior Department to confer with the Commissioner of the Land Office to stop effectually the alleged frauds in securing title to oil lands in the San Joaquin valley. In addition to the order heretofore made withrawing from entry lands which have been described in letters and telegrams, Needham got the Department to issue another order requiring locators of these lands, who are attempting to get title with scrip, to publish a notice of their location in the nearest newspaper, and also requiring such locators to prove that the lands so taken are agricultural in their character and not mineral. The Department will hold that this order is retroactive. This order will place upon the scrip men the burden of proving that their lands are agricultural rather than mineral.

Lake.

The Abbott mine during November shipped 200 flasks quicksilver.

The La Joya mine, near Oakville, has resumed operations and will again be a shipper.

Mariposa.

The boilers for the Mariposa mine are to be set in a foundation of steatite (soapstone), which is abundant in this county. Men are sawing out blocks of the proper size from a deposit on Stockton creek, near Mariposa. The mine workings, which have been abandoned for years, are being unwatered and the shaft retimbered. This mine has opened a large quartz vein at or near a contact of black slate and diorite-porphyrite. A characteristic feature of the vein is the frequent occurrence of brilliant quartz crystals in rings in the vein. A large amount of gold was taken from the mine in its early history, much of it in masses or pockets. Besides the pockets a great deal of rock was milled, returning about $10 per ton, which at that time—about 1870—no more than paid expenses. Under modern condition a like return would net a large profit.

Mono.

Bridgeport *Chronicle-Union*: Arrangements are being made to run the mill at this mine during the winter months. The Low Land tunnel has been completed and has cut a fine body of quartz. A new tramway, 500 feet long, has been built from this tunnel to the mill; also new ore bins, carpenter and blacksmith shops, and new snowsheds have been erected. The sawmill has proved a success and decreased the cost of the tramway and buildings. The owner of the Castle Peak is A. D. Cullum of London, who is represented at the mine by E. J. Andrews, J. J. Kermeen being manager.——At the Alamo mine, in Little Antelope valley, work is progressing rapidly under the management of C. E. Watson, its new superintendent. Should the winter's work show a body of ore to warrant it, a mill will be erected in the spring.

Napa.

Quicksilver shipments for November were: Napa, 450 flasks; Ætna, 400; Great Western, 154; Vallejo, 118; Mirabel, 61; Sulphur Bank, 72. Total, 1255 flasks—a decrease of 148 flasks from the prev ous month's shipment. The month's shipment, at $50 per flask, is worth $62,750 to the producers. It is now higher.

Nevada.

A strike is reported in the Maryland mine, near Grass Valley. This mine is an extension of the Eureka-Idaho, and the new ore shoot is entirely independent of the rich Eureka-Idaho shoot, which produced many millions and is exhausted. Heretofore no great amount of exploration outside of the main shoot and vein referred to has been made.

A number of owners of city property in southeast Grass Valley have bonded the mining right attaching to their lots to E. M. Taylor and others, who now offer the consolidated right for sale at the rate of $2000 per acre.

A new air compressor is being put in at the Allison Ranch mine, on Wolf creek, below Grass Valley, and a large pump is to be placed on the 900 level. At one time the Allison Ranch was one of the richest mines in the State.

The shaft of the Brunswick mine, near Grass Valley, is to be straightened and the mine put in condition for more economical operation.

The South Idaho mine, near Grass Valley, is to be opened by J. P. Maleville. The machinery at the Daisy Hill will be moved to the South Idaho for this purpose.

Orange.

The tin discoveries reported from the Eastern side of the county, near the Riverside county line, are said to be genuine and to contain 14% tin oxide. It is reported that a site for smelters, etc., has been secured near Capistrano.

Placer.

W. Nicholls, Jr., owner of the Polar Star mine, will work four monitors during the winter run and thirty men will be employed. Two thousand inches of water will be used. The gravel is coarse and requires blasting. The Bear river dam, approved by the Debris Commission, will probably require no building up for the season.

San Benito.

The New Idria mines, sixty miles southeast of Tres Pinos, are producing 400 flasks of quicksilver monthly. A new plant has recently been put in at these mines and the low grade dumps can now be worked at a profit. These dumps are said to run from 1% to 15% metal. The hanging wall of these deposits is well defined and consists of finely laminated shales, in which there are occasional occurrences of quicksilver. The foot wall rock is arenaceous shale, graduating into soft sandstones.

San Diego.

The long tunnel run to cut the Kentuck S. vein, near Banner, has reached the lead and is reported in good rock. The success of this enterprise should give more confidence in the future of the district, as proving that veins are not of superficial character. The rich shoots of the district as determined on the surface have a vertical range of 1700 feet—from the bottom of the mines in the canyon near Banner to the summit of the hill above the Owens mine at Julian—and there is no reason to believe that the ore does not extend to that depth throughout the district, and the recent development in the Kentuck S. tends to substantiate this.

A company has been organized to reopen and operate the Helvetia mine near Julian, which has had many owners and managers, but of late years has not paid. All the workings are through a shaft, though it could be developed through a tunnel.

Santa Clara.

The Guadaloupe quicksilver mines, six miles east of Los Gatos, has been bonded by J. V. Coleman to Napa county, Cal., people, who say they intend to rehabilitate the mines. At one time, under the direction of Supt. Thayer, these mines produced 1200 to 1500 flasks of quicksilver monthly. The Guadaloupe mines are in the same belt with those at New Almaden, a few miles distant.

Shasta.

A strike is reported in the Midas mine, on Harrison gulch, in a new shaft, which unexpectedly cut a rich vein. Near the Midas Harwood & Huntington have found a rich vein on their claim, and the same vein has been discovered on the opposite side of Harrison gulch, on the claim of Fletcher & Sherk.

The engine house of the Summit mine, Sunny Hill district, was burned last week. Nitro powder had been placed over the boiler to thaw it. It caught fire, and the house and contents were destroyed.

L. F. Barlow has nearly completed his contract at the Summit mine, of driving an upraise 450 feet from the tunnel to connect with the shaft. The raise is from the tunnel, 1000 feet from its mouth.

Sierra.

A nugget of gold, valued at $600, was found recently by J. Gutgens near Logansville in the gravel.

The Diadem mine is being worked by J. M. Harper. Five tons of rock recently crushed at the El Dorado mill yielded $5000. A number of pockets have been found the past season.

The tailings of the North America mine are to be worked.

The upraise from the bedrock tunnel to the channel of the Swansea drift mine is thought to be approaching the gravel and is expected to reach it before Jan. 1st.

The Mammoth Spring mine, two miles east of Forest City, is being worked, and the workings are now in pay gravel. R. P. Mott is in charge.

Siskiyou.

(Special Correspondence).—Jillson & Co., who bonded the Fairy Queen mine some time ago, have struck a 15-inch vein of high-grade ore in the lower tunnel. They have also bonded the Central mine of C. R. Wiegel, in the same district. Two shifts are at work.

J. L. Coyle has completed a test run of 100 tons from the Tauina mine, an extension of the Hazel, near Henley.

H. Mattern of the Ashland mine has bonded four claims for $5000 on Rocky gulch and is developing the property.

Coles, Dec. 12th, '99.

E. Carlson is developing a mine on the head of Dutch creek. The ore contains copper and gold.

Spengler Bros. are working their placer ground at the mouth of Humbug creek.

The McCook mill, on Humbug, is running by water power.

A large number of claims have been located in East Fork district, and also in Gazelle and Butteville districts.

Etna *Advance*: The tailing dam at the Oro Fino gravel mine has been completed; it is one of the largest in northern California. Supt. Rusby is getting the pipes and elevators in shape to commence operations as soon as sufficient water comes to justify starting up.

Tuolumne.

The Bonanza mine at Sonora is again being unwatered. The inclined shaft is over 1400 feet deep.

At the Rawhide mine twenty stamps are dropping.

At the Jumper mine, near Stent, crosscutting is in progress on the 1100 level. Forty stamps are dropping.

A strike is reported in the Nonpareil mine, near Deer Flat. The mine is being opened by the Longfellow Co. of Big Oak Flat. It is reported that a steam hoist and a mill are to be built.

Yuba.

W. M. Jefferds of Brown's Valley is to sink a 5x12 vertical shaft on his Northern Light mine, situated at the edge of Brown's Valley. It is the intention to sink this shaft to a depth of 500 feet to tap the main Pennsylvania-Jefferson vein.

COLORADO.

BOULDER COUNTY.

The Big Five Co. have bought the Davidson mine at Ward for $8000. Previously it has been worked mostly by leasers.

CHAFFEE COUNTY.

The Buena Vista smelter has closed down, owing to a disagreement between owners and workmen over hours and pay. The report is that the management of the smelters posted a notice that twelve hours' work would constitute a shift beginning Dec. 11th, with no increase in wages, and the men walked out.

FREMONT COUNTY.

By the recent deal of the American Zinc-Lead Co., the capital has been increased to $1,000,000 and the principal office removed from Boston to Canyon City. Five new cupola furnaces and sixteen zinc furnaces are to be built, making a total of ten cupola furnaces and twenty-four zinc furnaces. It will have a capacity of 300 tons of zinc ore daily. The Canyon City smelter has in the past employed zinc ores chiefly in making zinc paint.

HINSDALE COUNTY.

S. D. Nicholson is trying to make arrangements to resume operations on the Ute and Ulay mines near Lake City, which were closed down on account of the coal famine a few weeks ago. The Ute and Ulay and the Golden Fleece are the largest mines in the county. The ores of the Ute and Ulay are chiefly lead carrying silver, and the mine outputs from 100 to 300 tons daily. During the summer, the mine and mill are run by water power.

LAKE COUNTY.

(Special Correspondence.)—The properties of the Penn M. & Leasing Co., on Breese hill, Leadville, are shipping seventy-five tons of ore per day, which consists of an oxidized, decomposed quartz, and comes from about 235 feet depth, though a prospecting shaft has been sunk to 700 feet depth. S. J. Sullivan is the manager.

The Adams, Maid and Wolftone improvements on the Wolftone grounds are progressing rapidly. Timbers are ready for the erection of the new gallows-frame over the 950-foot shaft. The frame will be 75 feet high and the shaft house 34x74 feet. This construction is in charge of John McLellan. The boilers for the new plant are being put in place. The hoisting machinery and pumps will arrive later. The shaft is to be sunk to 1250 feet depth.

The Greenback is located in the saddle between Carbonate and Iron hills. It is the property of Tingley S. Wood and Patrick Mulrooney, and is shipping 175 tons of ore per day, consisting of a clean iron pyrite, with considerable lead and no zinc. The first-class ore runs 50 to 60 ounces silver and .06 to .08 ounces gold, the second class running about 24 ounces silver, 35% excess of iron and about the same values in gold as that of the first grade. The first grade also carries a good excess of iron. A new shaft house has been completed. The depth of the shaft is 1100 feet, 4½x11 feet, giving room for water pipe compartment. From the shaft a drift runs southward 200 feet to the ore body, cutting the latter at right angles to the strike. The vein ranges from 14 to 40 feet in thickness. The surplus water, 500 gallons per minute, is handled by the pumps at the Mahala mine.

The Mike and Starr, located on the saddle between Iron and Breese hills, owned by the Hibendum M. Co., is being worked by three sets of lessees. The property produces low-grade iron pyrite, with sufficient copper values to make it specially desired by the pyritic smelters. The product of about 150 to 175 tons per day is being taken out through the Yak tunnel.

The New Northern, comprising a group of fourteen claims on Carbonate hill, has shipped as high as 100 tons per day of iron oxides, carrying silver values.

The new air compressor on the Ibex group has capacity for twenty-five air drills. It has two low-pressure air cylinders, 30x30 inches, which operate in tandem with two steam cylinders of same dimensions. The speed of the entire compressor is controlled by an air governor, which keeps the pressure uniform. The flywheel is 14 feet in diameter and weighs seven tons. In the same room is a boiler-compound tank, which holds enough of the material to last eight or nine boilers a month; this is fed into the suction pipe of the boiler feed pump, being arranged with sight feed so it can be fed into the boilers in the desired quantity. The hoists at the several shafts, the compressor and other machinery of the property are supplied with power from a battery of twelve boilers, aggregating 960

H. P. at No. 3 shaft, steam from which being conveyed as far as 1500 feet to various engines. An Edison direct multipolar, direct current dynamo, of 65 K. W. capacity, direct connected with engine, makes 280 revolutions per minute and lights the underground and surface premises of the Ibex and runs a diamond drill motor.

The Curren and Grand Prize, on Breese hill, are under a five-year lease to McAllister & Connell, who are working from a 500-foot shaft.

The Big Six is being developed further by an Aspen Leasing Company. The shaft is 400 feet deep.

The Denver & Rio Grande Railway Co. are extending their belt line around to the western and southern slope of Breese hill; and around the Ibex grounds they have erected very expensive snow sheds. WASCOTT.

Leadville, Dec. 8th, '99

(Special Correspondence).—The Iron Silver mine is producing nearly 300 tons per day, about 160 tons of which are iron sulphide ores carrying silver and lead, the balance being more zinciferous in character. The iron ores contain no oxides nor manganese. The ore body on this property is in a contact between porphyry and lime, the main working level being 400 feet depth. The work extends eastward from the shaft about 2000 feet. The crushing and concentrating mill is running eighty tons per day, having fourteen Wilfley tables, which are arranged in two rows, the one for the material crushed to 12 mesh and the other for that crushed to 25 or 30 mesh. The tailings from the coarse tables are also conveyed to the fine tables. The principal lead values are obtained in the coarse product, the iron with accompanying values in the fine product. The ores generally run 11% lead, 25% zinc, 18% to 22% iron. The concentrates from the mill average 27% lead, 22% iron. Those ores not milled are shipped.

Robert B. Estey and Norman M. Estey, as general manager and superintendent, respectively, are doing extensive development in various parts of the district for several different companies, in which Boston men are interested with them.

On the south slope of Breece hill the Comstock G. M. & L. Co. lease is being developed by sinking a shaft, now down 450 feet, over which is a good plant of machinery. Under the same management the Chippewa group on Breece hill is being developed as the Chippewa lease. One shaft has reached a depth of 600 feet and other shafts have been started.

On Rock hill two shafts are being sunk by the Revenue L. & M. Co. Buildings have been erected and machinery put in place for hoisting and pumping.

The Rialto group is also under the management of Messrs. Estey, and is located on the south slope of Iron hill. The Pyrenees shaft, one of the Rialto group, is 1250 feet deep, on which work is to be resumed.

Messrs. A. W. Lawrence, George H. Flint, George D. Edmonds and William G. Reed, all of Boston, Mass., are heavily interested with Messrs. Estey and Albert Hohenloe of Leadville in the various companies above named.

Leadville, Dec. 11th, '99. WASCOTT.

A strike of carbonate ore in the Nubian shaft on California gulch has been made at the depth of 450 feet. The ore carries 40 to 150 ounces silver per ton.

The gold mines of the sulphide belt back of Breece hill are outputting a large tonnage of pyritic ore. The principal shippers are the Ibex and New Monarch. It is expected the Resurrection will soon begin shipments.

A discovery of gold and auriferous pyrite is reported in quartzite in the Bently claim on Mount Zion, at Leadville. Up the Arkansas river gold is found in the quartzite at the same geological horizon and in South Dakota in a large number of valuable mines the gold occurs in Cambrian quartzite and there is no reason why it should not also be found in Leadville district, which is in the same geological horizon.

SAN JUAN COUNTY.

The new Sunnyside mill is to be run by water power, the pipe line being over a mile in length.

The Congress mine on Red mountain is producing a carload of high-grade ore daily. The working force is to be increased.

Ore from the Uncle Sam mine is being crushed in the Boston & Silverton Co.'s mill, where the ore is being delivered by pack train.

In the Henrietta mine a small vein of rich gray copper is being worked by the Paradox Copper & Gold M. Co.

SAN MIGUEL COUNTY.

Some time since the Liberty Bell put in an experimental cyanide plant for the purpose of testing tailings from their mill. Reported tests showed that considerable value escaping could be saved by cyanide treatment. In accordance with this result, operations at the mine have been materially curtailed pending the construction of a cyanide plant large enough to handle the mill tailings directly. Development work is in progress in the mine, but no stoping.

At the Palmyra group, in Turkey Creek basin, 500 feet of the old workings have been retimbered and the main tunnel is being driven on the vein. A new tunnel has been started, crosscutting to the vein, which it will reach 800 feet vertically below the surface. A mill will be built next year.

TELLER COUNTY.

(Special Correspondence).—There will be a big explosion at West Beaver Creek on the 18th inst. The Pike's Peak Power Co. on that date proposes to touch off about 30,000 pounds of explosives and throw down 40,000 cubic yards of granite, in their present work of building a steel-faced, granite-filled dam there. This will be one of the biggest things of the kind ever heard of.

Victor, Dec. 10th, '99.

A strike is reported in the Elkton Con. property on the sixth level, where it is said 12 inches of ore running over $3000 a ton has been found. Gold and tellurium are abundant. There is also over 5 feet of ore running several hundred dollars per ton.

The gold production of the Cripple Creek district for 1899 will closely approximate if not overreach $20,000,000. The monthly output for the first eleven months of the year has been as follows:

Months.	*Production.*
January	$1,550,000
February	1,296,750
March	1,504,000
April	1,513,000
May	1,576,212
June	1,300,000
July	1,181,980
August	1,445,300
September	1,731,000
October	2,003,600
November	2,515,500
Total	$17,607,342

The December production is estimated at $2,750,000, which, if realized, will make a total for the year exceeding $20,000,000.

IDAHO.

CUSTER COUNTY.

The Big Copper mine, near Houston, is reported to have a large amount of ore in sight. The workings are now down 700 feet and crosscuts are being run. W. Darlington, the Mgr., says if the ore carries sufficient pyrites he will build a pyritic smelter. The old smelter at Houston was blown in a short time ago and made a short run. It turned out $12,000 worth of copper, when the coke gave out. A new supply has been procured and the furnace will be blown in again. Next spring work will be prosecuted on a large scale and new furnaces will be built.

ELMORE COUNTY.

A strike of rich quartz at Spanishtown, a few miles from Rocky Bar, is reported, the ore of which is base at the surface. The ledge is owned by Towne & Kirby and is 5 feet in width. By roasting this ore, after pounding in a mortar, it pans out well.

IDAHO COUNTY.

Rich ore is being found in the Dewey on the Clearwater, four miles from Grangeville, some of it assaying $4000. The extent of the ore body has not been determined. S. I. Silverman is the manager.

It is reported that Clark & Sweeny have paid M. D. Pettibone $11,000 cash for the Vesuvius claim, at Buffalo Hump. The property has been prospected by crosscuts on the surface and sinking. The vein is 22 feet wide.

OWYHEE COUNTY.

For some months past a tunnel driving contest has been in progress between the De Lamar and Trade Dollar mines. Manager Huntley of the De Lamar says his men have made a record in tunnel work and have distanced the Trade Dollar crew so far that the latter gave up the contest some time ago.

MICHIGAN.

HOUGHTON COUNTY.

The Atlantic mine, during November, produced 300 tons of metal, which is the largest output in its history.

The Calumet & Hecla will build a new mill with six heads next spring, to stamp ore from the Osceola lode.

MONTANA.

The report of State Mine Inspector Byrne has been made public for the fiscal year 1898-'99. He says the mining industry in Montana gives employment to 12,316 miners. During the year there were but forty-nine fatal accidents, which is a decrease in percentage of the fatalities of the previous year. A comparison of the mining industry during the year with previous years exhibits a marked improvement. More mines are in operation; a greater number of men employed; better methods and results in the mining, smelting, milling, cyaniding, and the combination of those and other processes which are being applied to the recovery of values contained in the ores of this State. The results of the improvements in this direction are of incalculable benefit to the chief industry of our State, for not only is the productive area of the regular producing lodes increased in consequence, but several old mines, after a long period of inactivity, have again resumed operations and are yielding handsome profits from a class of ores that were worthless to their early operators.

SILVER BOW COUNTY.

The Speculator mine at Butte is making extensive improvements, says the Anaconda *Standard*. The old inclined shaft is down 900 feet, and through this the mine is being worked. The new shaft is 200 feet from the old one. The sinking of this shaft was begun last June and is progressing at the rate of 4 feet daily, three shifts of six men each being employed. It is down 650 feet, the timbering being carried along with the sinking. There are three compartments, each 4½ by 5 feet. The timbers are 12x12 with 12x14 center pieces. In sinking hand drilling has been exclusively employed, the purpose being to avoid the shattering of the walls of the shaft, which sometimes follows the use of machine drills. Over this shaft will be built a steel gallows-frame 52 feet high, and the hoisting will be done with double-deck cages. The foundation for the gallows-frame is built and the steel frame is on the ground. The hoist will be capable of working to a depth of 2000 feet. The engine was formerly in use at the High Ore. It will be housed in a steel building 40x45 feet. The foundations for the engine are being set. The boiler plant will consist of four 150 H. P. boilers, and they will all be connected with a steel smokestack 6 feet 9 inches in diameter and 125 feet above the foundation. Altogether the mine is employing 150 men. It is under the superintendency of W. W. Wishon, who also has charge of the Ramsdell-Parrot. The mine foreman is P. Sheehan. The work of ore extraction goes steadily on, although effort is now directed to the new work. The new shaft is to be sunk to a depth of 1000 feet. A connection has been made with the old one at the 400 level and another will be made at the 700. When the new shaft is down to the heavy ore bodies and the hoist installed the old shaft will be used for ventilation only. The Speculator is owned by the Largey estate and J. A. Creighton of Omaha, Neb. Lying on the border line between the silver and copper belts, its product is chiefly copper, but there is also a percentage of silver. The first-class ore is sent to Deadwood, where it is treated by the Golden Reward Co. The second class is worked mainly at the Colorado smelter. The mine is in the northeastern part of the district, near to the Bell and High Ore.

Butte hill is changing its appearance, the old-time wooden buildings which enclose wooden gallows frames and hoisting engines disappearing and in their places are going up steel structures. At several of the leading mines, including the Mountain Co. No. 2, High Ore and St. Lawrence, these are already in operation, while at the Mountain View, Speculator and others new ones are going up. The hoisting engines are enclosed in buildings of brick and steel. The new surface plants will have a capacity of working to 3000 feet. It has long been supposed that the copper zone was confined to the hill between Butte and Walkerville. The Cora mine, east of the latter place, has lately developed into a copper mine and leasers are working this mine through two shafts. F. A. Heinze is working the 600-foot level and taking out ore carrying forty ounces silver, $8 in gold and 3% copper. On the 300-foot level the percentage of copper is said to be higher.

The suit between E. R. Morse of Boston vs. Montana Ore Purchasing Co. (F. A. Heinze) has recommenced at Butte, to determine the ownership of the Michael Davitt, Rarus and Johnstown claims in the Butte Copper Belt. The case was recently tried and resulted in a disagreement.

NEVADA.

ELKO COUNTY.

It costs less than $3 per day to handle the water at the Young America with the new gasoline pump, says the Tuscarora *Times-Review*. Tests demonstrate that the pump can be run steadily for twenty-four hours on less than $8 worth of gasoline. Conservative estimates place the cost of fuel to do the same work at $20 per day.

ESMERALDA COUNTY.

Several miles southeast of Hawthorne, A. B. McCaw, of San Francisco, has interested Ballard and Martin, mining operators of San Francisco, Cal., in extensive copper deposits. These are now being developed with encouraging results. The zone in which these ores occur is 1000 feet wide and several thousand feet in length. Superficial workings at numerous places show the ore to occur scattered throughout the belt. The gangue is silica (jasper) and the ore red oxide (cuprite), in various stages of alteration, with malachite and chrysocolla. No sulphide ores have as yet been developed. If more extensive development justifies the building of a smelter it will be put up on Walker Lake. The grade of het ore thus far developed will average 8% or 9%, though a large quantity of ore going 20% can be readily sorted.

LINCOLN COUNTY.

A strike has been made at Stateline by D. Huntsman, who was an original discoverer in the La Sals. The best assays return $156 gold and 82 2 ounces silver per ton, of which there are 5 inches in a vein 18 inches wide.

STOREY COUNTY.

The 1950 level of the Con. Cal.-Virginia is being reopened, after having been abandoned several years. The workings are found somewhat caved, but are generally in better condition than was expected. The water is held 120 feet below this level by the hydraulic elevators.

NEW MEXICO.

GRANT COUNTY.

(Special Correspondence). — From Clifton and Morenci by way of the Arizona & New Mexico Railroad to Lordsburg, New Mexico, is seventy-one miles. Your correspondent visited the old camp of Shakespeare, situated seven miles from Lordsburg. In the month of April last there was one property being worked by California people, known as the Eighty-five. They were then opening a property carrying gold, copper and silver and netting about $40 per ton. Now the extension of this property, an old (supposed to be worked out) mine, is paying its owners $200 per day above expenses, and another old property, bought the past summer for $800, was paid for by sorting over an old dump. Shakespeare was in the early seventies a booming camp, and was one of the enterprises which W. C. Ralston of San Francisco had under way. It was at that time a silver mining camp and several mills and hoists in various stages of dilapidation still bear witness to the expenditures made. Near the mines an adobe town was built. The houses were closed for years and there were no signs of life there whatever last spring. Now there is an awakening. From the present outlook it would seem that there ought to be an opening for a concentrating plant.

Lordsburg, Dec. 3d, '99.

A new mining district has been discovered seven miles south of Georgetown, where ores of copper, lead and silver have been found. The ore is mostly low grade.

OREGON.

BAKER COUNTY.

A. J. Hendry, with S. S. Start and others, has secured a bond on the Wilson group, which adjoin the Red Boy on the south. There are five claims. The Wilsons have a tunnel in 100 feet, and the ores show a good prospect.

The Evening Star group, located near McCullock's Fork, three miles west of Sumpter, have been incorporated by the Evening Star M. Co.

A strike is reported in the Robert Emmet, at Cornucopia, an extension of the Red Jacket.

Several mines in Granite district are shipping concentrates to the smelters.

The Vananda group of mines on Olive creek has been sold to British Columbia capitalists, represented by Col. Topping. The price is reported to have been $1,500,000. The new company will erect a mill.

JOSEPHINE COUNTY.

The Josephine dredger at Sailor Diggings has started up again.

H. Rissue has made a strike on a claim in Bohemia district. The ledge is 8 feet wide. A deal was recently made of 640 acres of patented land, containing placer and quartz claims, on Galls creek, near Gold Hill. The buyer was F. H. Osgood of Seattle.

UTAH.

A bill has been introduced in the Senate to establish an assay office at Salt Lake City.

DOUGLAS COUNTY.

A copper strike is reported in the Copper Star mine, near Sedalia, where 2 feet of rich ore has been cut in an 8-foot vein. The mine is two miles from Sedalia.

JUAB COUNTY.

About 8000 shares of the outstanding stock of the Centennial-Eureka has been bought by Clark & Coolidge of Boston, for $500,000, completing the purchase of the 30,000 capitalized shares of the old company at a cost of about $2,100,000.

An important strike is reported on the 900 level of the Grand Central, at Tintic. The mine is making shipments of high-grade ore.

There is more activity in Dry canyon than in many years. The Mono and Hidden Treasure, which in the early days of the chloride excitement became noted, after years of idleness are again to ship ore from deeper levels than any reached heretofore.

SALT LAKE COUNTY.

The Bingham Tunnel Co. has decided to sink a shaft on the Keystone claim in alignment with the Bingham tunnel, and at the tunnel level start a heading each way to more rapidly complete the work. The shaft will be 385 feet deep at a distance of 5000 feet from the mouth of the tunnel. For this work an air compressor and an electric hoist have been ordered. The intention is to prospect the Keystone group, which is traversed by a well-defined vein.

J. T. Hudson, J. H. Stallings and R. Bemis have bought the Dewey mill at Bingham for $7500, and have bonded the Dixon group for $50,000. The mill is situated near the group, which comprises six claims. The ore contains gold, silver and lead, and runs from $10 to $40 per ton.

It is locally stated that a syndicate headed by R. C. Chambers, Mgr. Ontario mine at Park City, will build a smelter near Salt Lake, which will be a competitor with the American Smelting Co.

SUMMIT COUNTY.

The differences between the Daly-West M. Co. and the American Smelting & Refining Co. over the valuation of the former's Park City ore, says the Salt Lake *Tribune*, have been adjusted, and ores of the value of over $50,000 that have been tied up pending this adjustment will now be settled for.

The Ontario Co. has declared a $15,000 dividend. There are said to be $400,000 in the treasury.

In the East Ontario mine at Park City the vein on the lower level is 3 feet wide. The tunnel reaches the vein 1200 feet vertically from the surface.

TOOELE COUNTY.

Eight new steel tanks for the Mercur mill are each 30 feet in diameter by 5 feet high. They will increase the capacity of the plant 250 tons, making the total daily capacity 600 tons.

J. B. Weimer has bonded the Colossus, Success and three other silver and lead claims on Dutch mountain, in the Deep Creek district. Mr. Weimer says he believes he will be able to produce a tonnage of 300 tons daily in a short time.

WASHINGTON.

FERRY COUNTY.

(Special Correspondence).—A crosscut run from the south drift of the Republic mine on the 600 level shows the vein to have a width of 53 feet of solid quartz. The raise connecting the 600-foot with the 400-foot level has been completed.

The Tom Thumb is troubled with water and it is proposed to put in a pumping plant and air compressor.

It has been decided to continue the shaft on the Rebate, adjoining the Tom Thumb on the south, an additional 100 feet.

Lighter parts of the Mountain Lion mill are arriving daily from Grand Forks. It will be impossible to haul heavier portions, now on cars at Grand Forks, until wagon roads improve.

The Gold Ledge on Gold hill has resumed work, after unwatering the shaft.

Whims for both the Delta and Hit or Miss have arrived, also lighter parts of Princess Maud compressor plant.

Excavation has commenced for the new 75-ton custom mill. Contracts call for completion not later than May 31st.

The Poland China group on Meyers creek has been bonded to a Montreal syndicate for $30,000.

The Park & Central tunnel in Davis Camp, on the south half of the reservation, has cut a 3-foot vein of galena assaying $50 in gold, silver and lead. It is thought the main lead is

some feet ahead. The tunnel has been driven 320 feet, and the depth attained on the vein is 200 feet. The property has a good surface showing of concentrating galena ore.

Republic, Dec. 5th, '99.

PIERCE COUNTY.

By an explosion of fire damp in the Carbonado coal mines on the 10th inst., thirty-two miners lost their lives. Seventy-six men were employed on the shift, the greater number of whom escaped or were rescued later.

WYOMING.

CARBON COUNTY.

The Kurtz-Chatterton copper mines, in the Grand Encampment district, is reported sold to a company of Chicago men for $50,000. Machinery will be put up at the mine.

FOREIGN.

AUSTRALIA.

The Broken Hill mine, New South Wales, is officially reported to have produced since its discovery 4,132,184 tons of ore, containing 397,969 tons of lead and 100,159,768 ounces of silver, the total value of which is about $100,000,000. The expense of production was about $55,000,000, and nearly $35,000,000 have been disbursed in dividends.

BRITISH COLUMBIA.

Gold Commissioner Graham of the Atlin mining district has made his annual report to the Provincial Government, showing that royalty has been paid for the season of '99 on 20,000 ounces of gold. Eight thousand placer and ten hydraulic leases and 650 quartz claims were recorded.

On the 12th inst. the roof of the No. 4 stope of the Union colliery caved, flooding the workings with fire damp, which exploded, killing several men. It came unexpectedly, as no gas of consequence had ever been previously noticed in this part of the mine.

The first shipment of ore from Greenwood camp over the new Boundary railroad has been made from the Snowshoe mine, and consisted of two cars of ore, hauled to Greenwood on wagons. This shipment went to the Trail smelter. The Snowshoe is under bond to the Rossland & Slocan Syndicate for $60,000.

A five-stamp mill on the Waterloo mine at Camp McKinney is paying all the expenses of development and ten stamps are expected to be added when the mine is satisfactorily developed.

The Ewing mine on Nigger mountain will build a four-mile road and ship ore during the winter months. The shaft is in 9 feet of shipping ore.

The quantity of ore shipped to the Trail smelter is about fifty tons a day.

The St. Eugene, Moyie, Queen of the Hills and Lake Shore groups in East Kootenay have been consolidated and will be known as the St. Eugene Consolidated Mining Co., with $3,500,000 capital. It is reported that 80,000 tons of ore are blocked out in the several mines.

About 300 men are employed in the construction of the Granby smelter, which is to be completed March 1, 1900, and will cost $300,000. A. W. B. Hodges is in charge of construction and will be the superintendent. J. P. Graves is general manager of the smelter company and also of the City of Paris, Majestic, Knob Hill, Old Ironsides and Victoria mines.

BRITISH GUIANA.

The principal gold output of British Guiana is from seven districts, as follows: Barama, Barima, Cuyuni, Demerara, Essequebo, Groete Creek, Mazaruni, Potaro, Puruni. The export of gold from these districts, from Jan. 1st to Nov. 7th, '99, was 92,841 ounces 4 dwts. 3 grains, valued at $1,645,915.93. In '98 it was 90,062 ounces 18 dwts. 16 grains, valued at $1,576,144.34.

CUBA.

There are three different companies operating Cuban iron mines, all of them with American capital. One of these is the Juragua Co., operating thirty miles east of Santiago, controlled by the Pennsylvania Steel Co. and the Bethlehem Steel Co. This company has shipped out 3,500,000 tons of ore to this country. East of that is the Spanish-American Co., controlled by the Rockefellers and operating at Daquiri. Seventy miles west is the new property of the Cuban Steel Ore Co. This company is building piers and opening up its mines so as to be ready to ship ore by May 1. The Cuban ores are all Bessemer ores of a high grade, running about 63% iron. The present production of Cuba is about 1,000,000 tons of ore a year.

SOUTH AFRICA.

The output of gold from the Rhodesia fields is reported for the years '98–'99 as follows:

	1898. Ounces.	1899. Ounces.
January		6,370
February		6,423
March		6,614
April	6,471	5,755
May		4,938
June		6,104
July		6,031
August	27	3,179
September	2,346	5,653
October	3,913	4,276
November	5,566	....
December	6,258	....
Total	24,581	55,343

No estimates have been made for the months of November and December, '99.

MEXICO.

The Guanajuato Con. M. & M. Co. of Guanajuato, Mexico, produced $23,600 in October. The November cleanup will not be reported until about the 10th of this month. The company contemplates increasing its capacity and has already ordered a portion of the new equipment.

The Discubriadora M. Co., thirty miles west of Mopimi in Durango, has ordered two 300-ton furnaces, which, when completed, will increase the daily capacity to over 1000 tons.

The New York & Sonora Smelting Co., J. B. Magruder, Mgr., is doing extensive development work at Las Cruces, about thirty-six miles east from Hermosillo, says *Modern Mexico*. It is working three mines: La Colorada, upon which it has sunk a double-compartment shaft to a depth of 300 feet; Los Muertos, upon which a tunnel has been run 500 feet, and Las Guias, upon which a shaft is now down 110 feet, and drifting both ways at the bottom. A new gasoline hoist was received at the camp last month.

Industrial Notes.

—Santa Fe railroad employes want more pay.

—Arizona justly asks for statehood at this session of Congress.

—A revolution in Peru has sent cocaine from $2.50 to $6.25 per ounce.

—The Pacific Mail Steamship Company will extend its line to Manila.

—The Nevada mineral exhibit for the Paris Exposition includes over 6000 specimens.

—At Dawson, on the 1st, oats were 20 cents a pound; meat 70 cents a pound wholesale.

—The Tesla, Cal., coal mine strike of employes on the wage question is being settled.

—The S. P. Co. will develop the coal beds seventy miles south of Ortiz, N. M., and ship to Guaymas.

—The Idaho Northern Ry., north from Nampa, Idaho, is graded seven miles; construction work is going on.

—Late Chinese papers say that there are at present six smokeless powder factories in operation in the Chinese empire.

—Oil is to be used on naval vessels, enabling Government transports to go from San Francisco to Manila without a stop.

—The total receipts at the Seattle, Wash., Government assay office since its establishment in July, 1898, to date are $18,374,396.29.

—The Rocky Mountain Bell Telephone Co. proposes to spend $500,000 in 1900 extending its lines in Montana, Wyoming, Utah and Idaho.

—The steamer Defiance, at Vancouver, B. C., from Vananda and other northern mining ports, brought smelter products valued at $25,000.

—A $25,000 refinery has been put in at the Sunset Oil Co.'s works at Sunset, Cal., where the entire output will be refined and distillate manufactured.

—A drydock to cost $750,000 is to be built at Hunter's Point, San Francisco. It will be over a natural rock basin, will be 750 feet long, 80 feet wide at the bottom and 120 feet at the top.

—The six Chinese Companies of San Francisco have donated $4000 to the California State Board of Trade to aid in bringing about closer relations between China and the United States.

—S. Pearson & Son, contractors for public works, have completed negotiations with the Mexican Government to take the Isthmus of Tehuantepec railroad on a fifty-year lease, to reconstruct a railroad and build a harbor at each end.

Personal.

R. J. COREY of Denver, Colo., has returned from a northwestern trip.

JAS. EARLE is now manager War Eagle Co.'s property, Silver City, Idaho.

BAER BROS. of Leadville, Colo., are interested in mining in Shasta county, Cal.

J. P. EVANS of the Colorado Iron Works has returned from Prescott, Arizona, to Denver, Colo.

JAS. MCFARLANE is now in charge of Homestake and Horseshoe Companies, Deer Lodge, Nevada.

JNO. BROCKMAN is the new manager Commonwealth, Arizona, M. & M. Co., succeeding N. S. Berray.

A. G. LAMSON, Mgr. Bingham Tunnel Co. at Bingham, Utah, has returned to the mine from Denver, Colo.

C. W. GUMP succeeds H. L. Swain in the superintendency of the Ibarra M. Co., Calmalli, Lower California.

LEO VON ROSENBERG of New York City is examining mines in New Mexico and will be in Los Angeles, Cal., on the 20th ult.

ADELBERT M. DEWEY, special agent U. S. Department of Labor, Washington, D. C., is in San Francisco securing statistics.

MAX BOEHMER of Leadville, Colo., visited Inyo county, Cal., last month to make examination of copper property near Keeler.

C. C. DERBY, long time Supt. New Almaden, Cal., quicksilver mine, assumes general management of the property on the 1st prox.

M. L. REQUA of San Francisco, Cal., has returned to Arizona to look after his recently acquired mining interests in that Territory.

BEN STANLEY REVETT of Breckenridge, Colo., is at Oroville, Cal., in connection with the Continental Dredging Co.'s operations on the Feather river.

WAKEFIELD BAKER, Pres. Pacific Coast Jobbers' and Manufacturers' Association, has returned to San Francisco from the Atlantic side of the continent.

JOHN DOESCHER of New York, Pres. of the Siskiyou Mining Co. of California, has been making a personal inspection of the company's holdings in Siskiyou county, Cal.

PROF. W. L. WATTS has returned to San Francisco from an investigation of oil lands in Monterey county, Cal. He has assumed his duties in the service of the State in a continuation of his labors in the petroleum fields and in the examination of mines.

JOHN H. LODER of the Loder Pyritic Reduction Co., Denver, Colo., goes to Atlanta, Ga., to supervise starting a Loder pyritic smelting plant about completed in that vicinity.

R. H. WARD, a California miner who is developing British Columbia hydraulic property, is in San Francisco from Quesnelle, Cariboo district, B. C. He will return early in 1900.

T. T. LANE of Angels, Cal., is in San Francisco, Cal., from his mines near Parral, State of Chihuahua, Mexico. He will give particular attention hereafter to the silver-lead mines of that region.

CLARENCE HERSEY recently made examination of a mining property in northern California. Mr. Hersey has continuously maintained an assay office in Leadville, Colo., for the last twenty-one years.

BERNARD MACDONALD has accepted the general superintendency of the British American Corporation, Rossland, B. C. For some years he has been in Canada in charge of the McQuaig-Rykert Syndicate of Montreal.

GOV. MURPHY of Arizona has appointed as delegates to the Mining Congress in Milwaukee in June, 1900, James Douglas, Pres. Copper Queen Co., S. A. Parnell of the Globe Co., and J. B. Seager of the Helvetia Co.

PROF. W. P. BLAKE, Territorial Geologist of Arizona, reports officially that thus far none of the samples of rock from the Arizona discovery submitted to him for determination as to platinum contents contain that metal.

B. K BANNISTER, Gen. Mgr. Utah Power Co., and consulting engineer for the Payette dam and electric power project, is at Boise, Idaho, and says that the enterprise noticed on page 640 of the issue of the 2nd inst. is meritorious and feasible, that the surveys will soon begin and involves the investment of about $750,000.

List of U. S. Patents for Pacific Coast Inventors

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DECEMBER 5, 1899.

638,208.—LOOSE LEAF LEDGER—J. W. Amrath, S. F.
638,375.—ROTARY ENGINE—C. F. Baintel, Los Angeles, Cal.
638,438.—FLY TRAP—J. L. Boone, S. F.
638,620.—MITER BOX—T. Bootsman, Arctic, Wash.
638,377.—CHEESE CUTTER—E. S. Burt, Glencoe, Cal.
638,321.—SUB-IRRIGATION—B. O. Clark, Pasadena, Cal.
638,324.—CONCENTRATING TABLE—W. G. Dodd, S. F.
638,384.—SELF-LOCKING BOLT—G. H. Dyer, S. F.
638,325.—FRUIT EVAPORATOR—D. M. Ellsworth, Camas, Wash.
638,386.—NAIL—C. S. Farrow, Eugene, Or.
638,390.—STORAGE BATTERY—Hanscom & Hough, S. F.
638,456.—PLOW—H. Hansen, Redwood City, Cal.
638,460.—AIR COMPRESSOR—J. H. Hopps, S. F.
638,393.—CABINET—H. E. Hutchinson, Mt. Vernon, Wash.
638,585.—FRUIT GRADER—J. Mann, Butte City, Cal.
638,468.—DENTAL PLIERS—H. L. McKellips, S. F.
638,644.—BALING PRESS—J. N. Neuman, Riverside, Cal.
638,283.—PRESERVING MILK—J. Russell, S. F.
638,285.—MINING APPARATUS—P. Schnetter, S. F.
638,404.—DOOR LOCK.—C. E. Smith, Oroville, Cal.
638,292.—FOOT GUARD FOR RAILROAD TRACKS—P. J Stockinger, Oakland, Cal.
638,406.—MILK COOLER AND AERATOR—A. L. Stone, S. F.
638,540.—HOSE SUPPORTER—Ella F. Young, S. F.
31,941.—DESIGN—H. Root, S. F.
31,935.—DESIGN—J. M. Smith, Villa Park, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong&Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Recently Declared Mining Dividends.

Osceola C. M. Co., Mich., $3; Dec. 15.
Orphan Bell M. Co., $82,899; Dec 7
Swansea G. M. Co, Utah, $10,000; Dec. 9.
Silver King M. Co., Utah, $50,000; Dec. 15.
Bullion-Beck M. Co., Utah, $10,000; Dec. 15.
Portland G. M. Co, Colo, $60,000; Dec. 15.
Elkton G. M. Co., Colo., 3%; payable Dec. 20.
Alliance M. Co, Colo, 7 cents per share; Dec. 4
Ontario S. M. Co, Utah, $15,000; payable Dec. 20.
Tamarack C. M. Co, Mich., $6; payable Dec. 28
Daly-West M. Co, Utah, 20 cents per share ($30,000); Dec. 10.
Calumet & Hecla C. M. Co., Mich., $20; payable Dec. 29. Total to date, $66,850,000.
Stratton's Independence Limited, Cripple Creek, Colo., $488,000; Dec. 12. Total, $976,000.
New York-Honduras Rosario M. Co., Honduras, $30,000; payable Dec 16. Total to date, $1,160,000.
Yellow Aster G. M. Co., California, $20,000; Dec. 11. Total, $313,789.

Commercial Paragraphs.

THERE has just been put upon the market by John Taylor & Co., 63 First street, San Francisco, a patented hydro-carbon burner wherein either coal oil or gasoline can be used as fuel. For many years gasoline has been employed in crucible and muffle work by assayers and others, but not until the present time has it been possible to use coal oil for this purpose. The burner herein noted is devised for coal oil. The advantage of this burner becomes apparent when the greater safety of coal oil is considered as compared with gasoline. Coal oil can be procured in all parts of the world. Gasoline is sometimes obtained only with difficulty. By a slight change of jets in the Taylor burner gasoline can be used in place of coal oil, and for those who have been accustomed to the use of this latter fluid may be preferable.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HINGED TELESCOPIC BOX.—C. J. Russell, Santa Maria, Cal. No. 637,997. Dated Nov. 28, 1899. This invention relates to a telescopic box having hinges and slidable guides so arranged that the two telescoping parts of the box may be adjusted to give any desired depth within its capacity. At the same time the parts are connected by the hinge so that they can be opened without separation when they are extended to their fullest capacity. The box consists of two sections of any suitable material, one of which is slidable within the other. Vertical bars are fixed upon the sides of one of the sections and corresponding clasps in which the bars are slidable are carried by the other section. Holes are made in the bars and spring latches fixed upon them, the other section have pins which are adapted to engage the holes in the bars and retain the parts at any adjustment with relation to each other. The clasps are hinged and are carried by the turnable leaf of the hinge in which the rear of the T-shaped bars are slidable so that the sections may be extended to their limit and then opened about their hinges and without separating the parts, as is usual with ordinary telescopic boxes.

MILK COOLER AND AERATOR.—A. L. Stone, San Francisco, Cal. No. 638,406. Dated Dec. 5, 1899. The object of this invention is to provide an apparatus for cooling and aerating milk. It consists of an outer casting having a removable interior casting formed with side walls and inclined step-like surfaces, with a closed chamber beneath said surface. Outlets are formed between each pair of the surfaces so that a blast of air, delivered into the rear end of said chamber, is forced through the milk which flows over the steps.

CHEESE CUTTER.—E. S. Burt, Glencoe, Cal., assignor of two-thirds interest to J. Burt of same place, and W. E. Holbrook of West Point, Cal. No. 638,377. Dated Dec. 5, 1899. The object of this invention is to provide a device for cutting cheese into desired sizes for sale and use. It consists of a support for the cheese having a removable cap or cover, a vertically slotted guide exterior to the periphery of the support, a knife or cutter of substantially triangular shape, having the deepest portion adjacent to the guide, and having a longitudinal stem or shank movable in slots in the guide. The rear end of the shank has a guide, and the lever is fulcrumed to this rear guide and a rod connected with the knife passes through the slotted guide so that by the operation of the lever the cutter may be forced down vertically through the cheese. Anti-frictional rollers are journaled between the clamps and travel against the guide bar to reduce the friction of the movement. The edge of the knife is curved, the inner end forming a point which first enters the cheese near the center, and the edge is so contrived that it makes a drawing cut which facilitates the work. The edge of the knife which cuts the outer portion of the cheese is made convex, and this fits into a similarly shaped channel in the supporting base so as to insure the severing of the cloth with which the cheese is wrapped.

DOOR LOCK.—C. E. Smith, Oroville, Cal. No. 638,404. Dated Dec. 5, 1899. This invention relates to locks for doors. It consists of a latch bolt guided and slidable through the edge plate of the lock and lugs between which the inner end of this bolt is slidable and guided, a spring surrounds the inner portion and is compressed between the lugs when the latch is withdrawn, and acts to force it forward when released. There is a turnable socket piece through which the knob shank passes, and this socket piece has an extension or arm at one side, and a latching link detachably connecting the extension with the inner end of the latch bolt, so that the turning of the knob will withdraw the latch after the key has been inserted and turned.

SELF-LOCKING BOLT FOR BUILDINGS.—G. H. Dyer, San Francisco, Cal. No. 638,384. Dated Dec. 5, 1899. This device is intended to be used where it is necessary or desirable to insert bolts or bars into brick, stone or other masonry walls, and to secure the same therein to form a permanent support for structures, such as balconies, fire escapes and the like. It consists essentially of a bolt having a turnable key upon its inner end, a contact surface against which the key is supported, and means for turning it and causing it to lock when it has been inserted into place, a hole being bored or drilled in the masonry wall of sufficient size. A tube is inserted to the proper depth to allow the bolt to extend through the tube and beyond its inner end, when the beveled inner edge of the turnable key being interior to the inner end of the tube, will engage it, and when a nut is screwed upon the outer end of the bolt, so as to pull it outward, it forces the key to turn and enter the masonry surrounding the hole, thus standing transversely across it and being permanently locked in place.

Catalogues Received.

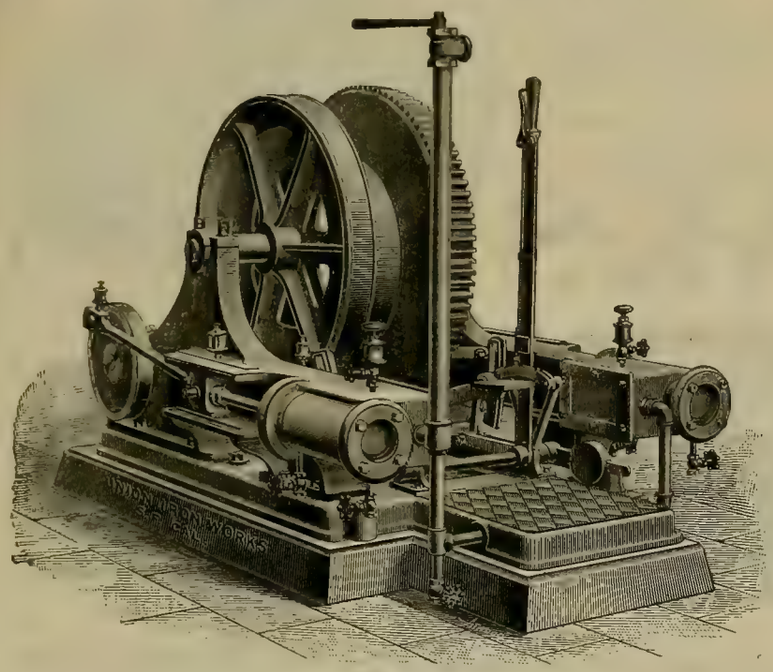
"SOME Recent Compressed Air Machinery" is the title of a treatise on various devices and apparatus with compressed air as motive power, issued by E. A. Rix, 507 Market St., San Francisco, California, reprinted from technical journals and replete with information thereon. The pamphlet is worth reading and will be sent to any one interested therein asking for it.

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The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

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CAPACITY OF WAGONS 16 TONS EACH, or total freight carrying capacity of train 50 tons.



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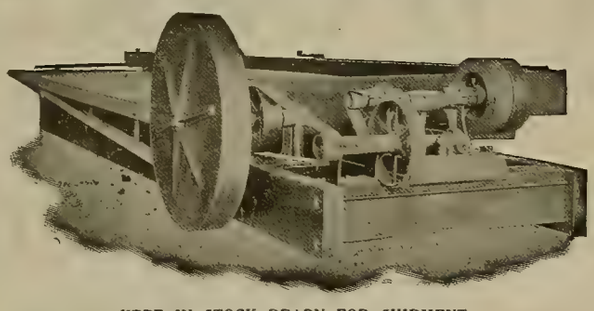
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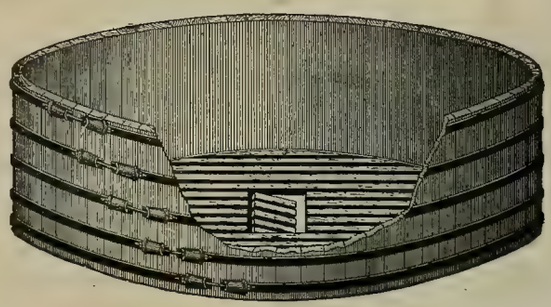
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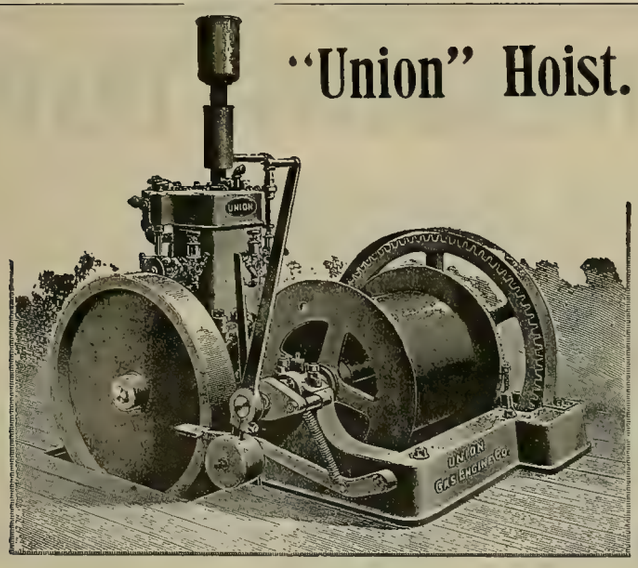


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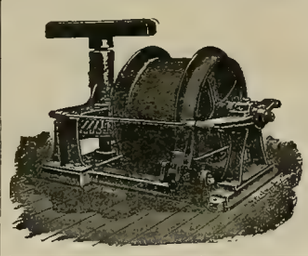
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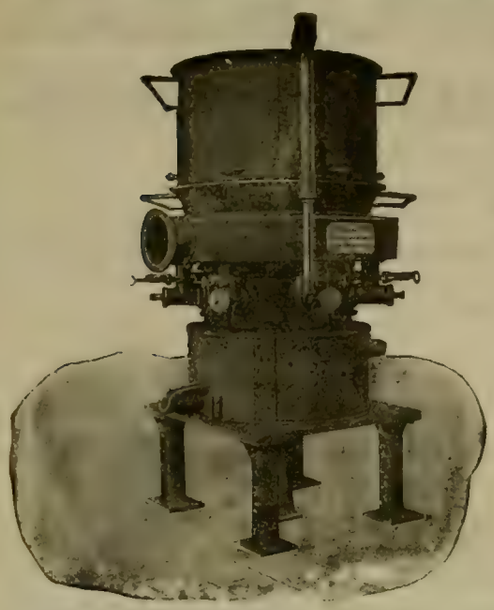




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(SEE PAGE 700.)

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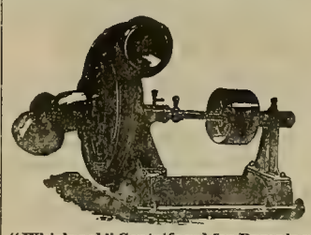
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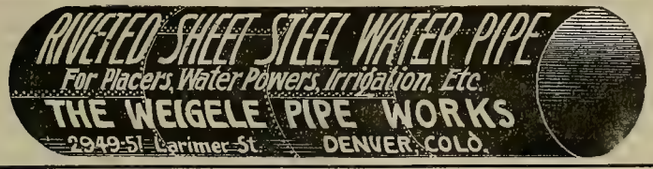
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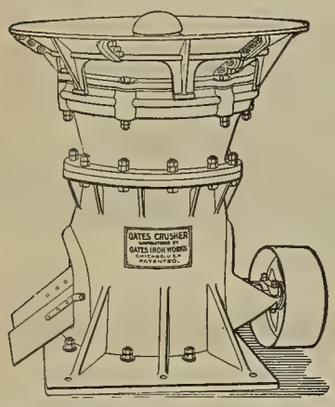
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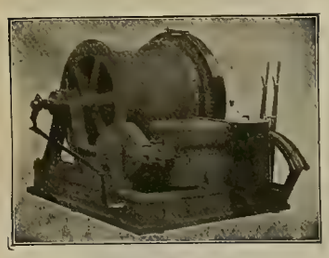
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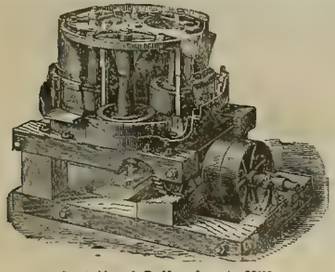
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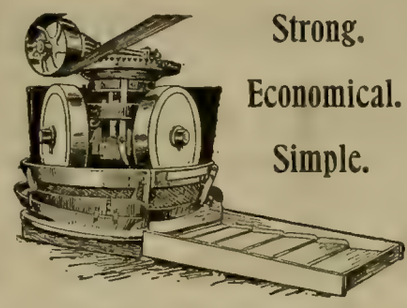
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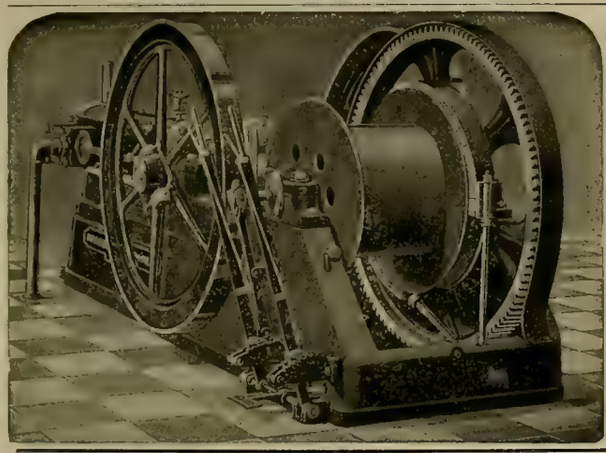
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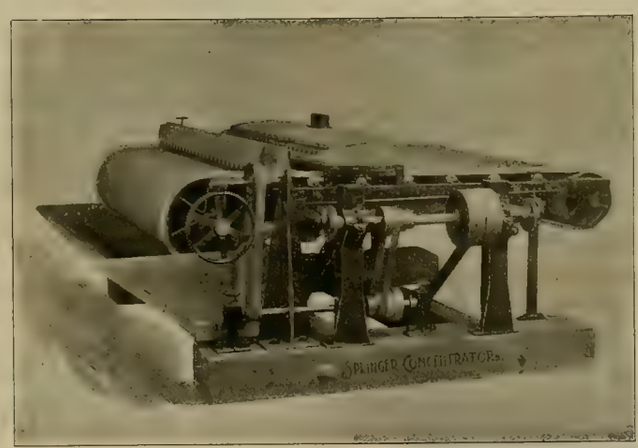
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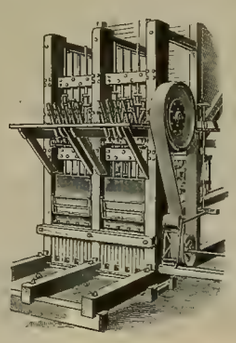
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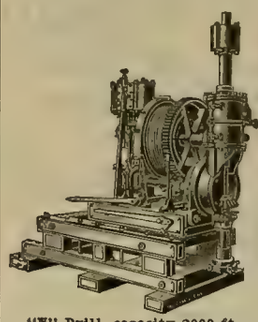
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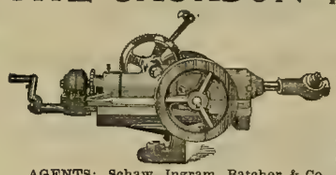
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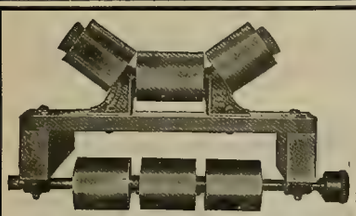
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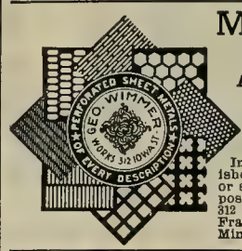
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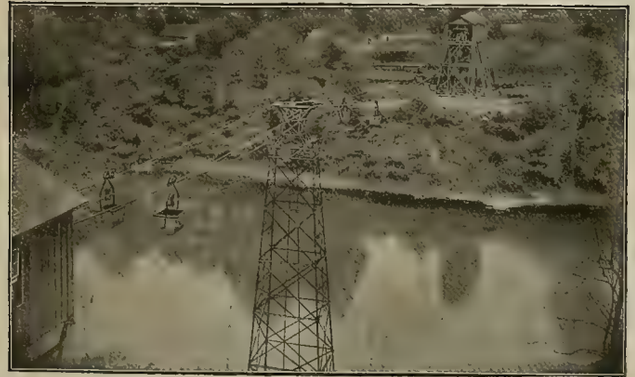
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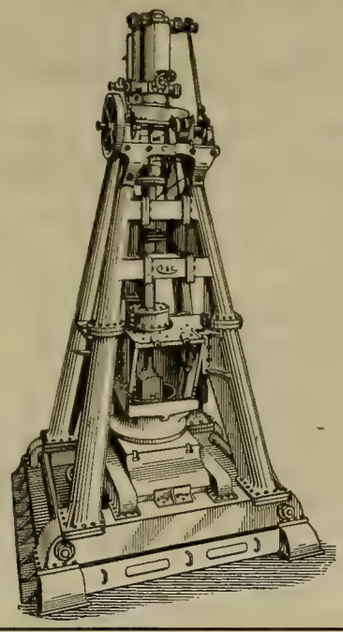
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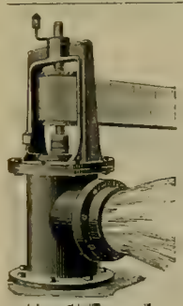
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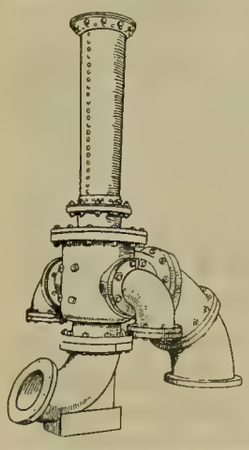
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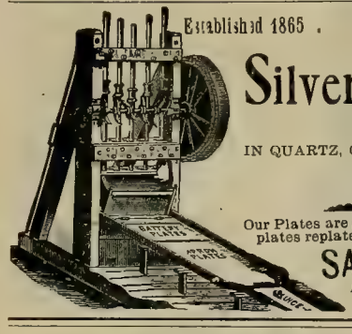
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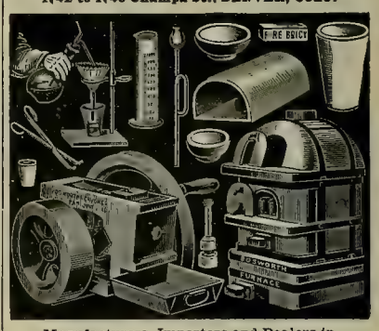
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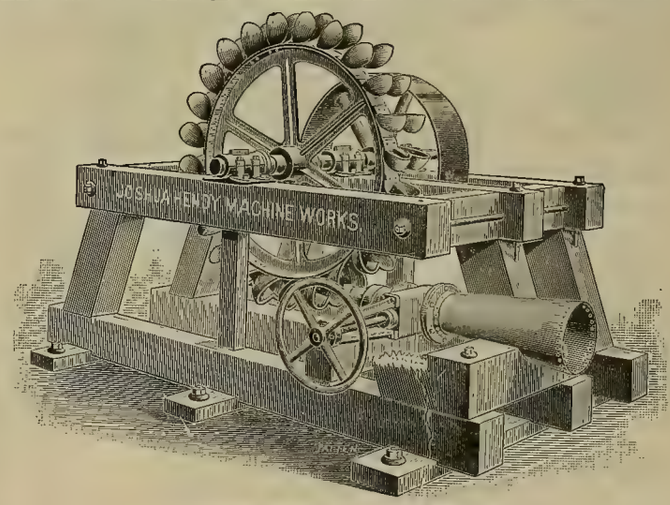
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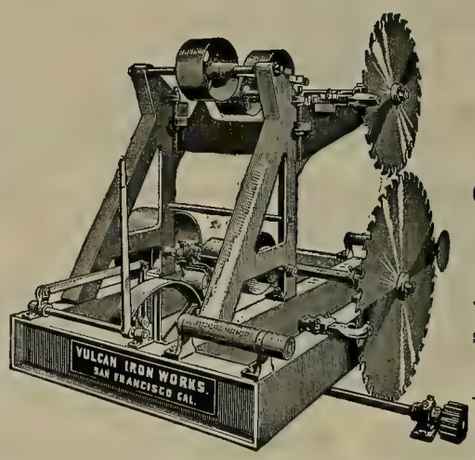
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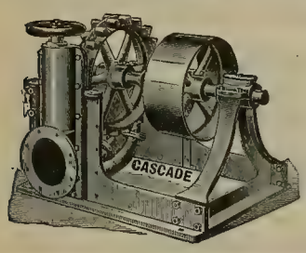
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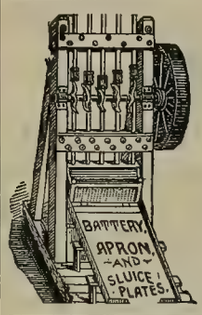




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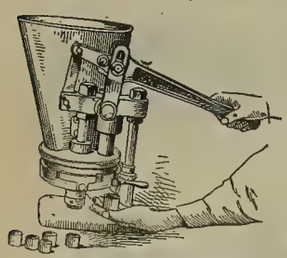
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Supplies the solution with the oxygen required for perfect extraction. Prevents settling, packing and channelling. Heats the solution and prevents freezing in winter. Doubles the capacity by requiring less than one-half the usual time. Saves the highest percentage of values at the lowest cost per ton. *"Mill rights" sold direct to users; no royalties.*

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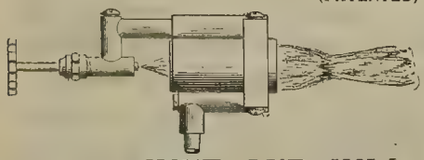
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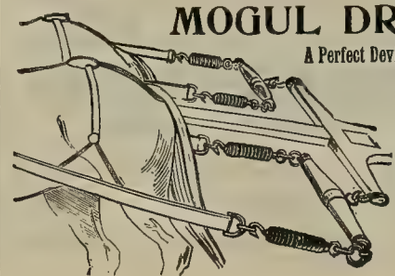
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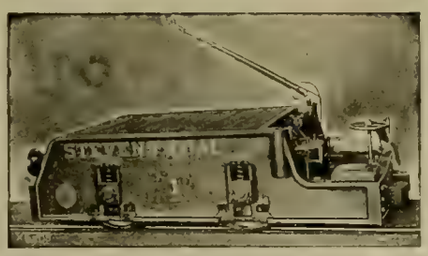
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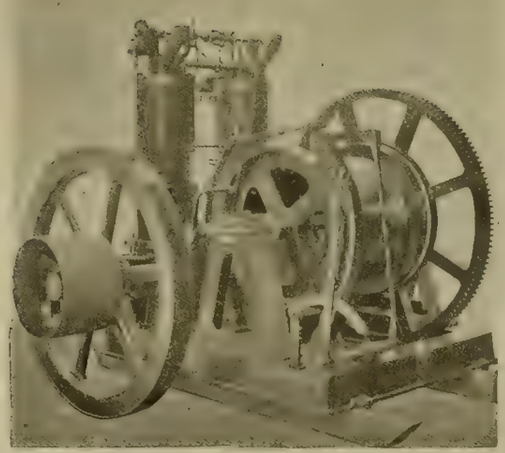
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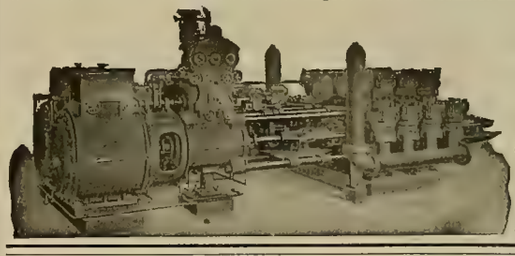
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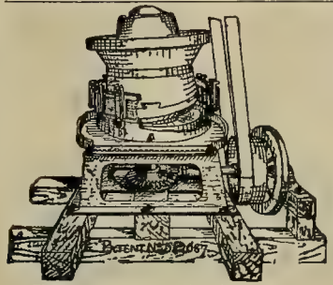
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Market Reports.

SAN FRANCISCO, Dec. 14, 1899.

SILVER.—London, 27¼d; New York, 59@59¼; San Francisco, 59@59¼; Mexican Dollars, 47½@48¼; New York exchange, sight, 10; telegraphic, 15 cents premium.

LEAD.—New York reports steady, $4.60 bid, $4.75 asked; brokers' price, $4.45.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¼c; bar, 6½c.

COPPER.—New York reports Lake at $16.55@17; brokers' price, $17. Local—Mill copper plates, 23¾c.

Extensive shipments of copper from Lake Superior by rail have commenced. Last winter was the first time in ten years in which copper was shipped by rail from smelters at Houghton, Mich., it being the custom to hold copper during winter until reduced rates could be had on water transportation in the spring. Copper will be shipped as fast as smelted this winter, which proves the strong demand, as all rail shipments cost fourtenths of a cent per pound more than mixed water and rail route to seaboard, making added transportation cost about $275,000 for the five months navigation is closed.

IRON.—American, soft, $24@25.50 per ton; Scotch, $37.50 Local bar, 2¾c per lb.

It is reported that large shipments of iron ore are to be made from Cuba, and that the output of 1900 from that source will reach 1,000,000 tons.

STEEL.—11¼@20c per pound.

TIN.—Firmer, $25.25 bid and $25.50 asked; pig, 36@39c per lb.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER. — Local, $51.50@52; export, $46.50@47; carload lots, special rates.

Quicksilver shows still a slight upward tendency, and there is no indication that the price will go lower unless some great producer came unexpectedly to the front, which is improbable. The rising market is daily having a more noticeable effect. The Guadaloupe mines, near San Jose, Santa Clara county, Cal., are to resume after an idleness of years. This property at one time was a large producer.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Dull; $4.60 bid, $4.70 asked.

Prices for spelter are lower, but the general situation has shown improvement of late, and the expectation is that the lowest prices have been reached. There is still a large profit to the producer with zinc above $30 per ton, and Joplin advices are that it is unlikely to decline below the $30 mark. The decline in the metal has placed the industry on a healthier basis.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c, No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c ₱ lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1½c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5¼@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¼@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c ₱ 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$ 7 50	Cumberland	$ 9 50
Brymbo	7 50	Cannel	9 50
Pennsylvania, hd..	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 60

COKE. — Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 66c; cs., 71c; raw, bbl., 64c; cs., 69c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 61c; cs., 66c; raw, bbl., 59c; cs., 64c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 20c; Astral, 20c; Star, 20c; Eocene, 22c; Extra Star, 24c; Elaine, 25c; Water White, bulk, in tanks, 14c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 59c; cs., 64c; No. 1 bbl., 49c; cs., 54c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 13, 1899.

9:30 A. M. SESSION.

200 Alpha	03c	200 Mexican	38c
100 Belcher	19c	200 Ophir	82c
500 Best & Belcher	34c	100	81c
200 Bullion	03c	200 Potosi	16c
100 Caledonia	47c	100 Seg. Belcher	03c
500 Chollar	15c	300 Sierra Nevada	46c
250 Con. Cal. & Va.	$1 65	100	45c
250	1 60	100 Union Con	28c
100 Confidence	75c	200 Yellow Jacket	11c
800 Gould & Curry	11c		

2:30 P. M. SESSION.

200 Andes	11c	100 Mexican	40c
700 Belcher	18c	400 Overman	11c
300 Best & Belcher	38c	300 Sierra Nevada	49c
100 Caledonia	51c	300 Union Con	30c
400 Con. Cal. & Va.	$1 60	100 Utah	06c
200 Gould & Curry	11c	500 Yellow Jacket	10c
200 Mexican	39c		

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed, **Mines**, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. **EDW. N. BREITUNG**, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBEE. CODES: LIEBER'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. F. Keith and J. and Wm. Gannon, in the Sydney Flat Gravel Mine, near Jacksonville, Tuolumne Co., to deposit tailings in Woods Creek and Tuolumne River; from the Eureka Lake and Yuba Canal Co., Cons'd, in a portion of the Consolidated Placer Mine, at Columbia Hill, Nevada Co., to deposit tailings in Spring Creek; from F. M. Thomasson, in the Chalk Flat Mine, near Pike City, Sierra Co., to deposit tailings in Chalk Flat Ravine; from Walter Boire, in the Boire Placer Mine, near Railroad Flat, Calaveras Co., to deposit tailings in a ravine below the mine; from Paris Bean, in a branch of Coffee Pot Ravine, in Yuba County near Clipper Mills, to deposit tailings in Coffee Pot Ravine; from J. W. Pinder, in the Little Gap Mine, near Hamilton, Tuolumne Co., to deposit tailings in Streamless Valley; from J. M. Gilbert and A. M. Colwell, in the Ben Franklin and Davis Consolidated Mine, at Yankee Jim's, Placer Co., to deposit tailings in an old pit; from Jos. Williams et als., in the Williams Ranch Mine, near Ono, Shasta Co., to deposit tailings in Watson Gulch; from O.W. Henderson et als., in the Southern Cross Mine, at Yankee Jim's, Placer Co., to deposit tailings in Mexican Gulch; and from A. W. Mellon et als., in the Cherokee Mine, at Cherokee, Butte Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 26, 1899, at 1:30 P. M.

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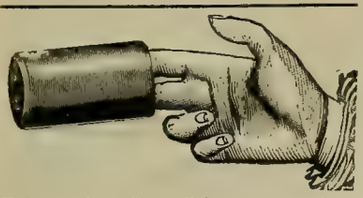
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 10) of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 632 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—632 Sacramento street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 14) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of November, 1899, an assessment (No. 21) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras county, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of November, 1899, an assessment (No. 3) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 20th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post Street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 8th day of December, 1899, an assessment (No. 99) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

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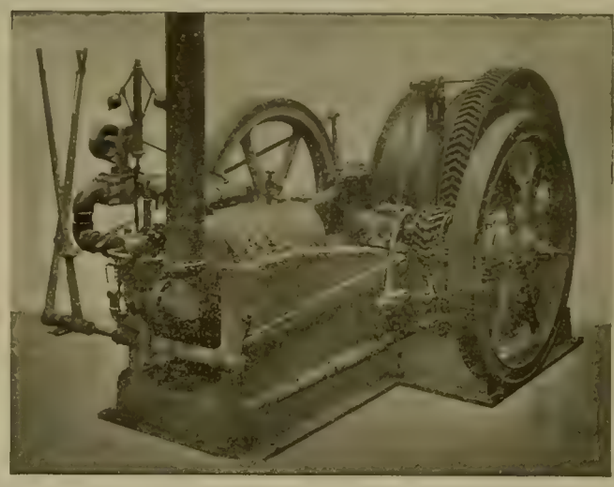
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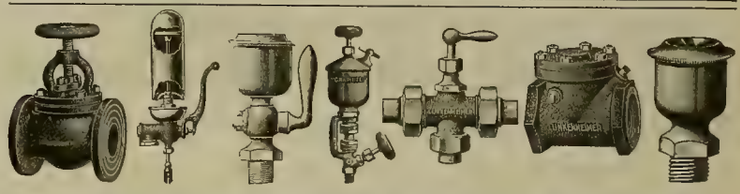


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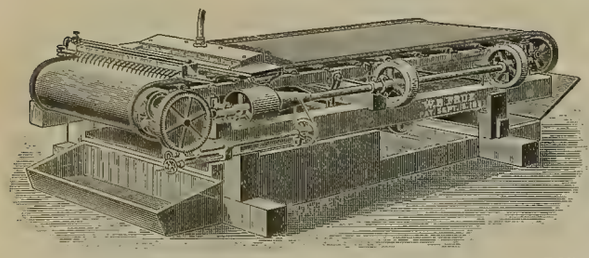
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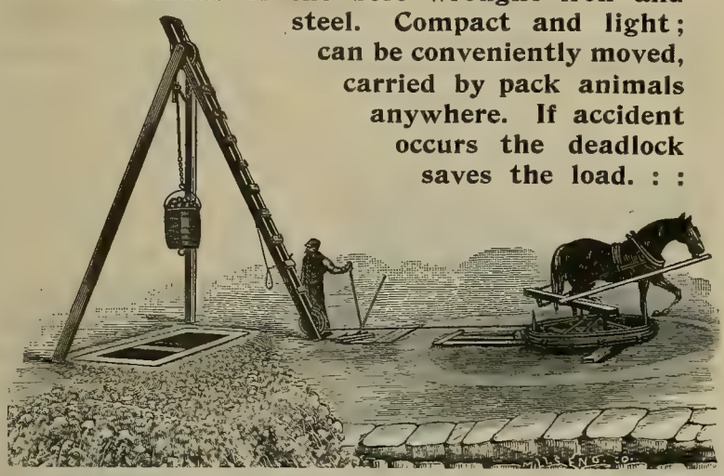
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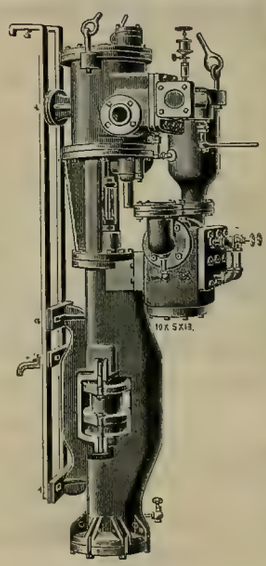
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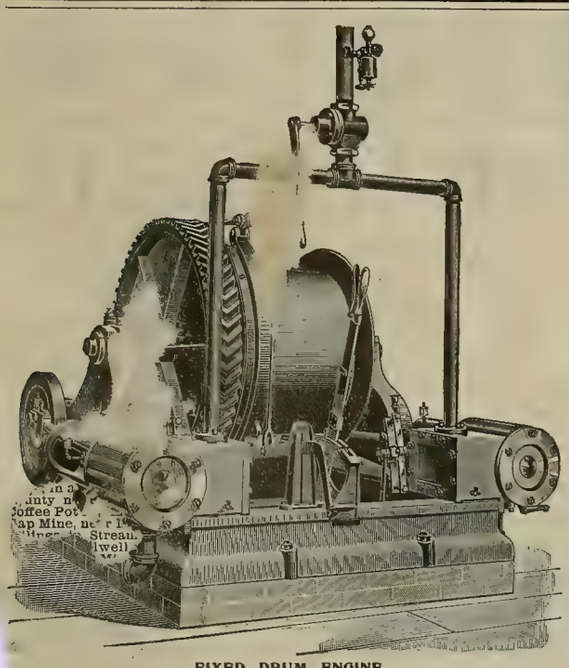


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Hill Sculpture Due to Erosion.

That particular part of the California gold belt known as the mother lode is characterized throughout its length, and particularly in Mariposa, Tuolumne and Calaveras counties, by a succession of hills which rise abruptly above the surrounding lower rounded slopes. A number of these elevations form prominent features in the landscape, among them being Mount Ophir, Pinon Blanco and McAlpine hill in Mariposa county; Quartz mountain and Whisky hill in Tuolumne county; Carson hill and Chaparral hill in Calaveras county.

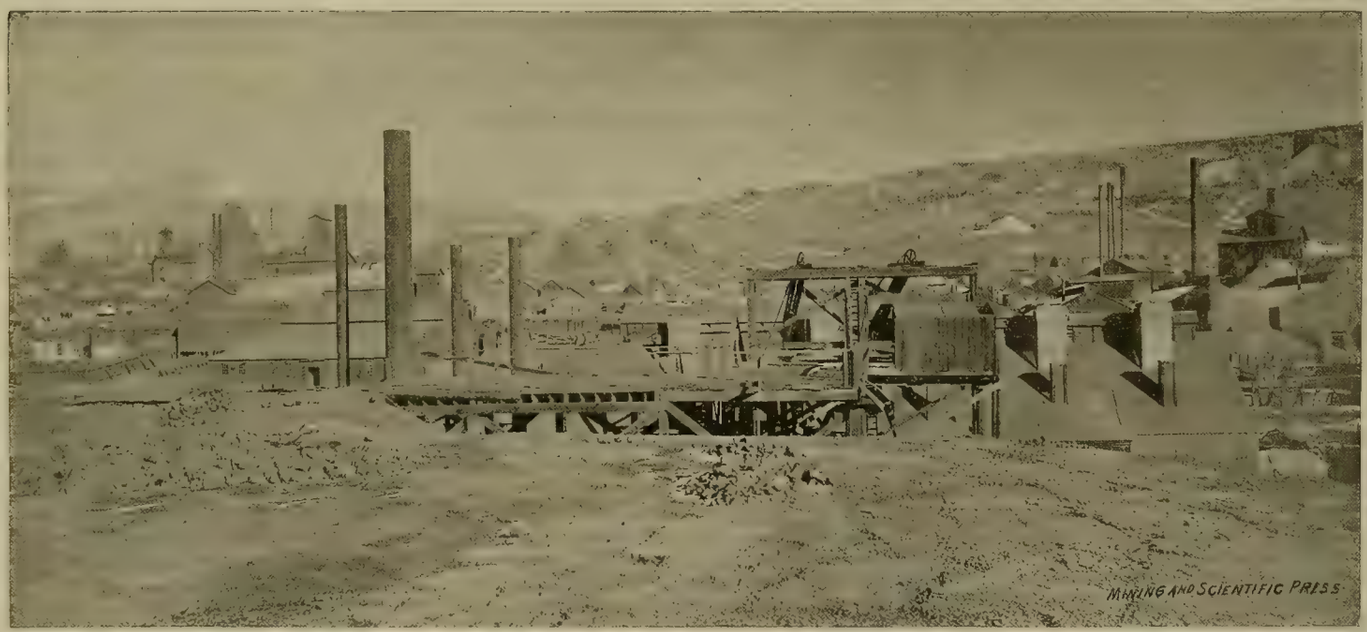
Each of these elevations owes its existence not to a greater uplift than the other hills of the region, but to the occurrence of large and massive veins of quartz and dolomitic rock, which are characteristic of this portion of the mother lode. These great masses of rock, which constitute a vein from 100 to over 300 feet in width, being of superior hardness, have resisted the erosive effects of the elements, and while the surrounding region suffered greater or less degradation these hard rocks, by their power of resistance to the destroying force, more ably maintained themselves while the neighboring rocks were being worn down, and now exist as hills of less elevation, showing that the topography of that part of the gold belt is due very largely to erosion, and not to superior uplift or to the intrusion and outpouring of volcanic rocks.



CARSON HILL FROM NEAR ROBINSON'S FERRY, CAL.

Carson hill, an engraving of which appears herewith, came into prominence in the earliest days of mining in California, by reason of the finding of several large nuggets of gold in the gullies which seam its sides. The hill comprises a group of hills, as it were, but all so intimately connected as to practically form a single eminence. The hill is ribbed with a dozen or more veins of varying width, some of them more than 100 feet wide, and all are gold-bearing. Thousands of feet of tunnel follow the veins into the mountain or crosscut its rocky ribs, which consist of a variety of rocks, the most important besides the veins of quartz and dolomite being diabase, amphibolite schist, serpentine, gabbro and black clay slate. The most active mining operations now in progress on the hill are those of the Melones Con. Mining Co., which is running a long tunnel into the mountain and building a 120-stamp mill in anticipation of developments in the future. Near the summit of the hill is the Morgan mine, on which in the early '50s was found a mass of gold ore said to have been worth $3,000,000. This occurred in a soft decayed talc schist, reticulated with veins and seams of quartz. The excavation from which the gold was taken, though caved somewhat, is now only about 30 feet square and of the same depth.

The excitement following this and other rich discoveries resulted in building up a settlement of several thousand people, but all traces of that early town have long since disappeared, and in its place, after years of inactivity, is now building a more substantial village near the works of the Melones Co.



Penrose. Starr. Bon Air.

LOWER WESTERN SLOPE OF CARBONATE HILL, LEADVILLE, COLO., SHOWING HOME MINING COMPANY'S GROUP OF MINES. (See page 720.)

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TABLE OF CONTENTS.

ILLUSTRATIONS.—Carson Hill from near Robinson's Ferry, Cal.; Lower Western Stope of Carbonate Hill, Leadville, Colo., Showing Home Mining Company's Group of Mines, 713. Cross-Section Vein, Moose Mine, Cripple Creek, Colo.; Cross-Section Vein in Independence Mine, Cripple Creek, Colo.; Gold-Bearing Granite in Washington Mine, Cripple Creek, Colo., 717. Latest Mining and Metallurgical Patents, 719. Loder Smelting Furnace; Solar Attachment for Transits, 720. The Clark Patent Tube Mill Showing Discharge End, 721.

EDITORIAL.—Hill Soulpture Due to Erosion, 713. The Industrials and the Market; What Constitutes a Valid Oil Location? Miscellaneous, 714.

MINING SUMMARY.—723-724.

THE MARKETS.—The Local Markets; Mining Share Market; Sales in San Francisco Stock Board, 738.

MISCELLANEOUS.—Concentrates, 715. The Cripple Creek Gold Field, 716. Types of Veins; Three-Quarters of a Century's Progress in Mining and Metallurgy, 717. American Inventive Genius; Ore Shoots—Ore Chimneys—Pay Shoots; A Department of Mineralogy and Mining, 718. Latest Mining and Metallurgical Patents; Developed Mines vs. Prospects as an Investment, 719. The Loder Smelting Furnace; The New Heat Process; Workings of the Home Mining Co., Leadville, Colo.; New Solar Attachment for Transits, 720. Phenomena Attending the Accumulations of Bitumen; A Great Torrential River; The Mines of Ophir; The Clark Patent Tube Mill, 721. Chemical Features of Gold; Powder Used in Coal Mining; Cum Grano Salis, 722. Industrial Notes; Personal; Commercial Paragraphs; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Recently Declared Mining Dividends; Catalogues Received, 725.

THE last monthly statement of the Alaska-Mexican Mining Co. shows that the average of ore treated returned $1.69 per ton, the cost of mining and treatment being $1.348 per ton. This affords an excellent example of how low a grade of ore can be profitably mined and treated in that northern country, though the conditions obtaining on the coast of Alaska are better than are found in the interior, not only of Alaska, but in many places in the United States.

IN the rush which follows a new discovery in mining regions many things are done which would not occur in later years, when the excitement has subsided. Things go with a rush in stampede days; machinery is put in for which there is found no use; the character of the ore sometimes changes, and the outlook is not encouraging. Another strike in some other locality is reported and the old camp is deserted by all who can leave and its palmy days are over. In after years some one with more experience and better judgment sees great possibilities in the deserted mines and decaying mills and the life of the district is revived, when it is found that under the influence of advanced knowledge, improved methods and level-headed business management these were the only elements required to build up a substantial industry on the ruins of a stampede camp which was a failure.

STATE INSPECTOR OF MINES JOHN BYRNE of Montana, in his last official annual report, complains of the laxity of the managers of the large mining companies in observing the laws requiring greater care and attention to the life and health of the men employed in the mines, and urges that a commission be appointed by the Governor to draft a set of mine regulations defining as nearly as possible the duty of the mine owner, the duty of the miner, the responsibility of the mine owner, the responsibility of the miner, what the mine owner shall and shall not do, and what the miner shall and shall not do. These recommendations at once commend themselves to all miners, and such regulations in all mining States are surely a desideratum, but the mere passage of such laws, without giving the State Commissioner the necessary authority under penalty to enforce them, would be a loss of legislative time.

The Industrials and the Market.

Since January 1, 1899, there have been formed throughout the United States, but more particularly in Eastern cities, combinations of industrial, mining and other enterprises, the aggregate capitalization of which greatly exceeds two billions of dollars. These are the so-called trusts, though the individual concerns are known by many different names. The ostensible purpose of these consolidations is to control the production and sale of certain products and manufactures (and they embrace almost everything made in America), and thereby enable the manufacturers to secure raw material at better advantage and, by controlling the output, to obtain better prices in the market than is possible when competition cuts prices, and reduces the earning capacity of the several plants to a minimum. Incidentally, the favorable conditions obtaining under this method of consolidation and control are said to enable the employers to pay increased wages to the employed, and in many cases this has been done, though whether the increase in wages has been approximately commensurate with the increased profits arising from this method of conducting business is doubtful. One thing is evident—the past year has been one of the most prosperous the nation has ever known. Whether this prosperity is due to the trusts, or whether the trusts are the outgrowth of the great wave of industrial activity, affording an unusual opportunity for investment, is a question, though it appears that there has been a tendency for several years past to consolidate industrial concerns, and more recently mining and metallurgical enterprises have been included. Among these latter are found the Amalgamated Copper Co. and the American Smelting & Refining Co.

It is realized that, by merging several independent enterprises into a single concern having one general head or management, greater opportunities are afforded for money making and for the betterment of the great army of wage workers; but, unfortunately, this latter phase of the trust proposition is not greatly in evidence.

There is another feature of these trusts which affects the investors in stocks of these industrial aggregations, and that is the immense capitalization upon which trust "securities" are floated.

Half a dozen plants, situated in various parts of the country, costing, say, $10,000,000, earn when working independently $500,000 annually. This is about 5% on the cost of plant and floating capital. These several concerns are consolidated into a single company and floated at $60,000,000. Those who buy the stocks of this trust do so in the belief that it has a net earning capacity of at least 5%, or $3,000,000 per annum. It is to be anticipated that the consolidation of these several interests would cheapen the cost of production and insure an increased profit to the consolidated company on its products, whether of raw material or manufactured, but that it will do so to the extent of 50% per annum on the actual investment is more than doubtful, and that this is true is now beginning to be seen in more than a single instance.

For some time past warning notes have been heard from the more conservative financiers and the press, and on the 18th inst. an incipient panic shook Wall street to its foundations; further disaster was only averted by the prompt action of the "bears" themselves in stemming the downward rush of stocks by prompt and liberal buying; but that confidence has really been restored in those stocks known to be undeservedly high cannot be believed.

EASTERN business journals say "mining is the all-absorbing investment." Industrial stocks, State and county bonds, or county warrants are not so eagerly sought for investment purposes as formerly and the Eastern investor is learning that there is profit in the mining business when rightly conducted. Legitimate mining in this western half of America should receive impetus in 1900 from this volume of investment-seeking money, and fraudulent mining schemes should everywhere be exposed and discouraged on the same principle that counterfeit coinage or currency is condemned as being inimical to the common good. There will be considerable squeezing of watered stock in 1900, and consequent disappointment and distrust at the non-appearance of promised dividends from some of the big combines organized in '99. There will be a tendency to invest in mining, and, of course, a corresponding tendency on the part of some to unload undesirable mining property. Confidence is a plant of slow growth. It has taken a long time to educate the Eastern investor to know that mining is not a gamble; that it is a business, to be run on a business basis, and with the same industry, integrity and intelligence necessary for success in any business; and, rightly directed, the present tendency to more cautious investment in mining should receive the right kind of encouragement. The way to give the investor that kind of encouragement is to accord him square treatment throughout, and along that old-fashioned line lies the best success—best because surest and most mutually satisfactory—and in the long run most profitable.

What Constitutes a Valid Oil Location?

Judge Ross of the United States Circuit Court at Los Angeles, Cal., has decided that land which merely shows indications of mineral cannot be located as mineral land.

"Mere indications," says the Court, "however strong, are not, in my opinion, sufficient to answer the requirements of the statute, which requires, as one of the essential conditions to the making of a valid location of unappropriated public land of the United States under the mining laws, the discovery of mineral within the limits of the claim."

This decision was rendered in the case of the Sierra Nevada Oil Co. vs. the Home Oil Co. in favor of defendant, and, as far as this particular case is concerned, was just and proper, as the plaintiff had during a period of three years after location of the land in dispute failed to do any development or make improvements thereon. It was relocated by others, who sunk wells, finding oil in paying quantity, complying with the requirements of the law, and they were in consequence justly entitled to the decision as rendered by Judge Ross. The decision of the court, however, that indications, "however strong, do not constitute a sufficient ground for locating the land as mineral," can not meet with general approval.

In the location of a quartz vein, all that is necessary is an outcrop of a mineral vein in place. If the vein does not contain mineral in sufficient quantity to pay that is the misfortune of the locator. To the layman it would seem that if an outcrop of quartz or other mineral-bearing rock in place is sufficient evidence of possible value to make a location thereon legal, an exposure of oil sand or a seepage of oil should be considered sufficient evidence upon which to base an oil claim. The Federal Statutes do not require that a vein shall carry any given quantity of mineral per ton, but requires a bona fide discovery of "mineral bearing rock in place," nor should the court require that an oil claim yield a given number of barrels of oil daily before it can be recognized as a legal appropriation of mineral land under the statutes.

It would be interesting to know how "strong" the "indications" should be in a new oil region before a bona fide locator may consider himself safe in taking up an oil claim with any assurance that he could maintain possession of it under such conditions as determine the rights of a quartz vein locator.

The present situation seems to demand legislation, as oil-bearing formations are essentially different from metalliferous deposits, and the course which intending locators should pursue is not at all clear under existing laws.

IT should be understood that the decision of General Land Commissioner Hermann, issued the 15th ult., in the matter of lieu selections under act of June 4th, '97, or of lands selected in lieu of lands which have been deeded to the United States for forest reserves, also applies to State or railroad selections. Such selections cannot be made and approved within six miles of mineral claims of record without due notice by advertising for a period of sixty days, thus giving miners an opportunity to enter protest if the land be mineral in character. This ruling takes away no privileges of claimants of mineral land, but the land office will receive no affidavits as to character of land unless initiating a contest.

Concentrates.

A GALLON of sea water contains five ounces solid matter, principally salt.

NITRO POWDERS should be thawed slowly and not placed in direct contact with or near a high heat.

THE incorporated mining companies of Cripple Creek, Colo., have paid over $11,000,000 in dividends.

MALACHITE is the carbonate of copper. The specific gravity of copper is 8.95. It melts at 1996° F.

THERE is no United States duty on copper, tin or platinum. The duty on quicksilver is 7 cents per pound.

THE Boston & Montana Copper Co. of Butte, Mont., is producing copper at the rate of 75,000,000 pounds annually.

A WOODEN TAMPING BAR should be used in charging any kind of powder. In some States it is a misdemeanor to use a metal tamping stick.

THE Cox mine on Big creek and the Rudefeha mine at Battle lake, Carbon county, Wyoming, are at present the leading copper producers of Wyoming.

A "horse" in a vein is a piece of the country rock broken from one of the vein walls and afterwards surrounded wholly or in part by the vein stuff or gangue.

THE cyanide process was introduced in the United States in '91; the first detailed illustrated description of such use appeared in the issue of July 3rd, '92.

IT has been suggested that vacuum occurring in boilers when the steam pressure lowers may be avoided by placing a half-inch check valve in the top of the dome.

QUICKSILVER solidifies at 39° below zero, F., and volatilizes at 662° F. It is liquid at ordinary temperatures, showing this peculiarity with but one other metal—bromine.

THE largest gold nugget ever found in Colorado was one weighing 156 oz., taken on July 23rd, '87, from the Gold Flake mine on Farncomb hill, six miles east of Breckenridge.

THE telluride of nickel is reddish in color and is of rare occurrence. It is called melonite, named from the Melones mine, Calaveras county, Cal., where it was first discovered.

WATER dissolves its own volume of carbonic acid gas at all pressures at a temperature of 60° F. Ten per cent of this gas is dangerous to breathe, and 20% quickly produces asphyxiation.

NEVER fire a hole without some tamping. Wet holes require less care in this respect than dry ones. Moist earth with small fragments of rock or small gravel makes good tamping.

A LOCATOR who forfeits his location by reason of failure to perform assessment work can recover nothing for work performed or improvements made from his successor who legally relocates the claim.

NITRO POWDER should be kept in a cool, dry place. It deteriorates with heat and readily absorbs moisture, and if kept in a damp place, as in the workings of a wet mine, for some time its force is greatly weakened.

A STOPE filled with large waste at the time of extraction of the ore will settle but a few inches in 100 feet if no small material be employed in filling. The more care used in filling the less will the broken material settle.

THE cost of producing steam has decreased about 50% in the last thirty years. In '70 the Corliss simple condensing engine consumed twenty pounds of steam per hour for each horse power developed. Now the best types of compound engines need but ten and one-half pounds.

A HEALTHY man respires sixteen times per minute; each inspiration averages 34 cubic inches of air; 100 cubic feet of air will keep a man alive ten hours. One exhales about 22 inches carbon dioxide per minute; when at work, a man requires about 20 cubic feet of air per minute.

THE highest force detonators should be employed in blasting, as the powder explodes with better effect. XXXX caps are superior for this reason to XXX, and higher grades are still better, but should be handled with great care. Caps and powder should be kept separate, to avoid possible serious accident.

WHEN open excavations are left in mines subsidence usually follows, particularly if the vein lie at an angle approaching the horizontal. The subsidence will be greater or less according to the size of the excavation. The greater the depth of the excavation the less the subsidence will show upon the surface.

LIFE is too short to attempt correction of all the statements made in daily newspapers, "by telegraph," with a date line, etc., regarding alleged mine sales and discoveries. These meretricious items probably please those who secure their insertion, and are not believed by any one except those who want to be fooled.

IN Mexico ownership of mining lands is bounded by vertically descending planes; there are no overlapping claims. Anyone, native or foreigner, may take up unclaimed land, where practicable, in pertinenceas—squares 100 meters on each side. The "locator" pays an annual tax; failure to pay forfeits ownership and subjects the ground to relocation by some one else.

THE United States offers no bonus for the discovery of a tin or other kind of mine, though the mining laws are liberal and of a kind calculated to stimulate the search for and appropriation and development of mineral lands on the public domain. New Zealand has offered a bonus of £5000 on the first 100,000 gallons of mineral oil produced from shale, and a bonus of 4 shillings on each pound of quicksilver for the first 100,000 pounds of that metal produced in New Zealand.

"CONCENTRATES," in the issue of Dec. 2nd, said, substantially, that assessment work may be done at this time for two years—$100 worth of work in 1899 and $100 worth in 1900. That was suggested as a matter of convenience to those who have a long distance to go to perform assessment work, or where considerable expense attaches to the performance of the work from any cause. There is no law having a bearing on the matter. If $10,000 worth of work were done in 1899, not a single dollar of it in excess of $100 could be applied to required assessment work.

THE detonator or cap should be put at the top of a charge of nitro powder, and not in the center of the charge. The reason for this is that the fuse must burn down through the powder to the cap, and through some defect of the fuse the powder may take fire and burn or it may melt, and in either case its full force is lost in the discharge. By placing the cap in a short upper section of a powder cartridge, which is placed on top of and in contact with the main body of powder, the best results are obtained.

METALS, chemically, are usually grouped in four divisions, viz.: metals whose oxides are alkalies; metals whose oxides are earthy substances, as lime; metals whose oxides are earthy powders, insoluble in water; metals such as ordinarily are recognized as such, further divisible into two classes—common metals, iron, copper, lead, etc., combustible at high temperature, readily oxidable, rusting and tarnishing in air; precious or noble metals, gold, silver, mercury, platinum, not readily combustible, not tarnishing.

THE Montana State Legislature has prescribed that in that State "hereafter a cubic foot of water (7.48 gallons) per second of time shall be the legal standard for the measurement of water in this State. Where water rights expressed in miner's inches have been granted, 100 miner's inches shall be considered equivalent to a flow of 2½ cubic feet (18.7 gallons) per second; 200 miner's inches shall be considered equivalent to a flow of 5 cubic feet (37.4 gallons) per second, and this proportion shall be observed in determining the equivalent flow represented by any number of miner's inches."

IN a second a snail moves ½ inch; a man walking, 4 feet; a swift runner, 22 feet; an ocean wave, 24 feet; a carrier pigeon, 87 feet; a sixty-miles-an-hour locomotive, 88 feet; a swallow, 220 feet; a cyclone 380 feet; sound in the air, 1095 feet; the surface of the globe at sea level on the equator, 1500 feet; the moon, 3250 feet; the sun (apparent), 5½ miles; the earth, 18 miles; electric current on telegraph wires, 7000 miles; induction current, 11,040 miles; electric current in copper wire armatures, 21,000 miles; light, 180,000 miles; discharge of a Leyden jar through copper wire, 1-16 inch diameter, 277,000 miles.

CHUCKBLOCKS placed beneath the screen frame in a mortar are of service in creating a uniform discharge and treatment of ores. Those ores which have a natural tendency to slime should be worked with chuckblocks. As the die is worn down a high chuckblock is replaced with a low one, thus regulating the height of discharge and preventing to some extent the sliming of the ore which would result from continued pounding of the ore in a deep mortar. In some mills the chuckblock has a copper plate attached to its inner edge, in others it is fixed to a permanent block below the chuckblock. The former practice is the better.

ANSWERING R. R., Bisbee, Ariz.: Iron and manganese are not the same mineral, though not infrequently associated in the form of oxides of these metals. Pyrolusite is a soft manganese oxide brown, yellowish, reddish to black, and psilomelane is a hard ore (a hydrous manganese manganate), usually black or bluish black. Wolframite is tungstate of iron and manganese, as is also hubnerite, the latter containing 20% to 25% manganese oxide. These two latter minerals are entirely distinct from the manganese oxides before described. Manganese and the tungsten minerals are each employed in the manufacture of steel, and samples should be sent to steel manufacturers.

IF a person goes upon the mineral lands of the United States and either establishes a settlement or works thereon without complying with the requirements of the mining laws, and relies exclusively upon his possession or work, and a second party locates peaceably a mining claim covering a portion of the same ground, and in all respects complies with the requirements of the mining laws, then such second party is entitled to the possession of such mineral ground to the extent of his location as against the prior occupant, who is from the time said second party has perfected his location and complied with the law a trespasser. This is substantially the charge to the jury in Horsewill vs. Ruiz, 67 Cal., 111.

THE approximate height of a mountain can be determined by correct barometric observations. If, for instance, the barometer on top of Fremont's Peak, Wyoming, indicates 20 inches, when it is 30 inches at sea level, the altitude is 13,500 feet. The formula is: divide the product of 27,000 multiplied by the barometric reading at sea level, by the barometric reading at the altitude designated; from the quotient subtract 27,000; the remainder is the altitude in feet. For instance, if the barometric reading on the summit of Sierra Blanca Peak, Colorado, is 19.5 inches, the barometric reading at sea level 30 inches, then the height is

$$\frac{(27{,}000 \times 30)}{(19.5)} - 27{,}000 = 14{,}538 \text{ feet.}$$

THE San Francisco & San Mateo, Cal., Electric Street Railway Co.'s rails are welded together by electric process. A bar of steel 1x3 inches and 18 inches long, on which are three bosses—a boss being a projection of the metal on the side of a bar—is placed at each side of the rail web and the jaws of the welding machine allowed to grip it. A pressure of 1400 pounds is then applied by a jack connected to the upper end of the welding machine and the electric current turned on. Instantly the metal between the welder jaws begins to heat, showing bright until a welding heat is reached, when the current is immediately cut off, and, simultaneously, the pressure of the weld is increased to about thirty-five tons. Artificial means of cooling are then applied to the weld, that the cooling may be hastened while under pressure.

IT should always be borne in mind that in a mine possessing irregular streaks of high and low grade ores the latter are not rendered profitable by the admixture of the former. If the low-grade ore will pay alone, it should be worked; and, if not, the high-grade ore will not make it any richer. It often happens that an ore is too low grade to pay the cost of both mining and treatment, but will pay for treatment after having been mined. This ore should be reduced by mill, smelter or otherwise, and may be mixed with high-grade ore of otherwise similar character; but if too low grade to pay for treatment, should be used for filling, thrown over the dump or disposed of in some other inexpensive way. It also sometimes occurs that, when low-grade and high-grade ores are so intimately mixed in the vein as to render sorting expensive, it is cheaper to mill the whole mass than to sort it.

THE largest piece of gold ever unearthed anywhere free from quartz, of which there is any record, was that taken out of the Byer & Haltman mine, Hill End, N. S. W., May 10, '72. It was imbedded in a thick wall of blue slate 250 feet from the surface. It weighed 640 pounds, and was 57 inches long, 38 inches wide and averaged 4 inches in thickness. It was valued at $148,800. The Welcome Stranger nugget was found on Mt. Moliagel, Australia, Feb. 9, '69. It weighed 190 pounds and was valued at $45,000. The Welcome nugget was found at Bakery Hill, Australia, June 9, '59. It weighed 184 pounds 9 ounces and was valued at $44,856. The nugget found Aug. 18, '69, in the Monumental quartz mine, twelve miles north of Downieville, Sierra county, Cal., was the largest piece of gold ever found in California up to that date. It weighed 1142.25 ounces, or 95¼ pounds, cleaned, and was worth $21,156.52. It was found in decomposed quartz 25 feet from the surface.

AS TO WHETHER the top of a wheel goes faster than the bottom or just as fast, it may be said: When a wheel is put in motion every part of it starts at the same moment, and when its motion is stopped every part of it stops at the same moment, and the speed is uniform at every point. This is true whether the wheel is simply revolving on its axis or resting on the ground, though, in the latter instance, it has also a forward movement beside the circular movement around its axis. The forward movement is also exactly uniform in every part. The paradox can not be proven that "the bottom of the wheel goes backward or remains stationary for a moment while the top is going forward." In going forward the wheel, in one revolution, traverses a distance equal to its circumference. Every point on the wheel makes exactly the same distance, starting and stopping at the same distance with each other, which would not be the case if one part moved faster than the other—a thing impossible. The line described by any point in the circumference of a wheel moving on a plane, from the time it leaves the ground till it touches it again—in other words, making one complete revolution—forms a cycloid, and in making the next revolution every point on the circumference, whether at the top or bottom, continues forward at the same rate, starting immediately from where the last revolution left it. For a fuller explanation of this the querist is referred to the "Discussion of the Cycloid" in Church's Calculus.

THE distribution, size, and grade of battery plates is not uniform. An abundant plating surface is preferable in all cases where the gold is subject to amalgamation, and in the matter of grade there is some latitude. A grade suitable for one ore is unsuited to another. The quantity of water has also to be considered when determining the grade of plates. As to distribution and shape, wide plates—50 inches or thereabouts—are generally preferred to narrow ones. In some mills the pulp falls from the battery screen upon a plate of iron, in others upon a rough plank, but a good copper plate well plated with silver is superior to either of the former. The argument against the use of the copper plate is that the dashing fall of the pulp scours the plate. It does, and at the same time accumulates amalgam. A plate arranged in a series of drops is not objectionable. The drop of each section should be about 2 inches. These plates may be 2 or 3 feet wide. A 12-foot plate will then have a series of five or three drops. It will be found that under the drops amalgam will accumulate. The scouring keeps the quicksilver active and bright and furnishes a practical illustration of the advisability of frequently dressing the plates. After plates are dressed the mercury lies in a series of fine parallel ridges, this being produced by the brush used in dressing them. When the pulp has passed over the plates for several hours the depressions become clogged with an extremely fine but heavy material consisting of sulphides contained in the ore, fine particles of iron worn from the shoes and dies and other minerals of high specific gravity, and the surface available for gold saving becomes reduced thereby and the quicksilver becomes inert. When in this condition the plates need dressing, for they are not doing good work, though they may look bright.

ANY steam boiler may be exploded by overpressure such as might be caused by the combination of an inattentive fireman and an inoperative safety valve, or by corrosion weakening the boiler to such an extent as to make it unable to resist the regular working pressure, but some boilers are more liable to explosion than others. In considering the probability of explosion of any boiler of recent design, it requires study as to the probability of its having any of the features known to be dangerous in the plain cylinder, the horizontal tubular, the vertical tubular, and the locomotive boilers. The plain cylinder boiler is liable to explosion from strains induced by its method of suspension, and by changes of temperature. Alternate expansion and contraction may produce a line of weakness in one of the rings which may finally cause an explosion. A boiler should be so suspended that all of its parts are free to change their position under changes of temperature without straining any part. The circulation of water in the boiler should be sufficient to keep all parts at nearly the same temperature without straining any part. Cold feed-water should not be allowed to come in contact with the shell, as this will cause contraction and strain. The horizontal tubular boiler, and all externally-fired shell boilers, are liable to explosion from overheating of the shell, due to accumulation of mud, scale or grease on the portion of the shell lying directly over the fire, to a double thickness of iron with rivets, together with some scale, over the fire, or to low water uncovering and exposing an unriveted part of the shell directly to the hot gases. Vertical tubular boilers are liable to explosion from deposit of mud, scale or grease upon the lower tube sheet, and from low water allowing the upper part of the tubes to get hot and cease to act as stays to the upper tube sheet. Locomotive boilers may explode from deposits on the crown sheet, from low water exposing the dry crown sheet to the hot gases and from corrosion of the stay bolts. Double cylinder boilers have exploded because of the formation of a steam pocket on the upper portion of the lower drum, the steam being prevented from escaping from out of the rings of the drum by the lap-joint of the adjoining ring, thus making a layer of steam about ¼ inch thick against the shell directly exposed to the hot gases.

The Cripple Creek Gold Field.*

NUMBER II.

Written by T. A. RICKARD, State Geologist of Colorado.

The Cripple Creek district exhibits a great variety of vein structure. Many of the veins are essentially mineralized dykes, that is, a part, or even occasionally the whole width of the dyke, is sufficiently rich to be regarded as pay ore, and the boundaries of the dyke then become the walls of the lode. The Moose vein will exemplify this type. The accompanying sketch, Fig. 4, was made at the 350-

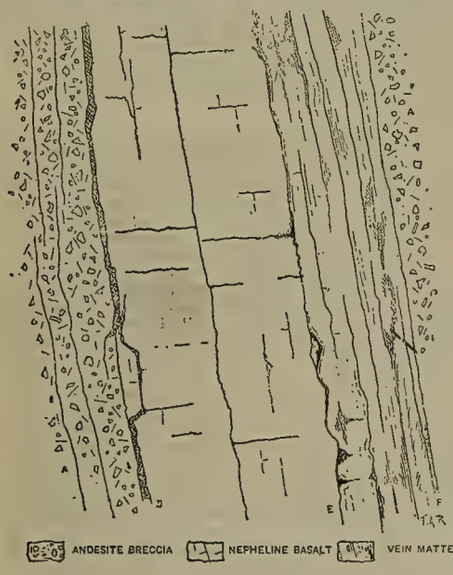


Fig. 4.—Cross-Section Vein, Moose Mine, Cripple Creek, Colo.

foot level. From *D* to *F* is the width of the dyke, which in this case is nepheline basalt, which traverses the andesite breccia. The pay ore extends from *E* to *F*, a width of 10 inches, and it is distinguished from the remaining comparatively barren portion of the dyke, a dark bluish gray rock, by being iron stained and seamed with reddish brown threads, in which gold and tellurides occur. The multiple fracturing, parallel to the walls of the dyke, is a characteristic feature of such lodes, and experi-

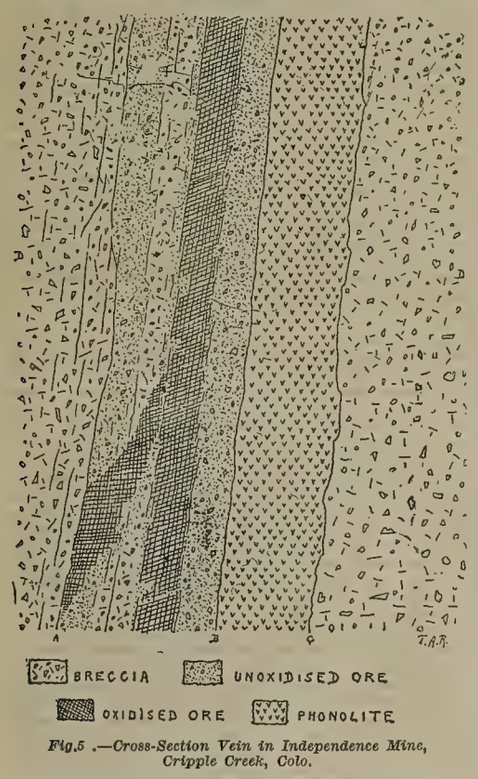


Fig.5 .—Cross-Section Vein in Independence Mine, Cripple Creek, Colo.

ence has shown that there is reason to expect the lode to consist of rich ore when it becomes threaded with minute seams following these lines of fracture. This feature can be described as a sheeting of the rock; it is a very important factor in ore deposition.

Another type is presented by those veins which accompany the phonolite dykes. This is very characteristic of the Cripple Creek district. The direction followed by a majority of the veins, especially on Battle mountain and Bull hill, conforms to that of a system of phonolite dykes. While a particular vein may not adhere continuously to the line of the dyke with which it is associated, nor the ore itself be found in the substance of the dyke, when they are together, yet the behavior of the vein is intimately connected with that of the dyke, and the ore occurrence is modified by both. Fig. 5, made in the Independence mine, will illustrate this. The lode, *AB*, is shown to be in breccia, and follows a phonolite dyke, *BC*, which is 2 feet wide. The ore is confined to the breccia, and if the phonolite is enriched it is so to a slight extent only, and the enrichment is confined to the planes of fracture near the lode and does not extend into the body of the dyke. The ore is essentially andesite breccia, rendered gold-bearing by the penetration of solutions which have circulated along the line of contact between the phonolite and the breccia. The gold occurs not only in the seams which follow the fracture in the breccia, but it is also found in the heart of it, where a spongy vesicular appearance has been caused by the removal of the more soluble ingredients of the rock.

In striking contrast to the two types above described I would instance those veins which are neither mineralized dykes nor immediately (emphasis is laid on "immediately" because the Independence vein, for a large part of its known course, accompanies a phonolite dyke) associated with them, but consist essentially of lines of fracture in the body of the granite itself. A good illustration is afforded by the Independence vein when it leaves the breccia and extends southward into the granite of the Washington claim. Fig. 6 was made at the bottom of the

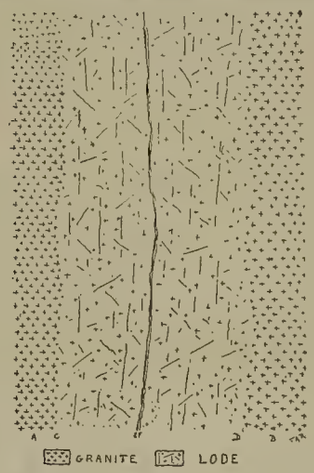


Fig. 6.—Gold Bearing Granite in Washington Mine, Cripple Creek, Colo.

old whim shaft on the 100-foot level. The lode is decomposed granite divided into two equal portions of 2 feet each on either side of the small seam, *EF*, which consists of a parting, *E*, marked by a slight clay selvage, and a seam of quartz, *F*, which is only from ¼ inch to ½ inch thick, but very regular and continuous. The lode, which here consists of 4 feet of two ounce ore, has no walls, that is to say, the decomposed gold-bearing granite, *CD*, is not separated from the undecomposed valueless granite, *A* and *B*, by any clearly defined boundary, although the transition from the dark brownish granite into the fresh pink rock can be clearly followed by looking at it from a distance of 5 or 6 feet. The ore is, therefore, essentially gold-bearing granite, which is found to have undergone several changes, the most notable being the removal of the mica, the decomposition of the feldspar, and the addition of secondary quartz, the general effect being to give it a honeycombed, spongy character.

The lode above described is similar to the outcrop of the Independence mine, which so many overlooked in 1890 and 1891, because it carried no visible metallic minerals or free quartz. The lode has undergone weathering, yet it has withstood the elements, because it carries more quartz than the surrounding rock. The outcrop ceases to appear at a point now occupied by the No. 1 shaft of the Independence mine. This shaft is situated at the contact of the granite and the breccia. The lode continues northward for a great distance, as the workings testify. Southward the lode is encased in granite, and it is itself composed of granite. The barren outer rock is pink in color, and its constituent minerals present a fresh, unaltered appearance. The gold-bearing portion, comprised within the lode, has a dull brown tinge. It is noticeable that the mica is absent, having evidently been leached out, leaving patches of chlorite and iron-stained spots, in which free gold can occasionally be distinguished. Of the two feldspars (orthoclase and oligoclase; the plagioclase variety, containing a larger percentage of lime, is the one which has undergone decomposition) of the original rock the more soluble has become kaolinized, while the other remains so undecomposed as to preserve much of the usual appearance of the granite. The original quartz has been removed, probably by the action of the hydrofluoric acid, the presence of which at one time is suggested by the purple fluorite now staining portions of the ore. Further, there is abundant secondary quartz, in groups of opalescent, indistinct crystals, to the presence of which the lode owes the fact that it is harder than the enclosing granite.

When the lode penetrates the breccia it continues to be made up, not of free quartz or any other foreign vein matter, but of the formation which it traverses, so that south of the contact the Independence is essentially gold-bearing granite, and north of the contact it is gold-bearing andesite breccia.

It is remarkable that while the several bands of gold-bearing matter have a general parallelism with the course of the two phonolite dykes, yet a large part of the ore is not contiguous to the phonolite, but traverses the granite and the breccia, regardless of such structural features as the contact or the dykes themselves. The ore has no defined walls. When definite partings appear to limit the widths of gold-bearing material it is only to mislead; there are simlar "walls" both within the ore itself and beyond it in the outer country. When the ore abuts against a phonolite dyke it does not usually extend into the dyke, save occasionally where tellurides are found upon the cleavage planes of the latter near its edges. Where the lode crosses the contact the ore changes at once from gold-bearing granite to gold-bearing breccia. A widening of the ore body exists at the contact, and for a considerable distance both north and south of it. The composition of the rocks appears to have been an entirely unimportant factor as compared to the physical and structural conditions in the locality of the ore deposit. Few examples of lode structure so well emphasize the general truth of those modern ideas of ore deposition which are advocated by the teachings of Posepny. It is interesting to accentuate this fact, because there was an erroneous impression conveyed, in the early days of Cripple Creek, by the writers of the daily press, that the gold field set at naught the accepted teachings of geological science. The idea was due to the careless utterances of local men, and never emanated from any recognized authorities. The converse is true, and should be emphasized, namely, no modern mining region so clearly establishes that explanation of ore deposition, which is based upon the recognition of the laws governing the circulation of underground waters, under conditions traceable to the geological structure of the rocks.

The Ores and Minerals.—In discussing the geological feature of the district frequent emphasis has been laid upon the fact that the ore is usually only rock, whether granite, phonolite or breccia, which has become impregnated with gold-bearing minerals to a slight extent as regards percentage, but to a notable degree as regards commercial value. In 1893, when W. S. Stratton, the owner of the Independence, sent several carloads of rich ore from his mine to the Denver smelters, the officials at the works thought a blunder had been made and that loads of ballast had been inadvertently consigned to them.

The gold occurs either in the native condition or as a telluride, and is found distributed among the interstices of the rock, lining the fractures or penetrating the substance of it in threads of varying minuteness. In lodes traversing the granite the gold, or the tellurides containing it, will be scattered amid the porous cavities due to the removal of certain more soluble portions of the rock. In phonolite the values will be found more frequently along fractures than in the heart of it. This renders the last mentioned class of ore very difficult of estimation. In the andesite breccia, the component fragments of which are so heterogeneous, the physical character of the rock varies considerably, and the gold values will partake of an irregular, sporadic distribution.

The distinguishing feature of the ores of the district is the occurrence of tellurides. The tellurides are compounds of tellurium with certain metals, and they are so termed just as the compounds of sulphur are called sulphides; thus, for example, calaverite is the telluride of gold, while iron pyrites is the sulphide of iron. Tellurium is a non-metallic element with a metallic luster. It acts as an acid base, just as selenium and sulphur, the three forming a recognized chemical group having common affinities. If tellurium were a metal, as is often supposed, its combination with gold or silver would only be possible as an alloy.

It is usually assumed that the precious metals enter into the composition of tellurides, and a high commercial value is taken for granted in speaking of this species of minerals. Nevertheless, there are many varieties which are valueless to the gold miner, such as telluride of mercury, called coloradoite, which occurs at Kalgoorlie, as well as at Magnolia in Boulder county, Colorado. The tellurides of the baser metals occur, for the most part, in quantities so restricted as to have no commercial value, and are rather to be considered as curiosities much desired by the mineral collector.

No native tellurium has yet been found in the Cripple Creek district, but in Boulder county, ninety miles farther north, it occurs among gold ores in a free state, and a mass weighing twenty-five pounds was found in the John Jay mine about twenty years ago.

Certain telluride materials very much resemble

*Condensed from a paper recently read before the Institute of Mining and Metallurgy.

the common ores of silver; the sulphide of silver (argentite), for example, is difficult to distinguish from hessite, the telluride of the same metal, silver. The instance is quoted in order to refer to a simple test applicable to any doubtful cases. Remove a small bit of the suspected mineral with the point of a knife, and put it in a porcelain dish or a white saucer. Add three or four drops of strong sulphuric acid, and heat over a lamp. Should tellurium enter into the composition of the suspected mineral, a beautiful purple will suffuse the colorless acid.

The principal telluride minerals found in the Cripple Creek ores are sylvanite, calaverite and petzite. Sylvanite, named after the place of its discovery, Transylvania, is the most characteristic of Cripple Creek ores, an average composition being 28% gold, 16% silver and 56% tellurium. Sylvanite is a brilliant silvery white mineral, having a characteristic crystalline habit, to which it owes its other name, "graphic tellurium," the arrangement of the crystals resembling Arabic lettering.

Calaverite is the simple telluride of gold. Pure specimens contain 44.5% gold and 55 5% tellurium. It is named after the county of Calaveras, in California, where it was first found at the Stanislaus mine. The purest varieties are bronze yellow color. Calaverite is rather difficult to distinguish from iron pyrites. The difference in color is slight, but the former is easily cut with a knife, while the latter will not permit of it. The cubic crystalline habit of pyrites will usually help to make it known, because calaverite rarely occurs in any other than a massive form.

Petzite, named after the German chemist, Petz, is, like sylvanite, a double telluride of gold and silver, its average composition being 25% gold, 42% silver and 33% tellurium. It is much darker than sylvanite, being steel gray to iron black; it is also slightly harder and more brittle.

The lodes of Cripple Creek are further characterized by the presence of fluorite or fluorspar (the fluoride of calcium), a purple mineral, which is so notably associated with the ores of the district as to have led to the idea that it could be accepted as an indication of the richness of the veins in which it was found. But, like most attempts at short cuts to knowledge of this kind, the generalization has proved fallacious. There are several large lodes of low-grade ore in the district which are purple with fluorite, and there are some very rich ores almost devoid of it.

In the upper levels of the mines, within the reach of surface waters, the tellurides are decomposed and the gold has been liberated. In the first years of development certain mines afforded specimens of native gold, the dull brown, lusterless appearance of which was a puzzling variation.

Below the depth, which ranges from 100 to 400 feet, reached by surface waters, the unaltered tellurides appear in all their untarnished beauty. At a further depth, from 500 to 700 feet, the ores become more complex, because of the increasing percentage of baser minerals, chiefly iron pyrites, but including also galena and stibnite. This change is important chiefly from a metallurgical standpoint, because the increase of sulphur renders the roasting of the ores more expensive.

(*To be Continued.*)

Types of Veins.

The terms simple fissure vein, group of parallel veins, linked veins, and chambered veins probably include nearly all species of deposits excepting sedimentary beds and placers, writes G. F. Becker in his monograph on the Quicksilver Deposits of the Pacific Slope. It is, of course, easy to imagine irregular bodies of ore unconnected with any fissure system, but it is doubtful whether such really occur in nature. If these terms should be adopted, the names impregnation, stockwork, pocket, etc., would be understood to refer only to the structural character of the specific portions of deposits, and not to the form of any deposit as a whole.

While it appears that even veins in firm, homogeneous rock must tend to irregularity near the original surface as it existed when the fissure formed, it is evident that at great depth fissures in irregular and weak rocks, such as those which form the greater part of the Coast Ranges of California, must tend to regularity and simplicity; for at great depths the walls of a fissure are so supported by the overlying masses that even if the country is composed of discrete fragments these will be held in place very much as if the material were continuous. Hence at considerable depths distinct fissures are to be looked for, even in the quicksilver mines; but it is evident that the material support of fragmentary rocks will act only so long as the fissures are very narrow. If considerable openings form, such as are suitable for the deposition of ore in large masses, irregular reticulated vein chambers will result in such material at any depth. In such rocks as I have seen in the quicksilver mines of California wide simple fissure veins are not to be expected at any level, and irregular chambers are not so likely to be met with at great depths as at small ones, though they may occasionally be found at any distance from the surface.

Three-Quarters of a Century's Progress in Mining and Metallurgy.*

Written by CHAS. KIRCHHOFF, New York.

It is difficult to measure progress, qualitatively, in branches like mining and metallurgy. It is expressed in the more complete utilization of the natural resources, as in the increase of the total extraction of the contents of a coal bed. It is in evidence in the form of a capacity to utilize bodies of ores, lower and lower in grade. It is proven by ability to produce from rebellious, or impure ores, metals nearly chemically pure, and commercially available for a wider and wider range of consumption.

A simple enumeration of statistics of production only partially reflects the development of an industry. Yet that in itself shows a record of which we may well be proud.

Practically seventy-five years ago our greatest mining and metallurgical industries were in their infancy, and many were not even started. We had only begun to mine small quantities of anthracite coal. We were producing iron, but had at an earlier date been relatively more important as an iron-manufacturing nation. Silver, copper and lead were made in irregular, very small quantities. Zinc was not produced, and the gold output, with the Georgia gold rush of '28–30, was about to begin. In other words, our mining and metallurgical industries were of so limited a character that, compared with the ancient operations of the leading European nations, they were insignificant to a degree.

While it is true that our miners and smelters rose to the occasion when they were called upon to meet special conditions, the general fact is apparent, from a study of our development, that we first copied and then adapted the methods approved by experience in Europe. We were forced and did create hydraulic mining to collect the gold from alluvial deposits. We developed the preparation of anthracite for the market. We had nothing to guide us in handling the copper rock of Lake Superior. The Washoe process was worked out to treat the silver ores of the Comstock lode. There were few precedents for methods in the petroleum industry, and had to learn by ourselves how to collect, distribute and utilize natural gas. But Cornish, Welsh and English miners long controlled the working out of our mining methods. German and English metallurgists guided our first steps in beneficiating our more complex silver, lead and copper ores.

Mining.—With the widespread search all over the world, and the increasing number of trained observers, there has been an enormous accumulation of observations and data relative to mineral deposits. In the case of bedded deposits, the relations between mining development and economic geology have become closer and closer. But, on the whole, it cannot be said that this branch of science has given much direct aid to the metal miner. The systems of extraction have not undergone any radical improvement. On the whole, they are modified more frequently to meet more closely local conditions. It is rather in the work of excavation proper that progress has been most striking. It was J. J. Couch, a Philadelphian, who, in '49, patented the first percussion drill ever made. Herman Haupt experimented with rock drills at the Hoosac Tunnel, from '56 to '61, while the first drill tried in mining was that of Schumann, at Freiberg, in '57.

Colladon had proposed to use compressed air to work drills as early as '52, but general attention to rock drills driven by compressed air was attracted by their employment at the Mount Cenis tunnel in '61, the plan to adopt them having been approved in '57, as the result of Sommeiller's work. Quickly following upon the start thus made by power drills, came the introduction of high explosives. Nobel first applied nitroglycerine in '63, and its use was begun in '66 at the Hoosac Tunnel. A year later Nobel introduced dynamite, and since then power drills and high explosives have wrought a complete revolution in mining, by increasing the speed of development and extraction, by very greatly increasing the efficiency per man employed underground, and by heavily reducing the cost. By constant improvement in design and detail of both compressor and drill, machines have been created which have a wonderful life and efficiency, considering the adverse conditions under which they are expected to operate. What the defects in design in the early days meant is illustrated by the fact that in '64, in the Mount Cenis tunnel, it took an equipment of seventy Sommeiller drills to keep eight steadily at work, and in '67, 200 were needed to maintain sixteen in actual operation.

The mechanical engineer and machine builder have given their powerful aid, too, in improving pumping and hoisting machinery. The simple and effective American direct-acting pump has done valuable service to mining, although for heavy service and large quantities of water it is giving way to more elaborate engines. In hoisting appliances for deep mining we long remained behind European practice, our shallow mining not calling for heavy engines. During the last decades, however, some splendid equipment in magnitude, in speed and in economy of operation has been designed in this country.

Underground traction has undergone far-reaching changes. Wire-rope haulage was introduced into collieries long before San Francisco led in surface cable traction, and in this country pneumatic and electric haulage were very promptly adopted and very rapidly developed. These, however, are only recent achievements, progress in underground haulage having been very slow for decades.

In timbering the Comstock, square set was a characteristically American creation to meet exceptional conditions, and it is true that the preparation of mine timbers above ground by machinery was first practised in this country.

For a long time the concentration of ores was neglected, simply because in many remote sections of the United States it did not pay to turn to mechanical dressing, and because the oxidized surface ores, easily smelted, did not offer opportunities. An exception must be made of the Lake Superior copper region. There the Ball steam stamp quickly superseded the time-honored battery. Subsequently, Leavitt reduced the steam consumption by compounding, and more recent practice has proven that the spring foundation is not equal to the solid anvil in bringing out the highest efficiency. Ore concentration has been well developed in later years in southeastern Missouri and the low-grade lead and copper camps of Colorado, Utah, Idaho and Montana.

It would be a serious oversight, in dealing with the treatment of ores, to overlook the enormous influence which the introduction of the Blake crusher has wielded in the efficient handling of rock. Nor should later types of crushers, like the Gates, be overlooked.

An example of steady progress in crushing apparatus is furnished also by what is known as the California stamp mill. Every detail has been watched and worked out for decades, and a number of efficient self-feeding appliances have been added, until to-day there are enormous plants pounding away year in, year out, without any intermission, with merely a crew of inspection to represent the labor account.

It seems certain that the part which the rock drill has played in general mining is destined to be paralleled in coal mining by the modern coal cutting machinery. The difficulties inherent in handling mechanical apparatus in low rooms may account for the fact that progress has apparently lingered so far behind in this field. In Europe, as well as in this country, inventors took hold of the problem in the '50s, but little headway was made for many years. It is only recently that machinery for this purpose is being introduced with a rush. Among the pioneers were Harrison, with a pick machine, and Lechner, with a cutter-bar machine. All the earlier types were driven with compressed air, and it was not until '89 that electricity was applied to the Jeffrey cutter-bar machine, since superseded by the electrically driven chain-breast machine. How rapid has been the development of this branch of work in this country in recent years is shown by statistics compiled by E. W. Parker of the United States Geological Survey. In '91, 6,211,732 tons of coal were mined by machines representing 6 66% of the whole. In '98 the tonnage had jumped to 32,413,144 tons, or 20 4% of the whole. It is not too much to say that, from an economic point of view, this is the most far reaching and significant recent development in mining.

A splendid achievement in mining was that of handling auriferous sands by hydraulicking. I do not remember ever having noticed in our literature any definite data which might fix the credit for this upon any one man or group of men. The date is placed at about '53, and in those stirring times, so soon following the discovery of gold in California, probably no record was left. The further stages of its development are coupled with the names of a number of inventors of nozzles and many ingenious hydrodynamic and hydrostatic contrivances, and in its greater days, before the anti-debris laws in '82 cut off the work, bold and splendid engineering work was done in connection with these undertakings.

In more recent times some very thorough work has been done in one branch of ore dressing, and that is in magnetic separation of iron ores. A number of American inventors—among them Ball & Norton, Wenstrom, Wetherill and Edison—have labored to utilize the lower grades of magnetites in the Eastern States. The problem of cheap and effective crushing involved has been carefully studied and brought out new ideas, but economic conditions for a while pushed the whole undertaking into the background. Recent events point to fresh opportunities in this direction.

Metallurgy.—In the metallurgy of the precious metals marked progress has been made, although no really revolutionary methods have come to the front until the present decade brought the cyanide process. In gold extraction the improvement in the California stamp mill, largely mechanical, has already been alluded to. There have been added, in

*Condensed from the Journal of the Franklin Institute.

the amalgamation process, some ingenious contrivances. The chlorination process, together with the improvement in the design and operation of the batteries, and the introduction of the Frue vanner and machines of its type, has rendered possible the profitable treatment of low grade ores. There are to-day prosperous enterprises based on a yield of one-tenth of an ounce of the yellow metal to the ton of rock—a quantity so minute that no gold is visible in the ore, week in, week out.

The chemist has again intervened in recent years. While the solvent power of cyanides on gold was known early in this century, it was not until the later '80s that the MacArthur-Forrest process made that method practicable by utilizing the fact that zinc shavings may be used as a precipitant.

For the treatment of more complex ores there was developed relatively early, at the Argo Works, in Denver, Colo., a series of methods dependent upon the employment of copper as a carrier, and more recently pyritic smelting is gaining ground. It is based upon the treatment of sulphide ores in the blast furnaces, so that a considerable part of the heat produced by their oxidation is utilized in their fusion. Small quantities of lead or copper serve as collectors of precious metals.

Silver.—Although the patio process of amalgamation was invented in 1557 by Bartolome de Medina, at Pachuca, followed in 1590 by the cazo process of amalgamation invented by Alonzo Barba, at Potosi, no real improvement followed in the succeeding centuries. On the heels of the discovery of the Comstock lode, in '59, by O'Reilly and McLaughlin, came the invention of what is known as the Washoe process of amalgamation, by Almarin B. Paul and James Smith. It was in the direction of improving the chloridizing roasting that metallurgists sought and found a solution of their troubles. Brueckner, Stetefeldt, Howell, O'Hara and others did admirable work; but with the steady improvements in lead smelting, increasing quantities of the rebellious silver ores were diverted from the amalgamating mills to the smelters, and now silver milling has shrunk to a secondary place.

Lead.—Although lead mining was begun as early as in the days of Law's famous Mississippi Co., and Mine La Motte, in southwest Missouri, still in active operation, was discovered at that time, yet production did not develop seriously until late in the '20s. It attained about 10,000 tons per annum in '33. With the rich and pure ores the Scotch hearth served admirably and remained the standard method until the discoveries in quick succession of the rich ore bodies of Eureka, Nev., and of different camps in Utah, late in the '60s, led to the copying of the German blast furnace practise. Arents, Eilers, Hahn, Grant and others soon introduced improvements, Arents' siphon tap being a very important step forward. Water jackets appeared and a thorough scientific study of the chemical composition of slags led to more regular and cleaner working, and the collection of flue dust assumed a growing importance, Iles, of Denver, Colo., doing conspicuous work in this direction. Charcoal as a fuel gave way to coke—the quantity of lead in the smelting charges needed to recover the precious metals was steadily crowded down under the pressure of a scant supply of lead-bearing ores. With the steady development of the railroad system of the Rocky mountains, dry ores carrying little or no lead became available in larger quantities, and to-day American lead smelting plants are models for the world.

Soon after the argentiferous base bullion of the Rocky mountains made its appearance, the Parkes zinc process, invented in '52, was first introduced at the Balbach Works at Newark, N. J., and the most important improvement in it was that of the Faber du Faur furnace for distilling the rich zinc alloy. Since then progress has taken the direction of economic handling of large charges and the introduction of labor-saving appliances.

Copper.—Although some copper was mined along the Atlantic coast at a number of points in the eighteenth and during the earlier part of the present century, it was not until the gradual opening up of the Lake Superior region from '45 onward that it attained the dignity of an important industry. Curiously enough, it was in the same year that the smelting industry on the seaboard was started by the Revere Copper Co. and the Baltimore & Cuba Smelting & Refining Co; both depended almost entirely upon foreign supplies of raw material. These flourished for about twenty years and then collapsed or led a precarious existence until domestic supplies of furnace material from the Rocky mountain region caused their revival. To-day our tide-water plants are among the great works of the world, and have begun to again draw heavily from foreign sources. Thus, Australian black copper comes to us via London for treatment, to be returned to the European markets, and Chili bars are making the same journeys. Metallurgically, there is little to remark concerning the development in the treatment of the native copper of the Lake region, which held sway in the markets for so many decades. The time-honored methods of refining continued with little change.

A new era began with the opening up of the oxidized deposits of Arizona and the ores of the Butte district. In the former the water-jacketing of the furnaces was one of the first successful steps, and a general improvement of practise followed quickly. In the Butte district a good deal of tentative work was done in concentration, in roasting and in smelting in reverberatories and in blast furnaces. The Brueckner, Brown and Wethey roasting furnaces were adopted, and the Manhes process of bessemerizing, invented in '83, in France, was first introduced at the Parrot Works. The practise has been improved very rapidly, and now the remelting of the matte is being superseded by direct transfer from the furnace to the converter. Almost simultaneously came the electrolytic process of separating the precious metals, in which very rapid progress has been made, and which, coupled with the bessemerizing, an economic revolution has been effected, not alone in cost of production, but also in the direction of furnishing a high-grade metal from impure ores.

Iron and Steel.—And now we approach the greatest of all metals—iron—in the development of which Pennsylvania has had so conspicuous a share.

After all, it was not until the days when John Fritz became a leader that the marvellous development was initiated. Remember that it was not until '39 that anthracite was used in the blast furnace, and that six years later raw bituminous coal was tried in this country as a furnace fuel. You must recall that boiling was only introduced in '48, that our modern steel making processes did not really occupy a commanding position until late in the '60s, and you will realize that the great period of the iron industry is really concentrated in the last thirty years.

One fact perhaps you will allow me to dwell upon, and that is, that the Bessemer process really forced a recognition of scientific work upon the attention of the practical ironmaster. The chemist very soon became a part of the force of the steel works, and, somewhat later, of the furnace plants, who were anxious to have them as customers for pig iron.

Not that chemical research had not long since been directed to metallurgical operations, and not that a few did not indulge in speculations as to the scientific causes of observed phenomena.

But progress during the last seventy-five years has been pushed along lines as important in their way, as the cheapening of product, or the raising of the standard of quality. Like in other industries, the captains have displayed increasing care of their armies of men. It has become an axiom with every enlightened manager that every means which shall render more satisfactory the surroundings of the workers is bound to tell upon the results of their labor. Compare our modern plants with those of former decades, of which some even survive now, and note what attention is paid to make the conditions under which manual labor is performed as tolerable as the circumstances will permit. There has been a tremendous improvement in this direction, and it does not lessen the achievement when we frankly acknowledge that it is largely due to the recognition of the fact that progress in this direction pays handsomely.

It was the keynote of Franklin's life that all his thoughts and all his endeavors were directed to making his work of benefit to the human race. Although those who have labored in our fields may not have done so as consciously or as deliberately as he, the fact is that progress in mining and metallurgy has powerfully contributed toward that end.

American Inventive Genius.

"The Patent Office is more than self-sustaining," says Secretary of the Interior Hitchcock in his annual report. "As American inventive genius has cheapened the cost of production, to the advantage of American wages, it would seem as though the legislative branch of the Government should do much to encourage the useful arts and the inventors of the country. At the present time our manufacturers are reaching out for foreign markets, and no greater aid can be given them than by fostering and stimulating invention to become dominant in the markets of the world through labor-saving inventions which will enable it to compete with the lower wages paid to the so-called working classes in other countries. The greatest development in American exports must be in the direction of increase in the export of manufactures. The commissioner asserts that we mainly owe to our patent system such foothold as we have gained during the past fifty years in foreign lands for our manufactured products; that we can, by a fair and liberal treatment of our inventors, control for our manufacturers not only our home markets, but the markets of the world. Most labor-saving machinery perfected within the last seventy-five years is the invention of our own people. It is not alone by fundamental inventions that our inventors have revolutionized in so many respects the manufacturing industry. Not the less have their inventions in automatic devices, in expediting processes and in many steps dispensing with hard labor, assisted in placing this country in the front rank in art. American electrical appliances command the world's markets. Let it not be forgotten that it is the American inventors who, by their inventions and discoveries, 'have made the last fifty years of the nineteenth century the most remarkable of recorded time,' and, at the same time, have laid the civilized world under tribute to American manufactures."

Ore Shoots—Ore Chimneys—Pay Shoots.

Written for the MINING AND SCIENTIFIC PRESS by J. P. WALLACE.

The above terms are practically the same in meaning. They may be defined as collections of the most valuable ore into continuous channels, troughs or expanded portions of a vein. Isolated ore bodies of this kind are generally called chimneys. Ore shoots may be vertical, more or less inclined or horizontal. One or more may occur in the same claim. When several are thus found in one vein they are generally parallel, or nearly so, and are separated from each other either by pinched portions of the vein or by ore that is comparatively low in grade or too poor for extraction. The distance between shoots varies in different cases—it may be but a few or many feet. The width of shoots, either crosswise or lengthwise to the vein, differs greatly in different shoots and also in different places in the same shoot; the width along the vein varies from a few feet to several hundred feet; the width crosswise to the strike generally corresponds to the distance between walls, except in those cases where the walls are impregnated or replaced with valuable ore. There is no regularity as to vertical extension of shoots or chimneys; sometimes they are less than 100 feet, at other times over 1000 feet and in rare instances over 2000 feet. Shoots often outcrop, but sometimes are blind—that is, covered up with debris or country rock. Occasionally they are encountered in the workings several hundred feet below the surface. The kind of ore in shoots differs; it may be chiefly gold, silver, copper or lead, or it may be a mixture of these. The grade of ore may and generally does vary in different parts of the same shoot; so, also, different shoots in the same lode often carry different values. A lode which is characterized by the occurrence of shoots should be so worked as to confine the development as much as possible to the ore-bearing ground; thus, a shaft in a perpendicular and a drift in a horizontal deposit of ore would in most instances be the economical method.

At or near the point of crossing of two veins, especially if the veins intersect at a small angle, shoots are of common occurrence, and the ore in such deposits is generally richer than in other ore shoots of the same vein. Shoots of ore occurring at vein intersections are occasionally the only ones found in the two fissures concerned.

Every lode when discovered should be prospected thoroughly and its back exposed in numerous places. In this way it may be determined whether the lode in question has pay shoots, how many and where situated. Too often this precaution is neglected, and after a wearisome and unprofitable struggle the owner abandons or sells the prospect for a song, only to see later on a rich shoot of ore opened up on it by the purchaser. Lodes which, after proper surfacing, do not reveal reasonably fair values in at least one place, are seldom worth the holding by a poor man. Blind shoots may be discovered by sinking at random, but this is uncertain. Depth may show better values, but generally it does not. Even if this were known to be true in a particular case, how could a lean purse drive the drill to the required depth? Mining outside of pay shoots had better be left to him who hath and to spare.

Sumpter, Or., Dec. 6th, '99.

A Department of Mineralogy and Mining.

Representative Osborne has introduced into Congress a bill providing for the establishment of an executive Department of Mineralogy and Mining. Following is the text of the bill:

"That there shall be established at the seat of government an executive department, to be known as the Department of Mineralogy and Mining, the objects of which shall be to gather and diffuse among the people of the United States practical and useful information pertaining to mining in all its branches. Said department shall be under the supervision and control of an executive officer, to be known as the Secretary of Mineralogy and Mining. Said officer shall be appointed by the President, by and with the advice and consent of the Senate. There shall be an Assistant Secretary of Mineralogy and Mining. The Secretary of Mineralogy and Mining shall receive the same salary as is paid to the Secretaries of the executive departments of the Government. The Geological Survey, as at present established, together with all records, maps and apparatus now connected therewith, shall be transferred to and made a part of the contemplated new department. This act shall go into effect and be in force on the 4th day of March next succeeding the day of its final passage."

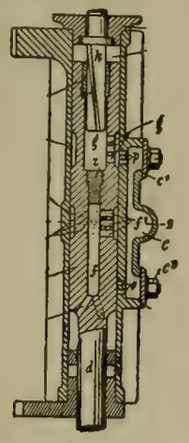
Representative Barham of California, chairman of Committee on Mines and Mining, is reported as favorably disposed toward the bill and will doubtless wield some influence in favor of its passage.

Latest Mining and Metallurgical Patents.

Patents Issued Dec. 12, 1899.

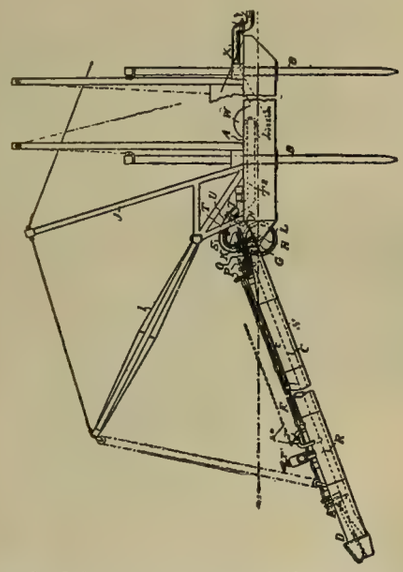
Specially Reported for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 638,856; G. S. Ullathorne and H. P. Vacher, London, Eng.



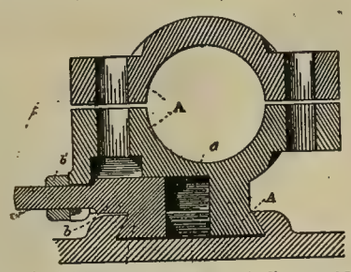
The combination of the working cylinder *a* closed on both ends by suitably shaped covers and provided with inlet ports *o* and *p* and with exhaust ports *x*, chest *c*, piston *b*, provided with annular recesses *r* and *s*, concentrical bores *f* and *g* and ports *f'* and *f²* and *g'*, piston rod *d* and of means for imparting a partly rotary reciprocating motion to the piston at each stroke.

DREDGER.—No. 638,883; R. A. Perry, Oakland, Cal.



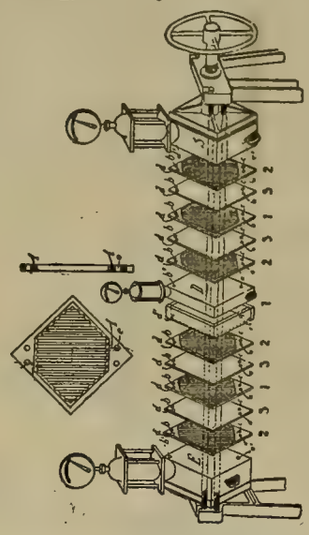
In a dredging apparatus, a stationary scow with a shaft across the front, a barrel standing at right angles with the shaft and supported thereon by a sleeve turnable upon the shaft, a ladder upon which the front portion of the suction pipe and the cutters are carried, having its rear end supported and turnable with the barrel to allow the ladder to move from side to side, and means for buoying the front of the ladder consisting of one or more air tanks whereby the scow is relieved from the weight of the ladder when the ladder is turned to either side.

ATTACHMENT FOR ROCK DRILLS.—No. 638,938; P. H. Reardon, San Francisco, Cal.



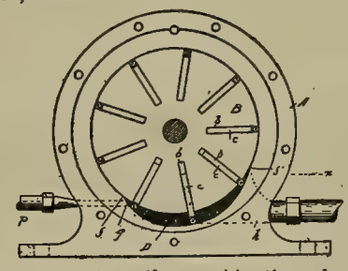
In a rock drill attachment, a shell provided with a pocket of two diameters, in combination with a column clamp having a lug adapted to enter pocket after the clamp is secured upon the column and a device opposable to the lug whereby it is secured in pocket. In a rock drill attachment, a clamp provided with means adapted to secured it upon a column, opposable projections thereon adjustable with reference to each other and to the clamp, in combination with a drill shell having a pocket of two diameters adapted to receive projections after the clamp has been secured upon its column. A rock drill column clamp having a projecting lug *A'* a device sliding in clamp and a lug *B'* similar to *A'* a suitable device adapted to engage with *A'* and *B'* whereby the drill may hang loosely thereon and means for operating the lugs whereby the drill is securely attached.

FILTER PRESS.—No. 638,949; G. Ackermann, Charlottenburg, Germany.



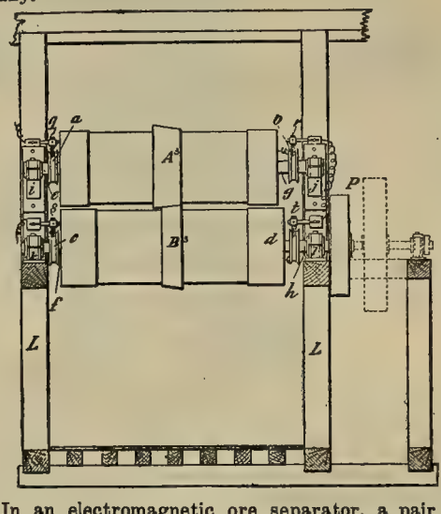
In a screw filter press, the combination with an inlet chamber *E*, gridiron frames, filter plates and end chamber *S*, of an intermediate or collecting chamber or chambers *D*.

WATER MOTOR.—No. 639,011; R. M. Blackmer, Wardner, Idaho.



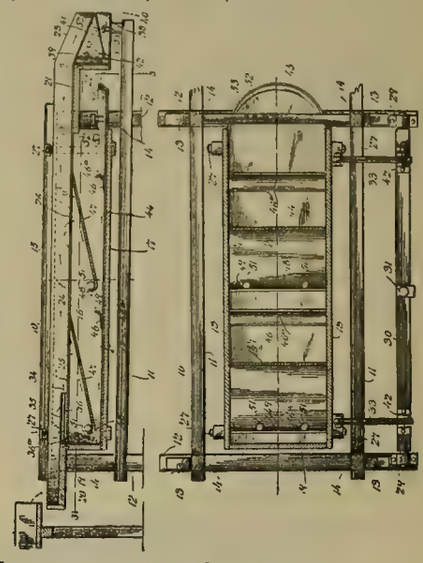
In a water motor, the combination of a casing provided with a cylindrical chamber expanded on one side, a cylindrical wheel in chamber provided with radial slots at its periphery, and plates *c* filling and adapted to slide in slots, the periphery of wheel being circular and unbroken except for slots and plates, means for keeping plates against the outer wall of chamber, a narrow water inlet at one end of expansion, so located that it shall deliver the stream of water in a direction that forms an angle with the radius of wheel at the point of delivery, slightly greater than a right angle, and an outlet for the water at the other end of expansion to that of the inlet.

ELECTROMAGNETIC APPARATUS FOR SEPARATING ORES.—No. 639,062; E. Kreuser, Mechernich, Germany.



In an electromagnetic ore separator, a pair of cylindrical electromagnets having at least three cylindrical poles of larger diameter than the intermediate parts on which the wire coils are wound, the two end poles being of the same polarity while the intermediate pole is of opposite polarity, and one of the sets of poles being made of larger diameter than the other so that such larger poles of one magnet are in contact with those of the other, while the polar distance between the smaller poles constitutes the magnetic field for the separation of the ores, and means for varying the diameters of the poles that are in contact, in order to vary the polar distance between the other poles.

ORE SEPARATOR AND AMALGAMATOR.—No. 639,089; I. A. Palmer, Seattle, Wash.



In an ore separator and amalgamator, a suspended box provided with a grizzly perforated at intervals throughout its length, a collector pan fixed to the box below the grizzly and provided with perforated riffles, a series of aprons within the box, below the perforated sections of the grizzly, and each having a perforated riffle in staggered relation to the riffles on the collector pan, a primary screen at the head of the grizzly, a tailings receptacle at the delivery end of the box and provided with an inclined apron and a riffle, and a discharge screen extending from the grizzly over the tailings receptacle. An ore separator and amalgamator comprising a shaking box provided with a grizzly, a tailings receptacle carried by box at its delivery end and having an amalgamated bottom terminating in a vertical flange, a screen inclined from the grizzly and extending over flange of the tailings receptacle to form overflow openings between the lower edge of screen and the flange, and an apron disposed within the tailings receptacle below the screen and inclined toward the head of receptacle, apron provided at its free edge with a perforated riffle.

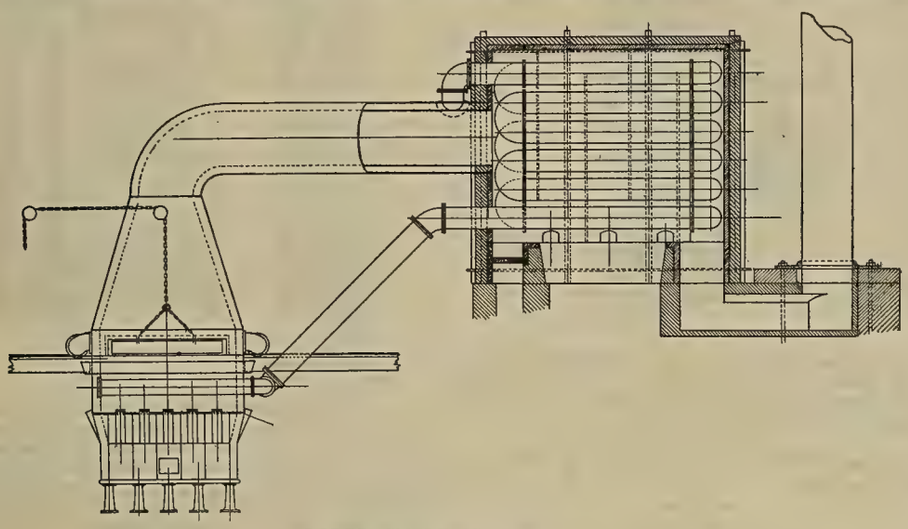
Developed Mines vs. Prospects as an Investment.

Those seeking investment in mining property are often at a loss to know whether to buy developed mines of recognized value or to take prospects and develop them. It is a question which each one must determine for himself, and in each individual case the merits of the proposition must be carefully considered. Usually the owners of well-explored mines demand a price so excessive that the would-be investor hesitates to undertake the great risk involved, though generally the value of a mine that has extensive development may be judged with reasonable certainty beyond the amount of ore actually in sight, and if the price demanded be not too great the risk may be undertaken with a fair prospect of a successful ending of the venture. On the other hand, the great amount of money required to purchase a large developed mine will equip and explore a score or more of prospects, but the difficulty is found in selecting the right prospects. That one man can see as far into the ground as another is an aphorism, and the large number of "promising prospects" which have proven upon development dismal failures proves this. In most cases prospects, or mines with only limited development, are risky as an investment, though often most alluring. It is not always the claim which makes the richest surface showing that eventually proves the most profitable mine, and, *vice versa*, the one making a poor superficial appearance sometimes develops into a bonanza in depth. The question cannot be answered arbitrarily, as the elements entering into it are not constant. The experience of those who make a business of searching for and buying mining property in various stages of development affords little by which others may be guided along the same path, as the percentage of success or failure which each meets may generally be said to represent the extent to which each permits the element of uncertainty to enter into their investments.

The Loder Smelting Furnace.

Written for the MINING AND SCIENTIFIC PRESS.

The Loder hot blast furnace, for reducing iron, copper and nickel ores to matte, utilizes the heat units contained in the pyritic ores to produce and support a smelting fusion. By reference to the accompanying cut an idea of the general plan of the furnace will be obtained. Upper and lower water jackets are connected to maintain a uniform heat at the zone of fusion, by which the lower jackets are kept much hotter than can be done where cold water is fed to them, as by the old method. The arrangement of the bustle and tuyere pipes is claimed to possess special advantages. They are of cast iron and steel and have a deflecting nozzle. As the tuyere is pulled from the furnace the air communication is closed by a rotating sleeve, which is bored and turned to fit the bustle pipe, making a



LODER SMELTING FURNACE.

safe connection from the latter to the furnace for hot air. The air from the blower enters the hood, which forms the upper section of the furnace, at either end, passes around the hood and out through a pipe into the heating chamber, through coils, where it is further heated, thence back to the furnace through bustle and tuyere pipes. The heating chamber of a 100-ton furnace contains 2800 square feet of heating surface exposed to the waste gases of the furnace, and in which, it is claimed, a temperature of 1600° C. can be maintained without the use of carbonaceous fuel, though the patentee of this furnace recommends the use of from 1% to 5% of coke weighed in with the charge.

It is claimed that a furnace of this pattern, 34x100 inches at the zone of fusion, is of sufficient capacity to average 100 tons per twenty-four hours. The ore is oxidized and smelted by one operation. When the ore ignites one-half the sulphur is consumed and escapes through the stack as sulphurous acid fumes, while the remainder is used to supply calorific power and form a matte during the oxidation of the iron to the protoxide. The silica combines with the FeO at the zone of fusion and passes off as slag. The iron, acting with the sulphur as a carrier of values, in the form of FeS, or matte, settles to the bottom of the receptacle; the slag, being lighter, flows off at the top and is granulated and carried away in water.

The old Elgin smelter at Leadville has been remodeled by the Boston Gold & Copper Reduction Co. and is now operating as a pyritic smelter, equipped with the Loder furnace. WASCOTT.

Leadville, Colo., Dec. 9th, '99.

AN illustration is given in the *Chemical News* of the new heat process brought forward by Goldschmidt, a German investigator. A rivet, such as is employed in bridge making, is imbedded in a mixture of oxide of iron, sand and aluminum powder, and the whole plunged in sand in a wooden box; on top of the aluminum mixture, which must just emerge from the sand in the box, is placed a small lump of a mixture of aluminum powder and an easily reduced oxide, in which is fixed the end of a short piece of aluminum ribbon. The reaction is started by lighting the free end of the magnesium, more sand being immediately placed on the top of the mixture, so that as little heat as possible may be lost. If at the end of a few moments the contents of the box are emptied out, the rivet will be found to be quite red, hot and ready to be forged. Working in an analogous manner, the inventor claims, steel tubes may be welded together, at the most trifling cost, and even two bars of soft steel can be fused together. Indeed, the temperature obtained under these conditions may, it is asserted, be higher than that realized in the electric furnace.

Workings of the Home Mining Co., Leadville, Colo.

Written for the MINING AND SCIENTIFIC PRESS.

Through the courtesy of Manager Bohn and Superintendent Nimon of the Home Mining Co., the writer was privileged to see the underground workings at the Penrose and Starr shafts of the Home group. The Penrose shaft sinks 540 feet to the ore body, which lies in blanket form along the line of contact between white porphyry and dolomite. Near the base of the shaft are two pumping plants, capable of handling 1400 gallons of water per minute, and a station is being cut for a third pump. From near this point a drift is being driven northeastward to connect with the Midas workings. The original workings in the Penrose were along a level running northward, with drifts westward therefrom, narrowly missing the extensive blanket ledge lying to the eastward, which has been so thoroughly opened by the Home Co. since last August. The new work by the latter company aggregates 600 to 800 feet in drifts, crosscuts and upraises in the ore body, the work starting with a drift eastward along the southern boundary of the blanket ledge. From this drift crosscuts northward have been made about every 50 feet, and from each crosscut an upraise extends from 30 to 40 feet without reaching the upper limit of the ore body. Other drifts parallel the first, all being connected by crosscuts, which leave immense sections of ore blocked out. The parallel drifts which are being pushed eastward, are carried along in double sets and are heavily timbered as the work proceeds. The work of stoping above each drift goes on at the same time. As the work advances eastward and northward, no limit to the ore body has been found, except at the starting point along the southern edge. However, the work reveals here and there a horse or a roll of lime rock of considerable magnitude, on going through which the contact ledge is always found beyond.

The ores here found are thoroughly oxidized and consist of iron and manganese oxides carrying silver-lead values, with streaks of lead carbonates and small stringers of dioxide of manganese 50% pure. Much of the vein material is decomposed and loose in formation, interspersed with streaks of a firmer character, and often takes the form of ochre. The ore readily breaks down and is mined at light cost per ton. The net returns from the ore shipped from the Penrose has thus far reached an average of $18 per ton.

When this shaft was unwatered the levels and drifts were found completely filled with siliceous and talcy material deposited from above through the network of small water courses.

The Starr shaft, 500 feet southwesterly from the Penrose, is over 500 feet deep. It cuts the same ore body as is found in the Penrose, and on the same contact, though the porphyry here is gray, instead of white, as found on the Penrose. Then, on the Starr the ore body is irregular and faulted, appearing to roll and wave; but the product from this shaft is of very high grade. The Bon Air shaft also sinks over 500 feet, but it reaches a lower level than either the Penrose or Starr, being started from a lower elevation.

The shipments from the three shafts of the Home group amount to about 250 tons per day, though Manager Bohn states that it could readily be increased to 400 tons were there no shortage of cars for shipping to the smelters.

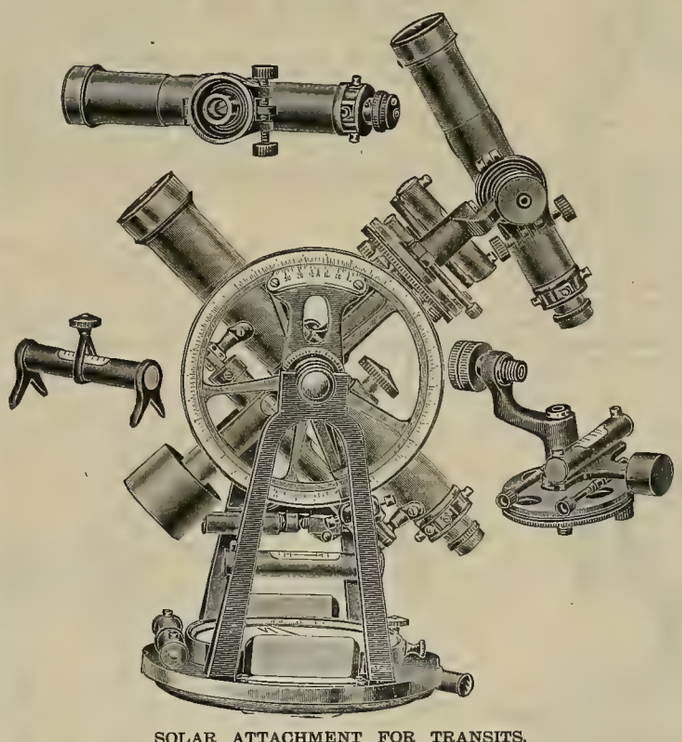
The accompanying illustration gives a view of the lower western slope of Carbonate hill, showing the Home group and other down-town properties.

Leadville, Dec. 7th, '99. WASCOTT.

New Solar Attachment for Transits.

The accompanying cut illustrates a new solar attachment by which surveyors' transits and mining transits may be converted into instruments by which the astronomical meridian can be determined by the sun at any hour of the day. The interchangeable auxiliary telescope, which is attached to the top or side of the mining transit, in connection with this new attachment becomes a solar telescope, as it has a greater power. The whole attachment only adds nine ounces to the weight of the transit, and is nearly balanced by the counterpoise used with the top telescope. When not required for service it may be detached from the transit and remain in the transit box.

The equatorial adapter has two parallel plates, the lower of which may be screwed to the vertical central post of the mining transit in place of its auxiliary top telescope. The upper plate, carrying the polar axis, may be adjusted to coincide with the vertical center of the transit proper, when previously accurately leveled and adjusted, by means of a small level attached to it and two leveling screws beneath the lower plate working against opposing springs. This adjustment is made by them before the instrument leaves their factory, but should occasionally be verified by the observer. About the polar axis revolves a socket controlled by a clamp and a tangent screw. The socket carries an arm to which is attached the declination axis and solar telescope in such a manner that the line of collimation of the latter revolves in the plane of the polar axis. Between the milled screw head and the arm is a milled nut so arranged that it can clamp the solar telescope at any required angle within its limit of motion. The auxiliary telescope used as a top or side telescope in their mining transits may be used as a solar telescope in connection with the equatorial adapter. For solar observations in addition to the fine vertical and horizontal cross wires adjusted to the line of collimation of the telescope is provided four coarse wires in the form of a square, equidistant from the fine wires and slightly smaller than the disk of the sun, to bisect the sun's disk by equal chords. The simplicity of this arrangement recommends it to surveyors, as the only computation necessary is that required to find the declination of the sun at the hour of observation and the proper correction for refraction. The instrument is made by C. L. Berger & Sons.



SOLAR ATTACHMENT FOR TRANSITS.

Phenomena Attending the Accumulations of Bitumen.

NUMBER III—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by A. S. COOPER, State Mineralogist of California.

Rapid percolation of siliceous waters through a rock prevents the deposition of silica. Shales and other substances containing small pores are very frequently silicated, whereas the adjoining sandstone or coarse substances are still porous. The greater porosity of the sandstones and other coarse-grained substances permit a too rapid flow of the siliceous water, and silica is not deposited; whereas since the percolation of siliceous water in the fine shale or other fine-grained substances is extremely slow silica is deposited. When these cherty shales are black it shows that bitumen was ascending with the siliceous waters at the time they were silicated. After being silicated they do not split along the plane of original deposition. Their hardness is 7. Their black color is destroyed by fire, showing that their color is due either to a bituminous or carbonaceous substance. It is in all probability the former, as carbonaceous matter does not, whereas bituminous does, accompany the flow of siliceous waters. In many places these blackened and silicated shales adjoin cracks and seams, through which mineral water accompanying bitumen is ascending.

Zaca peak owes its prominence to the protection of a crown of cherty shale; in fact, the preservation of this mountain range is owing to its silicification, which must have occurred before it rose above permanent water, whereas several thousand feet of sediments lying to the southwest of the same have been denuded in consequence of being leached and broken.

Silicated shales and sandstones are not easily eroded and suffer but slight decomposition through the action of the weather. The sandstone is not indurated to the same extent as the shale. The face of the shales are flatter than the face of the sandstones; the sandstones are nearly vertical. Frequently these cherty shales contain many small faults and cracks, the character of which show that they were made while the shale was in a semiplastic condition. They have been silicated subsequently to their faulting and cracking, clearly showing that shales were silicated after the formation had been greatly disturbed. The alteration of these white shales has been partly caused by baking, through the heat of adjacent metamorphic rocks. Joints and seams in the shales and spaces in the sandstones are colored red with the oxide of iron.

In part of the bituminized sands lenticular pieces of shale are found converted to chert, and fossil shells have been removed. These silicated lenticular pieces of shale were silicated after being water-worn, as their exteriors have all the appearances of shale. If they had been changed to chert before being water-worn, they would have had a polished surface. They show the laminæ of deposition, but do not split along the same.

The insoluble silica in the pieces of shale consists of fine quartz sand which composed the original shale, whereas the soluble silica was deposited in the pores of the shale from infiltrating water. These fragments of shale were silicified before the interspaces of the sand were filled with bitumen, as the circulation of water ceased after the appearance of the bitumen. For the same reason fossil shells must also have been leached from the sands before they were filled with bitumen. Therefore these sands were bituminized after their deposition, and must have bituminized before they were tilted to the high angles which they now occupy, and before the metamorphic rocks came in contact with them.

The bituminized sand near Zaca creek contains at least 10,000,000 barrels of maltha. Eight barrels of ordinary petroleum is required to make one barrel of maltha. As the interspaces of the bituminous sand are filled with maltha, a space ten times as large as the present bituminous deposit was required to accommodate 80,000,000 barrels of petroleum before it was changed to maltha. The apex of the anticline lying above the metamorphic rock when the curvature of the rocks was slight must have been the storage room for this vast amount of petroleum. When the strata of this anticline containing the petroleum slowly rose above permanent water, and owing to the fact that the anticline rose to a higher altitude in the east than the west, the oil flowed down the porous strata towards the west, and during the flow was evaporated, forming maltha, which finally reached its present resting place. During this migration of the oil, besides the amount dissipated by evaporation, a vast amount must have been carried away by percolating waters or drained from the porous strata and was lost.

In 18— a multitude of fish were asphyxiated in the Pacific ocean and came ashore between Monterey and Ventura in large quantities and variety. Many were dead and others were barely alive. This was probably occasioned by the ocean waters being charged with sulphuretted hydrogen or carbonic acid. These mephitic gases emanated from metamorphic action beneath the ocean, ocean currents and migratory habits of the fish submerging them in the deadly waters. In 1899 the fish were killed in Zaca lake by sulphuretted hydrogen, the presence of sulphuretted hydrogen being evidenced by the whitish state of the water caused by the liberated sulphur. The Indians had a number of superstitions regarding this lake, which were probably occasioned by former phenomena which appeared supernatural to them.

Conclusions.—Black or dark-colored cherty shales and sandstones show that bitumen accompanied the siliceous waters while these rocks were being silicated. Light-colored cherty shales and sandstones show the absence of bitumen during their silicification. These cherty shales and sandstones indicate either that siliceous waters have cooled while ascending towards the surface, or that the circulation of the siliceous water, generally upwards through them, has been very slow. Both these flows of water would have a tendency to remove petroleum from a formation if any had existed therein. If bitumen deposits exist in a formation the leached shales and sandstones usually overlie them, although white leached shales and sandstones may exist where there is no bitumen.

A Great Torrential River.

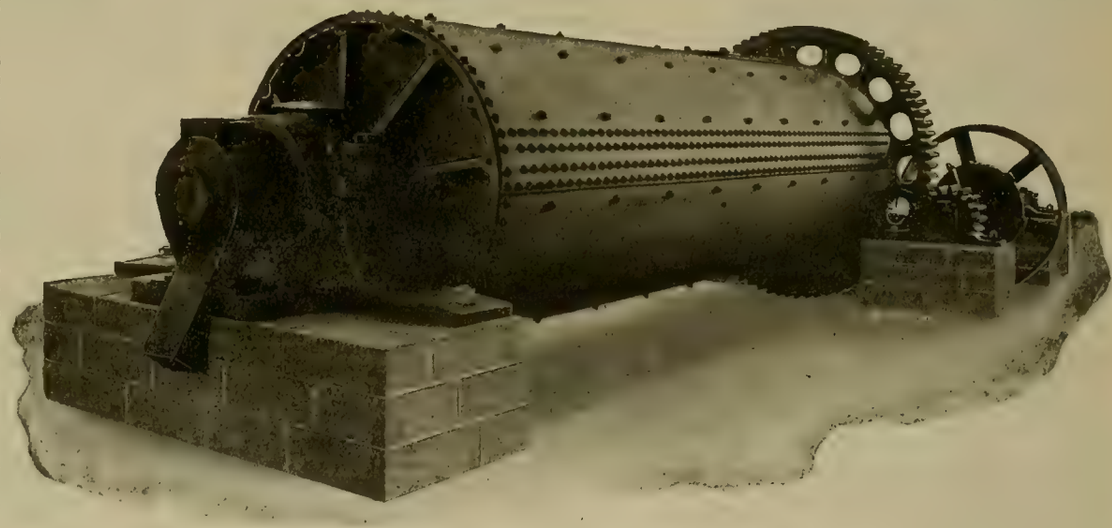
Such is the Gogra, recently bridged at Bahram Ghat. The river has a habit of meandering at will about the country. It has moved steadily toward the east at the rate of about 600 feet per year. Floods rise 15 feet above the ordinary summer water level, and, while they last, there is great scour in the bed of the river, and, after the floods have disappeared, the main channel for 300 or 400 feet in width is about 24 feet deep, and during the hot season only about 15 feet deep. The bed and banks alike consist of sand, and the banks are, or rather were, over three miles apart. Borings 100 feet in depth have been taken at different points along the line of the bridge, and nothing but sand has been found. In the main channels of the river where the current is strong, it is believed the bed for a considerable depth must be in motion, so that a section of the river, taken in the dry season when the river is low and the currents in the channels are weak, does not represent the section where the river is in flood and the currents strong. In the building of the bridge, the Gogra and its tributary, the Chauka, have been trained into one channel, and the calculations for the discharge of the two rivers have been based on the assumption that in high flood 10 to 20 feet of the bed of the river is in motion. The other bridge over the Gogra—200 miles lower down, now under construction at Turtipur—presents correspondingly greater difficulties.—Indian Engineering.

The Mines of Ophir.

Dr. Peters, an English explorer, claims to have discovered the mines of Ophir, from which Solomon is supposed to have obtained his gold. Dr. Peters' expedition was mainly based on an old atlas published in Amsterdam in 1705 with French text, the author being unknown. In this atlas it was stated that near this place (south of the Zambesi and near the River Manzoro, now Mazoe) is the great mountain of Fura, very rich in gold, which some people regard as a corruption of the word Ophir. This view was also held by the Portuguese writer, Couto, who was quoted by Theodore Bent in his "Ruined Cities of Mashonaland." With regard to Fura, Couto said: "The richest mines of all are those of Massapa, from which the Queen of Sheba took the greater part of the gold which she went to offer to the Temple of Solomon, and it is Ophir, for the Kaffirs call it Fur and the Mons Afur." Dr. Peters states that no traveler has visited this region within the last 200 years. He has now rediscovered ancient ruins of Semitic origin, including fortifications and what he regarded as a temple or storehouse. The whole region is practically uninhabited. He also claims to have found distinct traces of ancient gold workings there.

The Clark Patent Tube Mill.

Catalogue No. 15 of the Gates Iron Works is devoted to detailed description of mining machinery, and more especially pulverizers. The Clark patent tube mill is given illustrated attention. The accompanying cut therefrom gives a general idea of its appearance, a plain cylinder of steel plate, closed at the ends by cast iron heads, having hubs or journals formed upon them, upon which the cylinder is rotated in suitable bearings. These hubs have large openings through them, lengthwise, for the purpose of feeding and discharging. Rotation is accomplished by means of a suitable gearing bolted to one head and meshing with a pinion on the countershaft by which the machine is driven. The grinding surface is obtained by filling the cylinder about one-half full of hard flint pebbles. When the machine is rotated these pebbles are in constant action against each other, and between them and the shell the material is ground; thus an extensive grinding surface, of so flexible a nature as to preclude breakage, is brought into constant action, and is renewable when the machine is in operation. The material is fed into the cylinder by a worm or screw conveyor, actuated by the rotation of the cylinder. The discharge is automatic. The outlet is housed so as to make it dust proof, the Clark patent tube mill being essentially a dustless machine.



THE CLARK PATENT TUBE MILL SHOWING DISCHARGE END.

The number of revolutions at which these mills are operated depends upon their diameters and the material to be pulverized. Usually the speed is regulated so as to give a peripheral speed of 400 feet per minute. At this moderate speed there can be no excessive wear upon the journals, which are of large size, of the ball and socket type, and so designed that the pressure per square inch upon their wearing surface is well within the limit of good practice, making an easy running bearing that will not heat, if properly lubricated. Lubrication, which is a very essential feature in all machines, is accomplished by providing large chambers for waste in the upper half or cap of the main bearing, and these chambers should be filled with wool waste, or hair felt, saturated with oil, thus providing continual lubrication.

The Gates Iron Works, 650 Elston avenue, Chicago, Ill., are the exclusive licensed manufacturers of this tube mill under patent No. 583,008, issued to J. K. Clark, May 18, 1897, and build them in the sizes required.

ONE field remains which copper is bound to maintain as its own, namely, the construction of insulated electrical conductors. Experiments have already been made on a large scale with bare conductors of aluminum for telephones with perfectly satisfactory results, its conductivity, weight for weight, being double that of copper. But when the mains have to be insulated copper is absolutely unapproachable, on account of its greater conductivity, volume for volume, which is 165% of that of aluminum.—Cassier's Magazine.

Chemical Features of Gold.

Written for the MINING AND SCIENTIFIC PRESS by GEO. A. MARRS.

Although gold is one of the best known and most talked of metals, it has many properties very little known to the world, outside of chemists, and some whose value is very little appreciated even by chemists in general. This metal is one whose chemical and physical properties are so markedly characteristic as to be readily distinguished from all others found in nature. The chief properties with which chemists have to deal are solution, precipitation, amalgamation and fusion.

Gold can be dissolved in more than eight ways. 1. By nitro-hydrochloric acid (aqua regia) with the formation of chloride of gold. 2. By free chlorine, formation of same compound. 3. By bromine which forms bromide of gold. 4. By iodine by forming iodide of gold. 5. By cyanide of potash. 6. By electrolytic action. 7. By an acid solution of ferric chloride. 8. By rare acids like those of tellurium, selenium, etc.

In the electrolytic method the gold is suspended from one pole in a solution of either cyanide of potash or common salt. The action of the electric current will dissolve the gold and deposit it on the other pole.

An acid solution of ferric chloride will dissolve gold probably as follows:

1. $3Fe_2Cl_6+2Au=2AuCl_3+6FeCl_2$.
2. $2FeCl_2+O+2HCl=Fe_2Cl_6+H_2O$.

Gold is one of the easiest metals known to precipitate from solution. When in the form of the chloride in which form it is, in the chlorination process it can be precipitated in at least eight different ways: 1. By copperas. 2. Organic matter. 3. Oxalic acid. 4. Quicksilver. 5. Lead, zinc, etc. 6. Sulphuretted hydrogen. 7. Sulphurous acid. 8. Hydrogen peroxide.

Precipitation by copperas on a commercial scale is accomplished by throwing the commercial salt into the vat, agitating thoroughly and allowing to settle forty-eight hours, when the gold will be completely precipitated and the liquid can then be drained off and the black gold mud collected and refined.

Precipitation by organic matter is certainly the cheapest and easiest method, the chief objection being the time required. Rotting twigs and branches are thrown into the solution, preferably in a wide, open vat, as the action of evaporation and sunlight materially hastens the operation. After from three days to a week, the time depending on the conditions and quantity of gold in solution, the twigs are taken out and burned and the ashes added to the gold collected from the bottom and the whole melted and purified.

Oxalic acid precipitates gold according to the following equation:

$2AuCl_3+3H_2C_2O_4=2Au+6CO_2+6HCl$.

This is the method usually employed to precipitate gold in ordinary analysis in the wet way.

Quicksilver precipitates gold as an unamalgamable brown to black powder. This precipitation is rapid and complete in concentrated solutions, but somewhat slower in more dilute ones.

Gold may also be precipitated by almost any metal, as lead, zinc, iron, copper, etc., the most satisfactory precipitant being the amalgam of mercury and sodium, especially in cyanide solutions.

Sulphuretted hydrogen, sulphides and sulphites precipitate this metal also, but they are used mainly in the laboratory alone.

The most peculiar method of precipitating gold is by the addition of hydrogen peroxide. This compound is one of the most powerful oxidizing agents known and yet in precipitating gold it has the effect of a strong reducer. This action comes about thus—because the extra atom of oxygen in the peroxide of hydrogen needs another atom to unite with it, before it can pass off as free oxygen, i. e., only two atoms at a time can escape, and so when the hydrogen can be abstracted, the two atoms of oxygen unite and are freed, leaving the hydrogen to reduce the gold. The equation is:

$2AuCl_3+3H_2O_2=6HCl+2Au+3O_2$.

Probably the most interesting and at the same time the most valuable property of gold from a mining standpoint is that gold forms an amalgam with quicksilver. By far the larger part of the gold in use to-day is derived from placer mining and the stamp mill; and as a natural consequence the assayer is constantly called upon to make amalgamation tests. The methods used by different assayers in this determination are quite varied, but the usual practice is to assay the ore before and after amalgamation, when the difference is then supposed to represent the amount of gold amalgamated. This method, as will be seen later, is not only far from accurate in most cases, but in some cases is very inaccurate. Let us suppose an assayer is given some placer sand which averages $2 per ton to make an amalgamation test. Let us suppose it is flake gold containing flakes which weigh from $\frac{2}{10}$ milligram down (which is the usual case). Say he takes 10 lbs. of the sand, crushes, assays and amalgamates it in the usual way. Now to assay $2 per ton this will contain 16 5 milligrams of gold. Suppose that it contains ten flakes of $\frac{2}{10}$ mg. gold, twenty flakes of $\frac{1}{10}$ mg., and 12 5 mg. of finer gold. He takes out one assay ton to assay and gets one $\frac{1}{10}$ mg. flake and $\frac{2}{100}$ mg. of the finer gold, which makes his assay $\frac{12}{100}$ mg. or about $2 40 per ton. After amalgamation we will say he has left two flakes of $\frac{2}{10}$ mg. gold, five flakes of $\frac{1}{10}$ mg., and 4 1 mg. of finer gold, making a total of 5 mg., and consequent amalgamation of 69 7%. Now in his last assay if he got only finer gold the sand would assay 50 cents per ton or amalgamation would be 79%. If he got a $\frac{1}{10}$ mg. flake, which is highly probable, the sand would assay about $2 25 or amalgamation of 6¼%. If he caught one of the $\frac{2}{10}$ mg. flakes the sand would then assay $4 25 and the assayer would have his test to do over on a better basis.

This may seem a little overdrawn but it has been determined by actual experiment that it usually happens that more markedly discordant results than these are obtained. For example, some placer sand showed by fire assay $2 per ton. One sample for amalgamation showed 60% extraction, another 20%. The ore was reassayed and showed $1 per ton and 90% extraction. Later it was found that the correct assay was 75 cents per ton and about 5% extraction by amalgamation, the difference in assays being due to irregular distribution of the gold in the sand.

The following scheme will give more accurate results: Ten pounds of ore, crushed if necessary, is panned down with one ounce of quicksilver in the usual way. The mercury is then collected, washed and evaporated until only a small globule of mercury (say one gram) remains. It is then cooled and put into a test tube and the quicksilver dissolved off in c. p. nitric acid. The gold will remain in a good form for weighing and will be free from silver, which will remove the necessity for inquartation and subsequent parting. The yellow globule of gold is washed, the test tube filled with water and inverted over a porcelain capsule. The gold immediately falls to the bottom, when the test tube is withdrawn, the water drained off and the gold annealed and weighed on an analytical balance (an assay balance is unnecessary). Let W be the weight of the gold in grams, and let X be the gold extracted per ton: then 10:2000 :: W:X. X will be in grams and can then be transferred into troy ounces, if so desired. If the percentage of extraction is wished, four crucibles of one-half assay ton each can be run instead of two, on the original assay, but even in this way the results are liable to be very inaccurate.

There are several simple tests for gold in small quantities which if more widely known would save many a prospector both time and money. One very good test is to pulverize the ore fine and cover one-quarter teacup of it with about a quarter of an inch of a dilute solution of bromine in water, and let stand several hours. Then draw off as much of the liquid as possible without disturbing the sediment. Add stannous (tin) chloride and agitate briskly. If as much as $2 per ton of gold is present a light pink or purple color will be seen.

If greater accuracy than this is desired do not add stannous chloride, but throw a filter paper into the solution and evaporate to dryness; an ordinary saucer is a handy vessel for this operation. Now burn the filter paper to an ash in a porcelain capsule. If 50 cents of gold per ton is present it ought to color the ash a purple tint.

A good test for the presence of free gold is as follows: Some of the rock is ground fine in a mortar; quicksilver is added with a little water and the ore ground again; now add concentrated sulphuric acid and grind again; finally add water and grind the fourth time. Wash off the acid and collect the quicksilver by adding a little concentrated nitric acid and panning. Either dissolve the mercury in nitric acid or evaporate, when the gold will be left if present in any noticeable quantity.

Golden, Colo., Dec. 10th, '99.

Powder Used in Coal Mining.

An interesting detail in coal mining operations in Nova Scotia is the consumption of blasting powder. Nine of the Cape Breton collieries during the year ended Sept. 30th, '98, produced 1,413,701 tons of coal, requiring the use of 229,414 pounds of powder, or equal to nearly one-seventh of a pound, roughly speaking, for each ton mined. The above quantity of powder, at an average cost of, say, 12 cents per pound, amounts to over $27,000. The bulk of the explosives used in these operations is produced in Nova Scotia.—American Manufacturer.

IT has been reported that the smelters of Colorado will pay but $19 per ounce for gold contained in ores. Should this be attempted it is needless to say that the innovation will be vigorously resisted by the miners of that State.

Cum Grano Salis.

John W. Gates told a party of friends how he happened to get back into active business after he had cleared up a big fortune from the sale of his Federal steel and other interests and had made up his mind to retire. The story was not told in a boasting spirit, but the recital was nevertheless one of live interest as illustrating the whirlwind methods employed in organizing a gigantic enterprise and getting it under way.

Mr. Gates and Colonel Elwood had realized a "bunch of millions" out of Federal steel, and the former had laid his plans for a trip around the world with his wife, having gone so far as to invite a party of friends to accompany them and fix the date of departure. One day while sitting in his office in Chicago chatting with Colonel Elwood he was called up on the long-distance telephone by an acquaintance in Pittsburg, advising him that the owners of a big wire milling company had fallen out among themselves and would sell. "If you want to make a trade bring on $1,000,000 and I think you can get the property," said the man at the other end of the wire. Inasmuch as the mills were worth at least $2,000,000 the temptation was strong to buy them. The two millionaires who had just laid down business cares concluded to take the property "for a flyer."

The next evening they were in Pittsburg, and snugly reposing in Mr. Gates' cardcase was a certified check for $1,000,000. They had an all-night session with the owners of the wire mills, and at 5 o'clock in the morning they had the property and the former stockholders carried off the big check. The party repaired to the Duquesne Club for refreshments. There they met the proprietor of a big wire mill up the State, and to him the story of the night was told

"If you fellows have money to burn you'd better buy my mills," he said, banteringly.

"What will you take for them?" responded Mr. Gates.

"Nine hundred thousand dollars," was the answer.

"It's a go," said Mr. Gates, quick as lightning, and a deal involving nearly $1,000,000 was closed in less than sixty seconds.

The two Chicago men then communed briefly, and Colonel Elwood remarked: "John, if we are going into the wire business we must have a base of supplies. Better see if we can't buy the Cleveland Rolling Mills."

Taking the first train out of Pittsburg, they proceeded as fast as steam could take them to the city on the lake. That evening they broke in on the owner with the blunt statement that they had come to buy his property, which included rolling mills, steamships, docks, iron and coal mines, etc.

"But I don't want to sell," he protested. "Still," he said, hesitatingly, "I would like to hear your proposition. What are you prepared to offer?"

"Five million dollars cash," was the reply. And then Mr. Gates added: "Five million dollars is a big bunch of money. Better think it over."

"I want more money," expostulated the Cleveland man.

"We will give you $5,000,000 and not a dollar more."

The gentlemen met later in the evening and before midnight the trade was closed, the old owners stepping out and the new stepping in. The "cleaning up" yielded $2,450,000 in cash, so that the property really cost Gates and Elwood $2,550,000. It was worth from $7,000,000 to $8,000,000 without the cash. The next morning the Cincinnati *Enquirer* had the story of the Pittsburg deal, and the telegraph brought an offer of some valuable wire plants in and near the city. Mr. Gates repaired at once to Cincinnati, and Colonel Elwood hastened East to negotiate for valuable plants in Massachusetts. Forty-eight hours later they met in New York and on comparing notes found they had invested $12,000,000 of their cash in wire plants. All that happened during the week between Christmas and New Year, less than a year ago.

"It looks as though we were in the business," said Mr. Gates.

"A fair nucleus," responded Colonel Elwood. "Let us go home."

They cannon-balled to Chicago, and in less than another week arrangements were practically consummated for the giant consolidation known as the American Steel & Wire—capital, $90,000,000. January 18, or a little over three weeks from the date of that long-distance telephone conversation between Chicago and Pittsburg, the constituent properties were duly turned in, and the S. & W. stock was distributed according to arrangement.

This, in brief, the Chicago *Post* says, is the inside history of one of the "lightningest" deals for its magnitude ever negotiated. It was a Napoleonic campaign from start to finish. It is not recorded that either Mr. Gates or Colonel Elwood lost money on the transaction. Mr. Gates called off that trip around the world.

THERE are at present no less than half a dozen "petrified men" on exhibition in various portions of the United States. They have all come to light within the past year. They were each probably cast in the same mold.

Mining Summary.

ALASKA.

The report of the Alaska-Mexican mine for the past fiscal month shows 14,024 tons ore crushed, yielding $16,036, and 222 tons sulphurets saved, worth $6088. Gross yield, $28,791; average of ore, $1 69 per ton. The working expenses were $18,928.

The Alaska United mine reports 21,304 tons ore crushed, valued at $37,593, and 475 tons sulphurets saved of a value of $18,353. Gross yield, $54,615, and working expenses, $37,840. The ore averaged $2 50 per ton.

The discovery of a large gold-bearing mineral zone on the Yukon river, seven miles from Dawson, is reported. A large number of claims have been taken up.

ARIZONA.

COCHISE COUNTY.

The Dos Cabezas Con. Copper Co. has been organized with $2,000,000, and has bought the Emersly group of thirty copper claims at Dos Cabezas, near Wilcox. J. Schwertner of Wilcox is Supt. A smelting plant is to be put in.

MOJAVE COUNTY.

The Tennessee mine at Chloride has 1000 feet of development and is working three shifts. The ore carries 20% lead, twenty ounces silver and $4 gold per ton. One hundred tons of ore are treated daily.

E Roberts and J. H Carpenter report finding rich silver ore at White Hills on an extension of the Grand Army mine. A 10-stamp mill on the Grand Army mine is to be moved to the Gold mine in Cook district, on the opposite side of the valley.

Kingman *Mineral Wealth*: The Aubrey and Cedar mining districts in the southeastern part of Mojave county are attracting attention. The San Francisco mine in Cedar district is reported to have a rich body of ore and will soon have their stamp mill in operation. Work on the Midas M. & M. Co.'s properties is being pushed.

GRAHAM COUNTY.

The Azurite mine is reported sold by Shirley Christy for $500,000.

YAVAPAI COUNTY.

By a recent deal the Rebel mine, south extension of the McCabe mine, passes to H. B. Clifford. The McCabe vein is large and heavily mineralized and is one of the best paying mines in Arizona. The normal ore is sulphide, principally iron, and is rich in gold, while copper and silver occur as by-products. It is stated that the average of the ores is $60 per ton, while a great deal of the shipping ore runs higher. The deepest workings are now 557 feet, with one of the largest and richest bodies of ore yet encountered in the mine at the bottom. Judge Wells of Prescott owns the largest part of the property. There are two veins in the McCabe property, 500 feet apart. The most westerly one is a fissure about 4 feet wide, in which the country rock has been reduced to clay by pressure and movement. Within this the pay shoot occurs of variable width. In the early history of the mine it produced a large amount of shipping ore, some of which went $1700 per ton. This claim was called the Sink to Rise. The other vein is on the Gladstone claim and is parallel with the first, but in some respects differs, as the vein is represented by a zone of shearing of variable width, along which the ore occurs, having little barren vein filling such as is found in the neighboring vein.

T. E Peery has sold his mines near Stanton to the Octave M. Co. for $30,000.

Mr. McDonald, who has charge at the Buster copper properties, near the Peck, is crosscutting to the vein, which shows a number of small, rich stringers.

Prescott *Courier*: The old Tiger mill, operated by G. P. Harrington, started up December 10. The old silver pan mill has been changed to a modern gold plate mill. A test run of 100 tons of ore from one of O. Sibardou's properties is being made.

CALIFORNIA.

Amador.

A station is being cut on the 1200 level of the Lincoln. A compressor is being put in, the foundation being completed, and when the west crosscut is begun power drills will be used.

The Mason & Greisbach mine, at Pioneer, after a year's work, is again in condition to take out ore. The last tunnel completed gives an additional 100 feet more backs than the old tunnel.

Dr. Adams and partners are still taking gold from the Mt. Echo property, near Ione, and J. Newman and associates are developing an adjoining claim.

Three levels of the Ranlett copper mine are being worked, and when the requisite number of tons of ore have been brought to the surface the smelter will be blown in.

Sutter Creek *Record*: The Potazuba M. Co. have suspended operations until spring, when they will equip the mine with heavier machinery and sink the shaft to 1000 feet. It was deemed impracticable to keep the water out of the shaft and sink it deeper during the winter. The company has expended $50,000, of which $15,000 was taken from the mine. Several levels have been opened, showing large bodies of low-grade ore and small veins of high-grade ore. It is thought that with the shaft down 1000 feet and new levels opened up the developments will justify a mill.——Sinking is in progress at the south shaft of the Gover, north of Amador City.

Calaveras.

A Boston dispatch says the stockholders of the Melones M. Co. held a meeting in that city Dec. 14th, at which the old board of directors and officers were re-elected. It was decided to issue preferred stock to raise the money necessary to continue development work at the mine, construct the dam, build and equip a mill, etc. Details will be determined by the future meeting of the finance committee.

The report of Gen. Mgr. W. C. Ralston to the second annual meeting of the stockholders of the Melones M. Co. shows that 2129 feet of openings have been made during the year, making a total of 6759 feet of openings in all. Ore in sight is estimated at 1,000,000 tons. Forty-nine tons of ore taken from an upraise for a distance of 339 feet returned at the mill $3 73 per ton. Of the $300,000 originally constituting the treasury fund about $280,000 has been spent. Mr. Ralston says it is conservative to estimate that all of the ore in sight will net the company at the mill a profit of at least $1 per ton.

The mines at Copperopolis have been unwatered to the fifth level.

On the afternoon of the 20th inst. a cave occurred in a stope on the 300 level of the Lightner mine at Angels, imprisoning four miners, one of whom has since been rescued.

At the Ellen Vannen gravel mine in Old Woman's gulch fifteen men are taking out fifty tons of gravel per day. The width of channel is unknown.

Half a mile north of the Ellen Vannen the Empire tunnel is being driven to drain the mammoth gravel channel which extends from a mile east of Mokelumne Hill down the entire length of Old Woman's gulch. This property is owned by the North Star Con. M. Co., P. L. Shuman Mgr. The tunnel is 10 feet wide at the bottom, 8 feet at the top and 7½ feet in height. The tunnel is in bedrock and will tap the channel at about 1100 feet from its mouth.

Three shifts are working at the Hexter tunnel, owned by C. W. Howard of San Francisco. The tunnel is in bedrock and is intended to tap the Corral Flat gravel channel, which passes under Stockton ridge. Wm. Jones is Supt. Machine drills are used and the tunnel is in 1400 feet.

The Kramer gravel mine on Golden Gate ridge, recently bought by an Eastern syndicate, will be cleaned out and retimbered, steel rails will be put down, and new air pipes installed, and as soon as the mine is in condition a 10-stamp mill will be erected. J. K. Carpenter, formerly of the North Star mine, is Supt.

S. S. Moser, who owns the property adjoining the Lamphear, in Spring gulch, is getting out rock and running it through the Lamphear mill.

The shaft on the Demarest mine, south of San Andreas, is to be sunk 200 feet deeper. New machinery is being put in. This mine made a good record thirty years ago, but until two years ago had remained idle for a quarter of a century.

El Dorado.

(Special Correspondence).—The Oro Fino, or Big Canyon mine, is running thirty stamps upon ore of satisfactory grade.

The Union mine is running twenty stamps during the day time on high-grade ore. It is currently reported they are taking out upwards of $20,000 per month.

The Vandalia mine is cyaniding thirty tons per day, which is giving satisfactory results. The owners, Seamour & Saver, are now figuring to increase their plant to 100 tons capacity per day. They have sufficient good ore developed to keep them going for many years.

The St. Claire mine, near Kelsey, cleaned up last week from 105 tons of ore a little over $1100. They have a good-sized vein and plenty of the same quality of ore in sight.

The Blue Gouge mine, twenty miles east of Placerville, is now constructing a 20-stamp mill and four Huntington mills at their property. They have a large amount of low-grade ore. The ore-bearing zone is said to be 700 feet wide.

The old Van mine, near Georgetown, has been unwatered by Lane & Smart and found to be satisfactory; they are now preparing for more permanent work.

The Little Gem mine, at Volcanoville, owned by Judge Behars of San Francisco, is building a mill at the mine, which is nearly completed.

The Poverty Point 15-stamp mill is run steadily by leasers and the ore is turning out satisfactorily to all concerned.

The Cambrian mine, six miles west of Placerville, owned by Colorado people, is running ten stamps on high-grade ore. It is said they came on to a large body of rich ore last week.

Chapman & Parker are now building a gravel mill 1½ miles east of town. It is said they have good prospects

The Kimble & Cohn gravel mine is working a number of men and the mill is running on the cement gravel.

Placerville, Dec. 18th, '99.

Humboldt.

Blue Lake *Advocate*: With the location of two more 160-acre claims last Saturday the new oil locations in the Mattole oil fields now aggregate 12,420 acres.

Kern.

Since its incorporation, Dec. 1, 1897, the Yellow Aster Mining Co. at Randsburg has paid $280,000 in dividends, having previously paid $33,789. It has also built a 30-stamp mill, equipped the mine with hoisting machinery, and made many other costly improvements. The point of discovery, an outcropping ledge of pay rock, has not been disturbed and may be seen by the passer by. The first dividend paid was $100, which was divided equally among the three partners. Two hundred men are now employed, the payroll reaching $15,000 monthly. An addition to the mill is in contemplation. The capacity of the mill is 140 tons daily, which requires 140,000 gallons of water, pumped from the wells six miles distant. It is stated that the ore amalgamates so freely that tailings are worth less than $2 per ton, and that concentration does not pay on oxidized ores.

Randsburg *Miner*: The Buckboard mine is milling 300 tons at Barstow. The ore runs $20 per ton.

The California Borax Co. has bought the Gordon brothers' mine and mill in the Slate range for $15,000. They will add eight stamps, making it a 10-stamp mill.

The Spangler brothers have struck a 3-foot vein of ore in a tunnel in one of their mines, seven miles from Garden station, 9 inches of this going $100 per ton, the balance $50. It is not all free milling, but the concentrates can be shipped. They are operating an arrasta successfully at their mine, hauling the water from Garden Station.

The Pinmore will be worked through a shaft when the mill starts, instead of through the tunnel, as formerly. Part of the mill is on the ground, and the work of erecting it is in progress.

Los Angeles.

The Anker Metallurgical & Furnace Co. has its new smelter at Los Angeles ready to handle ore. The company is incorporated for $500,000. A smelter was projected here some years since by the late Dr. Endleich, but never materialized. Several years ago a small smelter was built and run for a time at Oro Grande, in San Bernardino county, which was destroyed by fire, and thirty years ago a smelter was run at the Resting Springs mines for a time. These three smelters are the only ones ever built in southern California.

Mariposa.

A strike of rich ore is reported north of the Mary Harrison shaft, two miles south of Coulterville. The quartz at this mine occurs in the dolomite vein, and is associated with black clay slates, serpentine and diabase. The quartz varies in width and also in value, but is generally of medium grade. Visible gold often occurs upon the cracks appearing in the quartz. It was worked to a depth of 600 feet years ago. The Merced G. M. Co. has reopened this mine and several others on the property formerly called the Cook Estate.

Nevada.

The pumping machinery at the Bullion mine, near Grass Valley, is run by an electric motor recently installed by G. S. Mainhart, superintendent.

The Nevada City mine in Woods Ravine has passed conditionally to the principal stockholders of the Champion Co. For years the Nevada City mine has been in litigation. The mine was worked and an indebtedness of $20,000 created against the property. Suit for possession followed, and recently Judge Morrow rendered a decision in favor of the lien holders of the property. Plaintiffs have appealed the case to the United States Court of Appeals. The purchase is conditional on the lien holders being decreed the rightful owners.

Placer.

Work has been resumed at the Gold Blossom, near Ophir. It has a 20-stamp mill.

The new air compressor and drills at the Boulder mine, near Ophir, are running, twenty men being employed.

Gilbert & Colwell are preparing to hydraulic the Ben Franklin gravel mine, near Colfax.

Pond Bros. will hydraulic at their claim in Todds valley, and deposit tailings behind a dam in Todds valley canyon.

The mill at Pioneer mine, near Damascus, is running on half time. An upraise is being made from No. 4 to No. 3 level. J. J. Sullivan is superintendent.

One of the compressors at the Drummond mine, near Forest Hill, will be taken to Ophir for use at the Gold Blossom mine.

Colfax *Sentinel*: At the Clark mine, at Yankee Jims, an incline is running 500 feet from the mouth of the tunnel to reach the bottom of the channel.——The Southern Cross quartz mine, at Euchre Bar, on the North Fork of the American river, near Towle, is being opened up from the west tunnel. The ledge was struck at 170 feet. The tunnel was driven along the hanging wall. The quartz is heavily charged with arsenical pyrites. The tunnel will be continued 100 feet more on the vein, when a crosscut will be run to cut the east and middle veins. An 857-foot tramway is being laid.——The mill at the Rawhide mine is crushing ore steadily. This mine is owned by J. T. Patrick, and is on Texas ridge, five miles south of Blue Canyon. The main tunnel is in over 100 feet and a lower tunnel has been started. The ledge is 2 to 5 feet in width.

San Bernardino.

A smelter at the Needles is being talked of again. A few years ago a milling plant was built near Needles, but the "process" was not adapted to the ore of that region, nor to that of any other, and soon failed.

J. B. Anderson is about to resume work on his claims near Kleinfeldter, half way between Needles and Blake stations.

There is a group of claims containing gold and copper in the Exchequer district, north of Homer station, on which considerable development has been done, but little of late. The ores are of good grade, but the faults and dykes which have dislocated the veins have proven a serious drawback to miners of limited capital. There is also a scarcity of water, which further embarrasses the advancement of an otherwise promising district.

The Peacock Copper M. Co. are shipping high-grade copper-silver ore from their mine in the Lava Beds district. This ore—bornite and chalcopyrite—runs from 20% to 30% copper and fifteen ounces silver per ton. The ore occurs in quartz porphyry. There is scarcely a sign of copper on the surface. A hundred yards from the main outcrop is seen the films of malachite incrusting the seams in the rocks, but constituting a small fraction of 1% in copper. The mine was originally opened on the outcrop of silicious silver ore, honeycombed and mineral stained from weathering. The first copper ore was discovered by accident in a crosscut tunnel run to develop the shoot of silver ore.

San Diego.

Thos. Johnson of the American Girl mine, four miles south of Hedges, says the camp is flourishing and a large crew is working on ore running from $15 to $20 to the ton. The American Girl property is in many respects similar to the Golden Cross mines at Hedges, though said to carry a higher grade of ore.

Santa Clara.

It is reported that the New Almaden, as well as the Guadaloupe mines, ten miles from San Jose, are involved in a transfer to English owners. The Guadaloupe is to be rehabilitated and supplied with modern machinery, furnaces, etc. The mine has been idle over twenty years.

Shasta.

(Special Correspondence).—The Bennington group of mines, comprising ten claims, located near the Iron Mountain mine, were sold this week to O. E. Williams and C. F. Bunker for $25,000; work began continuing two tunnels and shipping ores to the Keswick smelter. The property is contiguous to the Mountain Copper Co.'s railroad. The sale was made through the Pacific M. & D. Co. of Redding. The ore bodies average 2½ feet in width and the values run from $7 to $51 a ton.

The Black Spider mine, near Keswick, which has been idle for six months owing to the inability of the owner to cope with the influx of water, has been bonded to San Francisco capitalists. Engine and hoist are being placed and unwatering the mine will begin next week under the supervision of G. E. Bateman. Miss R. A. Bell of Shasta owns the property. The negotiations for the transfer of the property to the new company were made by the Redding Pacific M & D. Co.

Local report says that F. H. Dakin has sold to Wheeler & Speier of New York a section of land near Kennett, ostensibly for a smelter site,

Redding, Dec. 20th, '99.

In the new shaft of the Midas mine, on Harrison gulch, at a depth of 80 feet, a new ledge has been cut. A 20-stamp mill is building.

The Mount Shasta mine has closed down temporarily pending the placing of an electric hoist. The shaft is down 300 feet, and was sunk to that point by use of a gasoline hoist.

Siskiyou.

The Greenhorn Blue Gravel Mining Co. is contemplating sinking a new shaft, having a large amount of channel unworked.

At the Sheba mine on Patterson creek the air compressor is in position and power drills are to be used hereafter in the mine.

COLORADO.

CLEAR CREEK COUNTY.

(Special Correspondence).—The Wilkie mill, with its water power rights, has been purchased by W. E. Renshaw, whose purpose is to convert it into an electric power plant, to supply power to run the Newton, Silver Age and other mills. The erection of a new mill is planned by Mr. Renshaw to take the Gem ores.

The Atlantic & Pacific Railway tunnel, located about ten years ago by M. M. Pomeroy, contemplated cutting through the Continental Divide at a point near Gray's Peak, forty miles west of Denver. The tunnel starts on the eastern slope, about six miles from Silver Plume, at an altitude of about 9300 feet, and takes a westerly course. In '90 to '92 it was driven about 4000 feet, and to complete it to the proposed exit on the opposite side of the range would make nearly five miles of tunnel. This was part of a still bigger scheme to build a railroad directly from Denver to reach the undeveloped country in western Colorado and eastern Utah and to shorten the railway distance between Denver and Salt Lake City. While this auspicious dream of ten years ago did not materialize far beyond the issuance of flaming prospecti and the sale of shares of stock, it is now recognized that the central idea behind it was one of merit, of which the present generation may yet see a tangible fruition. The development of Denver as the leading mining and supply center of the Rocky mountain region must include the reaching of those new western fields by direct lines of travel. An awakening to facts bearing upon this subject has revived interest in the old tunnel proposition referred to.

Denver, Dec. 16th, '99. WASCOTT.

The owners of the Standard claims on Fall river have cut a fourth vein in the tunnel and have a wide body of ore. It was showing nothing until they put some shots into the hanging wall, when several feet of mineral was exposed. This is being drifted on.

The Tropic shaft, belonging to Jay Morton, has been retimbered and ladders put in to a depth of 300 feet for the purpose of a survey to arrive at the pitch and course of the vein. If it is determined that the vein cut by the Newhouse tunnel is the Tropic, work on it will commence within thirty days. The vein will be worked through the tunnel within thirty days after the first of the year.

CUSTER COUNTY.

The S. A. K. copper lode in Verde district has been sold to Eastern parties, the owner, J. Wilson, retaining an interest. Mr. Wilson has been twenty years developing this claim single-handed.

The Pointer has a body of ore in the west drift that assays half an ounce in gold and 515 ounces silver to the ton.

GILPIN COUNTY.

(Special Correspondence).—J. F. Depew is in charge of the Hillhouse mine, under lease and bond to C. A. Rice and associates. The hoisting machinery is being overhauled, preparatory to resuming work.

It is claimed the Argosy is to be equipped with new machinery and new buildings. Chris Hesselbine is in charge.

A pump of large capacity has been set at the 800 level of the Cook mine to handle the water which comes from a recently opened

crevice. When the connection shall be made with the Gregory-Bobtail workings, however, the water will be handled by the pumps at the foot of the incline.

The Crown Point and Virginia has installed a pump at the 580-foot level, to work in conjunction with one already in use.

The shaft at the Concrete mine is at a depth of 1300 feet and sinking is to continue. New hoisting machinery is to be provided.

The Boston & Denver Co. are driving a tunnel through Bates hill, having already advanced about 500 feet. It is designed as an ore haulage route from the Cook mine to the new mill of the Boston & Denver Co.

Blackhawk, Dec. 18th, '99.

GUNNISON COUNTY.

Denver *Republican*: The Wanderer's Last Chance group of four claims in Tin Cup district has opened a body of sulphide ore that will average $100 per ton. The shaft is down 117 feet and a tunnel is being driven to cut the vein lower down. Several shipments have been made.

The Midland mine, in the Gold Brick district, is to be started up with twenty men.

LAKE COUNTY.

(Special Correspondence).—Stevens Bros., having a lease on the Kitchen shaft of the Star group, are shipping twenty tons of manganese ore per day to the Illinois Steel Works. This shaft, 275 feet deep, was sunk twenty years ago from the kitchen of an old-time boarding house—hence its name.

The Catalpa-Crescent lease, on Carbonate hill, in the hands of Geo. W. Arthur and others, ships about eighty tons of oxidized iron-silver ore per day, including some manganese and lead. The shaft here is 480 feet deep, from the base of which the work extends several hundred feet east and west. The Colorado Southern belt line now extends over this part of the hill.

The Yankee Doodle, south of the Catalpa, is leased to Gordon & Thompson, who are drifting from the 450-foot shaft, expecting to strike the ore body, which pitches toward them from a point farther west. They expect to be shipping within thirty days.

The Modoc, some distance south of Yankee Doodle, has put in a new boiler and hoist and is about ready to resume operations from the 800-foot shaft. Dr. Hearne of Leadville is Mgr.

The Fortune and Penfield, on Little Ellen hill, were recently sold to New York parties for $100,000. The sellers were F. Brooks, Major Wilder, S. W. Southwick and others, and the negotiations were carried through by L. C. Ferree of Denver. The group is in the neighborhood of the Resurrection, Sedalia, Dollie B. and others. The property is fairly developed, disclosing a body of carbonate ore, carrying lead, gold and silver values.

Various projects to provide water pressure for the generation of electric power for the Leadville mines appear to be receiving serious consideration. Just now a shortage of coal supply for steam use is believed to be a possibility, due to the inability of coal operators to supply the unprecedented demand, the latter claiming that the unusual activity in metal mining has drawn large numbers of coal miners away from them, leaving them short of the usual force. The idea is that, with sufficient generative force, the several hundred hoists, pumps and compressors in the district could be operated by electric power at much lighter expense than by steam and would render the operators more independent of fuel combinations. It is claimed the required volume and pressure of water can be developed on the western side of the Arkansas valley and also on Ten-mile creek, east of the Mosquito range. In these days of long-distance transmission the problem of securing adequate electric power for Leadville district would seem to be merely a question of interesting the necessary capital in the proposition. WASCOTT.

Leadville, Dec. 12th, '99.

The zinc producing mines of Leadville are showing unusual activity. The concentration plants of the Antioch and Moyer mills are treating this class of ore and shipping the results of concentration daily. There are large amounts of tailings and old dumps, besides ore standing in the mines in sight in which the principal values are in the zinc contents, and it is this material that is now being treated. The greater product is being shipped to Europe through New York houses.

Leadville mines are shipping zinc ores to Antwerp, Belgium.

The recent rise in the price of lead has given an additional stimulus to mine operation and development in Leadville. Most of the prominent lead producers are in condition to take advantage of the market and the output will be materially increased in consequence, if sufficient cars can be obtained to handle the output.

PARK COUNTY.

(Special Correspondence).—T. R. Miller and Nathan Gregg have organized the Platte River Gold Dredging Co., to inaugurate dredging operations near Fairplay and Alma. It is claimed they have secured 2600 acres of auriferous ground in this vicinity.

Alma, Colo., Dec. 18th, '99.

RIO GRANDE COUNTY.

(Special Correspondence). — The Bobtail mine is one of a group to be operated through the Golconda tunnel, almost completed. A shipment of two cars of rich ore was made from the Bobtail on the 8th inst. The other mines in the group are the Aztec, Golconda, Little Annie and Iowa, all in the group being on the same vein. These properties are at the old camp of Summitville and have been worked for several years.

Summitville, Dec. 16th, '99.

TELLER COUNTY.

(Special Correspondence). — The Isabella directors declared a dividend of 3 cents per share, payable Dec. 16th, which amounted to $67,500, leaving a cash reserve of $171,000 in the treasury. A shipment of ten tons of ore was made from this property on the 12th inst. which was valued at $10 per pound.

A party of twenty-two Detroit, Mich., men, who are interested financially in the Detroit Reduction Works at Independence, Cripple Creek district, visited the place last week to inspect the mill, mention of which was made in these columns some time ago.

A recent strike of rich ore on the sixth level of the Elkton is reported. The new lead is said to be 6 feet wide. The Elkton has shipped 1000 tons per month for the last quarter. The Elkton Co. recently acquired the Thompson mine, which adjoins them on the south. The main workings will be extended into this property.

Horan & Co. shipped sixty tons of ore from the Deadwood on Battle mountain, which brought them $4800.

A recent shipment from one of the Christmas leases averaged $30 per ton.

The Mackin lease on the Lucky Gus made a 25-ton shipment which, it is claimed, ran about $80 per ton.

Eighty tons shipped from the Steelsmith lease on the Finley averaged $80 per ton.

The 105 specimens from Cripple Creek district collected for the Paris Exposition were selected from the Mary McKinney, Lucky Gus, Gold King, Lost Lillie, Elkton, Pharmacist, Deadwood, Zenobia, Burns, May Queen, Sheriff, Union, Pinnacle, Free Coinage, Bogart, Work, Isabella, Last Dollar, Damon and Red Umbrella.

A 24-ton shipment from the Raven netted that company $550 per ton. This batch of rich ore came from a winze on the main tunnel level.

Cripple Creek, Dec. 18th, '99.

(Special Correspondence).—The dividend of 10 cents per share, amounting to $100,000, declared on Dec. 15th by the Gold Coin Co., at Victor, makes that company's aggregate dividends for the year amount to $210,000. This company, as is generally known, is controlled by the Woods people, who also control several other dividend-paying companies, among which are the Jack Pot, whose December dividend was $75,000, and the Consolidated Gold Mines Co., that paid a $10,000 dividend at about the same time as the above.

Cripple Creek, Dec. 18th, '99.

Two strikes are reported on the Burns of the Acacia Co. One is on the McGill & Brady workings, and the other on the block under lease to William Parker and associates. The first has been made in a winze from the 600-foot level, and assays twenty to thirty ounces to the ton. From this lease it is stated that during November the net returns to the lessees was $19,000. Twenty cars of ore were sold.

The Parker strike was made in a drift at a depth of 200 feet, where an ore body 2 feet wide was cut, 14 inches of which assays seventeen ounces to the ton. New machinery is to be installed.

Cripple Creek dividends for 1899 are expected to reach $4,000,000, or nearly twice those of 1898.

A shipment of ore from the Isabella mine was made last week, the value of which was about $10 per pound. When the ore was first offered to the railroad company it was declined on account of the great risk. Subsequently it was taken by the railroad company. Other shipments of rich ore are to be made in a short time but of lower grade. The ore was sacked in the mine, hoisted at night and resorted. The second grade, it is estimated, will average $2 per pound.

Since their discovery in 1890 the mines of Cripple Creek district have produced about $67,000,000. The output for the year 1899 is estimated at over $18,000,000, from about 420,000 tons of ore, an average of about $45 per ton.

IDAHO.

BOISE COUNTY.

Work on the bedrock flume on More creek, ten miles below Idaho City, is finished, says the *Idaho World*. The head of the flume is about 150 feet below the lower end of the Stierman ranch. It is about 1800 feet long. The width is 16 feet and the depth, to the riffles, is 5 feet. The grade is 1 1-6 inches to the rod. The bottom of the upper end of the flume is a little over 3 feet below the surface of the bedrock. The cost of the construction of the flume was a little over $25,000. The flume company owns about four miles of placer ground along More creek, extending from the lower end of the Stierman ranch to Cold Springs Flat.

KOOTENAI COUNTY.

The crosscut in the Keep Cool mine, near Lakeville, which recently reached the ore shoot, has passed through 5 feet of high-grade ore. It is reported that the average value is $36 per ton in silver and lead. A crosscut is being run at a lower level to the same shoot.

SHOSHONE COUNTY.

It is reported that the Granite mine, at Nine Mile creek, near Wallace, has been sold to Finch & Campbell of Spokane. It was one of the early-day mines of the Cœur d'Alenes. It was equipped with concentrating plant situated on the opposite side of the mountain from the mine workings, the mill being lower than the mine. Ore was conveyed over the ridge by wire tramway. The ore occurs in a large dyke of intrusive rock cutting the slate of the country. The dyke averages 100 feet wide and the ore occurs irregularly scattered through it. Of late years very little has been done on the property, but operations will now be resumed.

MICHIGAN.

HOUGHTON COUNTY.

Work is to be resumed on the Trimountain with diamond drill. Starting near No. 1 shaft, the Copper Range lode will be traced if possible under heavy overburden to the Baltic line, a mile and a half, to settle the question whether or not Baltic and Copper Ridge lodes are identical.

MISSOURI.

JASPER COUNTY.

Richard A. Parker, consulting engineer of the American Zinc-Lead & Smelting Co., says: "The zinc situation is more promising than it has been for two months. There is no reason to expect better prices than $32 to $34 per ton. I expect to see jack sell at from $30 to $32 per ton right along. The American Zinc-Lead & Smelting Co.'s properties in the Joplin district are well developed and producing. So far as the methods of mining are concerned, I do not think they can be materially improved. As to milling, I can materially improve upon present methods and save a much larger percentage of ore than is now being saved. On our properties we have twelve mills, which I have examined, and have no hesitation in stating that I can decrease our cost 15%. I have shut down the mills making losses and we are now rebuilding three mills. The mills now in Joplin are all of 100 tons capacity. We contemplate building a mill of 450 tons capacity, which will require no greater expense to operate than a 100-ton mill. We propose to run double shifts, irrespective of the Miners' Association. The company is producing 350 tons of jack per week. Within six months we shall be in position to produce 650 tons weekly, and within a year to bring the production up to 800 to 1000 tons. The American Co. controls 3000 acres of zinc-producing territory in Joplin, part in fee and part under lease."

MONTANA.

The Montana Power Co. of Butte has transferred to the Montana Power Transmission Co., a New Jersey corporation, all its property, including 1900 acres of placer ground in Beaverhead and Silver Bow counties. The consideration paid was $1,775,000.

SILVER BOW COUNTY.

The commissioners appointed to appraise value of land sought to be taken for dumping purposes by the Montana Ore Purchasing Co. and Johnstown M. Co. from the Butte & Boston report that one piece containing 53 83-100 acres is worth $455,000 and another of 4 17-100 acres is worth $45,000, making a total of $500,000. The ground sought to be conveyed is placer and transfer will include mineral rights. It is on the flats near the Montana Ore Purchasing Co. smelter.

Burdette O'Connor has commenced suit against the Anaconda Copper M. Co. and the Washoe Copper Co. to enjoin the defendants from trespass in the Copper Trust lode claim and to recover the sum of $2,000,000, alleged to be due for 200,000 tons of ore extracted by means of underground workings from the Anaconda, St. Lawrence and Never Sweat mines. Plaintiff claims that the veins of ore apexing on his claim so far depart from a perpendicular as to pass beneath the surface of eight claims owned by the defendants. Judge Clancy has issued a temporary injunction and order to show cause and has made it returnable on January 20th. The suit promises to be greater than the famous suit of the Montana Ore Purchasing Co. vs. the Boston and Montana Co.

Over 8400 men are employed in the mines, mills and reduction works of Butte City. Of this number the Anaconda Co. employs 3600. The deepest mine in the district is the Green Mountain, down 2200 feet, the Mountain Con. No. 1 being next at 2000 feet. The Anaconda is 1700 feet deep and Clark's Parrot-Colusa is down 1400. A. F. Heintz' mine, the Rarus, is 1200 feet deep.

NEVADA.

ELKO COUNTY.

Rich ore has been found in the Dexter mine at Tuscarora, some of it going several thousand dollars per ton.

ESMERALDA COUNTY.

The Pacific Copper Co., with Messrs. Ballard, Martin, McCaw & Knapp as the principal stockholders, has been incorporated for the purpose of developing the Dunlap mines in Santa Fe district.

LINCOLN COUNTY.

The DeLamar mine has reduced working hours for mill men to eight hours per shift, with no reduction in wages. Heretofore twelve hours was a shift's work.

STOREY COUNTY.

The Gold Hill Miners' Union has elected the following officers for the ensuing term: President, E. P. Holmes; vice-president, Joseph Minnedew; treasurer, F. Clark; recording and financial secretary, J. B. McGinnis; conductor, Joseph Roach; warden, Richard Baglin; finance committee, Paul Roush, Joseph Crocker, Thomas Stack; trustees, P. H. Pollard, William Gray, William Donovan.

WASHOE COUNTY.

A copper prospect is being developed at Reno. The gangue is calcite and quartz, containing carbonates of copper, native copper, gold and silver. The vein is reported to be 40 feet wide and has been prospected on the surface 3000 feet.

NEW MEXICO.

GRANT COUNTY.

Owing to the excitement over the discoveries of copper in the vicinity of the Santa Rita mines, the new town of Hanover is increasing in population and there are 1500 people now in the district, most of whom are developing their properties. The Santa Fe track has been extended to the mines and a trainload of ore is being taken out daily.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Pyritic smelter at Deadwood treats daily 800 tons of ore and fluxing material at a greater rate per square foot of hearth area and at less cost per ton than any other smelter in the world. The ores are chiefly a highly silicious material from the mines about Terry peak, known as the Potsdam telluride ores. With these are charged pyritic material, limestone and copper, which latter is shipped from Butte, Mont. The great plant grew up from a small experimental furnace, constructed by Dr. Franklin R. Carpenter for the purpose of demonstrating that he could smelt Black Hills ores without either lead or copper, ores of these metals being rare in the Hills. The small furnace was a success and a large plant was built in Deadwood known as the Deadwood & Delaware Pyritic Smelter. Dr. Carpenter modified the various old processes previously in vogue in Europe, and adapted them to American conditions. The influence of this smelter has been far reaching. It was the first plant in America to do matte smelting with high silicious slags —48% to 52% and 6% to 10% Al_2O_3 (aluminous oxide). They were called Dr. Carpenter's impossible slags. The addition of copper added somewhat to the cost of treatment, but this was offset by cleaner slags and was not otherwise costlier. Pyritic smelters have been built at a number of places since the Deadwood plant became a success, and still others are talked of.

UTAH.

JUAB COUNTY.

The Carrisa mine, near Eureka, is shipping high-grade copper carbonate ore.

The Cleopatra, at Silver City, is in ore on the 370 level. It is supposed to be on the Swansea vein.

A. F. Holden, managing director of the United States Mining Co., has bought control of the Centennial Eureka mine, and will be elected president of the company.

SALT LAKE COUNTY.

The last monthly report of Mgr. J. W. Neill on the United States M. Co.'s property at Bingham states that 2161 feet of ground included in the property of the United States M. Co. at Bingham was prospected during November, of which 1256 feet were in Old Jordan and Galena group, 695 in Old Telegraph group and 210 in Niagara. Most of this work was in ore. In Old Jordan ground ore was encountered affording $196 40 per ton in gold, 67 ounces silver and 2.6% copper. This ore was on the 400 level. A new body in the Coolidge stope, on the No. 1 west, is being developed into a very large one. A drift has been put into it 45 feet, with solid ore on all sides. On No. 2 west, in same territory, an ore body has been crosscut 50 feet and drifted 60 feet, while an upraise has been made on the foot wall in solid ore for 80 feet. It is estimated that in this block there are 50,000 tons of ore. In the Old Telegraph, off the Grecian Bend level to the west, a drift has run on ore 75 feet, crosscutting the same body 70 feet. This ore shows an average of 3% copper, $8 in gold and three ounces silver, with iron excess of 20%. In Niagara group, important development has been in raise from the Spanish drift. The quartzite roll by which the ore body has been cut off was followed and old workings broken into on what was known as the front vein. These workings constitute a new apex from which work will be prosecuted. In the Mayberry and Davidson tunnels development has shown ore. The air compressor being installed will enable the management to run thirty drills, and will furnish power for each of the groups, and connections will be completed in a few days. Over a mile of pipe has been laid.

WASHINGTON.

FERRY COUNTY.

(Special Correspondence). — On the south half of the reservation a number of important strikes have been made on working properties during the past few weeks, principally in lead or copper ores. On the Rebecca, near the Columbia river, and ten miles west of the town of Keller, and ore body 25 feet wide is reported, and it is claimed that average samples across the vein assay 10% in silver and copper, but no gold. A crosscut is being run from the bottom of a 55-foot shaft—the deepest workings.

At the Iconoclast, on the outskirts of Keller, the tunnel, 190 feet in length, has crosscut a ledge of copper ore 5½ feet wide, from which samples are reported from $36 26 to $71.64, the latter consisting of $62.54 copper, $9.70 silver and $4.40 gold. The main ledge, it is estimated, will not be reached until 80 feet farther; the tunnel is being driven ahead and drifting started on the ledge just cut.

At the Crystal mine, near Fort Spokane, a third ore chute has been broken into on a drift run from the 85-foot level of No. 1 shaft. The ore is iron, copper, lead and silver, with little gold. Dump samples give about $30 total values. The ore in this property occurs in chutes, or chimneys, and the dimensions of the strike are not yet determined. Previous to the finding of this body of ore, it was estimated that there were 240 tons of ore on the dump and 1000 tons more in sight in the mine.

Another deal on a big consolidation has been effected in Wehe Camp, of the Palmer Mountain district, by which the Wehe Con. of the M. & M. Co. has incorporated twenty-six claims and invested $50,000 in the purchase and development funds. It is largely Cincinnati capital.

About $3500, largely Connecticut capital, is to be expended in development during the winter and spring on the Congress Hill group, on the south half of Bridge creek. This property has recently been incorporated under the name of Congress Copper G. M. & M. Co., and has a good showing of copper ore and some galena—both ores carrying high values in silver and some gold.

At Republic Camp it is estimated that the Mountain Lion mine now has blocked out and in sight 150,000 tons of ore that will pay to mill. It possesses the most continuous body of pay ore in the camp of the properties developed to date.

The Lone Pine-Surprise property is to have

a compressor plant and is to be developed in future by a three-compartment vertical shaft.

The crosscut tunnel on the Zala M., in the adjoining camp of Sheridan, cut the ledge on the 8th inst., at the 300 level, with a tunnel 550 feet, where the ledge is 4 feet wide and carries the same character of ore as on the upper levels—quartz impregnated with copper pyrites, large quantities of sulphurets of silver and some gold. Carload shipments from the upper workings showed average returns from the smelter of $260 per ton, only first-grade ore being shipped.

Republic, Dec. 12th, '99.

OKANOGAN COUNTY.

Between Loomis and Conconully, on Aeneas mountain, the Q. S. M. Co. is developing a large copper prospect by means of a tunnel. There are eighteen claims in the group, the principal vein being a zone 300 feet wide extending through three claims. Copper shows at many places along this belt, assays running from a fraction to 20% copper, with small values in gold and silver.

SNOHOMISH COUNTY.

At the U. S. group of mines, near Monte Cristo, a large body of decomposed quartz, containing free gold, has been uncovered. A tunnel is being run in ore. The group consists of fifteen claims and seven millsites, on the Sultan river, eight miles from its source.

WYOMING.

CARBON COUNTY.

The Sierra Madre M. & M. Co. has been organized to operate mines of the Grand Encampment district. They have bought the Little Marion on Miner creek, the Atlas, Bonafide and Brooklin, joining the Kurtz-Chatterton mine, also a group near the Home Fraction.

FOREIGN.

CANADA.

It is reported a new diamond field has been discovered on the north shore of Lake Superior. Numerous diamonds have been found in the glacial drift south of Lake Superior, which are supposed to have come from the north.

The Ontario Government has a plan to control the nickel ores in Sudbury district in the interest of the British Government. Acceptance would mean the placing of an embargo on the continued export to the United States for naval purposes of the nickel product of the Canadian Copper Company, which is composed mainly of Cleveland, Ohio, capitalists. This company has up to now had a practical monopoly of the supply of nickel for American armor.

In the seven years 1892-1898 the quantity of ore smelted and reduced in the Sudbury district was 891,852 tons, and the estimated metallic contents were 29,705,000 pounds of nickel and 34,570,500 pounds of copper. At the selling price of matte at the furnaces, which is the form in which it is exported to the refineries in the United States, the total value of the nickel product for the seven years was $3,294,060, and of the copper $1,302,805, or a total of $4,596,865. At the average selling price of the metals during the seven years this would amount to $10,396,760 for nickel and $3,975,607 for copper, or a total of $14,372,367.

The United States would not be prevented from getting nickel, even if Great Britain and France should attempt to control the supply of nickel ore. The principal deposits are at Sudbury, Canada, and in New Caledonia, a French island in the Pacific, but nickel is being produced in Oregon and in other parts of the United States. If England and France should refuse to allow their nickel to be sold to other nations, it would probably increase the price in the United States, but would not entirely shut off the supply.

BRITISH COLUMBIA.

In the Columbia Kootenay mine at Rossland, Supt. W. L. Haskins has been making a record in drifting. During sixty-one days a tunnel in 1000 feet was advanced 676 feet. In this work three shifts, eight hours each, were employed, two power drills mounted on a single bar being used. This makes a record for the camp of an average of 11.08 feet per day, or 3 69+ feet per shift. The work was accomplished at a cost of $13.50 per foot, which includes wages of miners, muckers, trammers, air, rails, smith work, explosives, light, etc. The character of the ground may be judged by the item of powder alone, which was $3 per foot. The rock passed through was diorite.

The Monte Cristo will ship two carloads of ore daily to the Trail smelter.

The Rambler-Cariboo Con. M. C. is sending 200 tons of ore to United States smelters.

The placer mines near Lake Atlin are to be worked by hydraulicing, American companies being formed for this purpose. Next year will see a revival in the mining industry of Atlin. On Willow and Moose Creeks, emptying into Atlin Lake, the owners of the claims along those two creeks have formed consolidations. On Willow Creek the company of which Dr. Young is at the head, controls 1700 acres. An English syndicate has bonded mines on Nugget point for $35,000. British capital is being invested in the country and new mines will be explored during the winter and exploited next spring. Since the trouble caused by the exclusion laws has been settled American investors are putting money into promising claims.

MEXICO.

It is reported in New York that the Kansas City Smelting & Refining Co. and Guggenheim Bros. have jointly invested $12,000,000 in a scheme to control a number of the best silver-producing mines in Mexico.

NEW ZEALAND.

New Zealand *Mining*: During the month ending October 26th £58,350 worth of gold was reported, and there were still several returns to come in.——A cinnabar lode has been discovered by Mr. Gibb on the Waitahuna ranges, twelve miles from Berwick, and halfway between that place and Waipori. Small pieces of cinnabar have been frequently picked up on the river bank, and a number of prospectors have been engaged for some weeks looking for the main lode, which has been found. A number of claims have been pegged off. It is an east and west lode of varying width, the walls on an average being 15 inches apart. The ore is high grade.

Industrial Notes.

—Alaska's coasts are to be accurately surveyed.

—In Colorado lignite coal is to be laid down for $3.50 per ton.

— Denver, Colo., has $35,000,000 surplus money on deposit.

—The U. S. homestead law will be extended to the Philippines.

—There are 350 miners at work in the coal mines at Red Canyon, Wyo.

—Raymond, Cal., is furnishing granite for the new San Francisco postoffice.

—The American Steel & Wire Co. is credited with having made $1,800,000 last month.

—The San Francisco mint produced $58,258,000 gold coin in the fiscal year ending June 30, '99.

—There is an advance of 20% in the price of leather belting. Glycerine is now held at 13 cents per lb.

—There will be a general advance in railroad freights on all roads east and west of Chicago Jan. 1st.

—The Colorado Fuel & Iron Co. proposes manufacturing coke, under the Hemingway patents, in Colorado and Utah.

—Deep snow in the Sierras and heavy continued rains in the valleys and along the coast insure a prosperous year for California.

—Jones & Laughlin Co. of Pittsburg, Pa., has advanced the wages of 1000 employes in its steel department 10%, to take effect Jan. 1st. A similar advance in all departments is practically assured.

—The Nevada, California & Oregon Railroad, which began its extension from Amedee, Cal., last April, has halted at Juniper ridge, Lassen county, Cal., 50 miles from Amedee and 110 miles from Lakeview, Or.

—The Commissioner of Railways renews his recommendation for a transcontinental air line railway from Kansas City, Mo., to San Diego, Cal. Similar routes, the Commissioner adds, should be opened between the cities of Chicago and San Francisco, Chicago and Seattle.

—The total tonnage of the "Soo" (Sault Ste. Marie) canal has been computed to Nov. 30th and aggregates 24,636,552 tons of freight, an increase of 15% as compared with the entire year of 1898. Upward of 54,279,000 bushels of wheat, 27,680,000 bushels of other grains and 6,804,000 barrels of flour passed through the canal. Of this flour about 35% was for direct export and nearly as great a proportion of the wheat. The great bulk of the lake commerce of the year has been iron ore.

—Chicago is to take official notice of increasing electrolysis, and will try to force street railway companies to provide their rails with proper connection to prevent leakage of electricity and consequent damage to water and other pipes. A burst in a water main was recently reported and the men found on laying bare the 6-inch pipe that a hole 1 inch in diameter had been eaten entirely through the pipe, while in other portions immediately about the leak the pipe was almost as badly eaten away. The leak was 9 feet below the surface of the ground, immediately under a street car line. In another street an 8-inch main burst, and excavation showed a large hole had been eaten through the iron. This main was also 9 feet below the street car tracks.

Recently Declared Mining Dividends.

Ontario S. M. Co., Utah, $15,000, Dec. 20.

Mt. Rosa M. & M. Co., Colo., $40,000; payable Dec. 23.

Bunker Hill & Sullivan M. & C. Co., Idaho, $33,000, Dec. 18.

Tamarack C. M. Co., Mich., $6 per share; payable Dec. 28.

Pennsylvania G. M. Co., Grass Valley, Cal., 20 cents per share.

Jack Pot M. Co., Cripple Creek, Colo., $75,000; payable Dec. 23.

Gold Coin M. & L. Co., Victor, Colo., $10,000; payable Dec. 25.

Calumet & Hecla C. M. Co., Mich., $2,000,000; payable Dec. 29.

Consolidated G. M. Co., Cripple Creek, Colo., $10,000; payable Dec. 23.

Silver King S. M. Co., Utah, 33⅓ cents per share, $50,000; payable Dec. 28.

Isabella G. M. Co., Cripple Creek, Colo., $67,000; payable Dec. 23. Total, $504,000.

Portland G. M. Co., Cripple Creek, Colo., $60,000; Dec. 15. Total to date, $2,557,000.

Yellow Aster M. & M. Co., Randsburg, Cal., $20,000, Dec. 11. Total to date, $313,789.

American Zinc, Lead & Smelting Co., Missouri, quarterly dividend, $1; payable Jan. 1, 1900.

Rambler-Cariboo Con. M. Co., B. C., 1 cent per share; payable Jan. 10, 1900. Total to date, $71,000.

Homestake G. M. Co., South Dakota, regular monthly dividend 25 cents per share; extra 25 cents, $105,000; payable Dec. 26.

Personal.

E. P. JENNINGS is the new Supt. Star Con. mine, Utah.

VICTOR M. CLEMENT is examining mining property in Utah.

W. R. BEALL, Supt. Cleveland Con. mines, Ono, Cal., is in San Francisco.

R. G. LEGG is the new manager of the Dexter M. Co., Tuscarora, Nevada.

W. B. MURDOCH returned to San Francisco this week from Lyon county, Nevada.

J. E. HASKELL is now Mgr. Penn G. M. Co., Prescott, Ariz., succeeding E. E. Wann.

C. DOBBELSTEIN, Mgr. Gray Rocks copper properties, Stillwater, Cal., is in San Francisco.

CAPT. PHILLIPS has resigned the mine managership of the Broken Hill, N. S. W., Junction S. M. Co.

B. SULLIVAN of Eureka, Utah, has been engaged to superintend the Little Chief mine, Tintic district.

SYDNEY SMITH of San Francisco was examining mining properties in Shasta county, Cal., last week.

D. C. JACKLING goes from Mercur, Utah, Jan. 1st, to take charge of mining property at Republic, Wash.

GEO. O. BRADLEY of Salt Lake City, Utah, will act in 1900 as consulting engineer War Eagle Con. M. Co., Idaho.

E. C. HOMERSHAM has gone from South Africa to West Australia, and is there managing the Sons of Gwalia mine.

GEO. E. BATEMAN has been appointed Supt. Black Spider mine, Keswick (Taylor P. O.), Cal. He takes charge Dec. 27th.

A. H. WADDELL, formerly of the Union Iron Works, San Francisco, has charge of a gold dredger at Adams Flat, N. Z.

F. H. HARVEY, E. M., of Galt, Cal., has recently completed an examination of the Lamphear mine, near Mokelumne Hill, Cal.

J. F. COLEMAN, bonding owner Mammoth Copper mines, Kennett, Cal., is in San Francisco, on his return from Halifax, Nova Scotia.

M. M. O'SHAUGHNESSY has returned to San Francisco from the Hawaiian Islands. He returns there next month to supervise an irrigation proposition and will remain there during 1900.

L. M. HILL of Oakland, Cal., has been appointed consulting engineer of the Comstock Pumping Association, to take charge of the installation of electric plants on the Comstock lode at Virginia City, Nev.

C. A. FORE of Denver, Colo., is returning from Nome. He says there are ninety miles of beach rich in gold, but thinks the country will be overdone next summer, as the rush will beat the one of '97 to the Klondike. He says that fraud is being perpetrated at Nome in the direction of recording claims by proxy. It costs $25 to record a placer claim by power of attorney, and Mr. Fore says hundreds of fictitious names are being used in recording these 20-acre placer claims; some proxies have fifty, which gives them color of title to 1000 acres of placer grouud. The law, however, compels a man to find gold on a claim before he can record it, and as hundreds of these claims have never been touched by a pick or shovel, Mr. Fore feels sure that very little respect will be shown fictitious claimants when the miners go to Nome next summer.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey, Strong & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DECEMBER 12, 1899.

638,689.—FURNACE—J. B. Archer, Oakland, Cal.
638,904.—CIGARETTE MACHINE—A. E. Buckingham, S. F.
638,863.—ROLLER BEARING—E. C. Chatham, S. F.
638,701.—NEEDLE THREADER—H. M. Childers, Ontario, Or.
638,910.—ROTARY ENGINE—E. P. Couture, Gualala, Cal.
639,152.—RAISIN STEMMER—C. S. Cox, Fresno, Cal.
639,205.—BEARING—G. Durnerin, Los Angeles, Cal.
638,918.—ELEVATOR—E. M. Fraser, S. F.
638,870.—WATERPROOF FLOORS, ETC.—P. H. Jackson, S. F.
639,056.—TICKET HOLDER—M. H. Jones, Nogales, Ariz.
638,729.—HITCHING HORSES—A. W. Lundberg, Interbay, Wash.
639,074.—WEIGHING MACHINE—S P. Mackey, Ridgefield, Wash.
638,875.—SKIRT MARKER—Isabel E. Malarkey, S. F.
638,876.—R. R. TRACK CROSSING—M. D. Meyer, S. F.
639,206.—PERFORATOR—A. C. Miller, Corona, Cal.
639,089.—AMALGAMATOR—I. A. Palmer, Seattle, Wash.
638,883.—DREDGER—R. A. Perry, Oakland, Cal.
638,886.—TARGET—J. Pillorget, S. F.
639,183.—RAIL JOINT—F. N. Plomondon, Matlock, Wash.
638,939.—ROCK DRILL—P. H. Reardon, S. F.
638,814.—PIPE TONGS—A. J. Sawin, Ventura, Cal.
639,101.—PRINTING ROLL PAPER—G. H. Schubert, La Porte, Cal.
638,890.—PUMP—T. J. Sparks, S. F.
639,202.—R. R. SIGNAL—W. R. Stearns, Portland, Or.
638,895.—ELECTRICAL TREE—G. H. Wallis, S. F.
639,203.—BORING MACHINE—Woodhill & Hulse, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey, Strong & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Catalogues Received.

"Air and Gas Compressors" is the title of a 136-page treatise thereon embracing much that any one interested therein would like to know or have verified. The pamphlet is an illustrated encyclopedia of compressed information on air and gas compressors, and its typographic excellence is commensurate with the practical value of its contents. It will be sent by its publishers, the Rand Drill Co., 100 Broadway, N. Y. City, on request.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELECTRICAL TREE.—George H. Wallis, San Francisco, Cal., assignor to Washburn & Moen Manufacturing Co., of Worcester, Mass. No. 638,895. Dated Dec. 12, 1899. The object of this invention is to produce a tree-like form for illuminating display purposes. It consists in the formation of the body of a tree of submarine or similar cable, with branches formed by untwisting the wires of the cable and extending them outwardly from the body; electric lights fixed to said branches and circuit wires through which the current is supplied thereto. Rings may be supported around the body of the tree at intervals with devices by which electric lights can be suspended therefrom.

TRACK CROSSING PROTECTOR.—M. D. Meyer, San Francisco, Cal. No. 638,876. Dated Dec. 12, 1899. This invention is designed to provide a device which will make a noiseless crossing at points where two lines of track intersect each other, and to prevent the constant jar and concussion caused by the passing of the wheels over the open joints formed by such crossings. It consists essentially in the employment of supplemental supporting surfaces extending across the tracks interior to the rails and against the inner sides thereof, having a base support independent of the crossing rails. These surfaces form a support upon which the wheel flanges travel and maintain the wheel treads out of contact with the rails while passing over the transverse line. Exterior to this line, on each side, are independent extensions which are inclined so that wheels are gradually lifted on approaching the crossing and again lowered upon the rails after passing the crossing.

ROLLER BEARING.—E. C. Chatham, San Francisco, Cal. No. 638,863. Dated Dec. 12, 1899. This invention relates to anti-frictional bearings for journals and the like. It consists of rollers adapted to travel in contact with the journal or shaft, and an exterior journal box with which the exterior surface of the rollers form contact. Intermediate rollers are placed between the main ones and have their ends projecting beyond the ends of the first named rollers, and these intermediate rollers are provided with V-shaped grooves. Caps are fixed to the journal and have channels formed in them to receive the projecting ends of the intermediate rollers, and form a track therefor. Turnable rings are fitted interior to the caps, having their outer periphery shaped to fit and engage the V-shaped grooves in the ends of the intermediate rollers.

DREDGER.—R. A. Perry, Oakland, Cal., assignor of one-half to the Atlantic Gulf & Pacific Co., of West Virginia. No. 638,883. Dated Dec. 12, 1899. This invention relates to improvements in dredging and excavating apparatus. It comprises a scow with a suction pump, engines and other machinery, and which is fixed by spuds driven through suitable guides or clamps into the bed of the stream, or other body of water. Upon the front of the scow is mounted a ladder, so-called, with peculiar arrangements of joints which allow it to swing up, down, and from side to side, and this ladder carries the peculiarly arranged excavators at its front, with the necessary mechanism for transmitting power from the machinery on the scow to operate them. In conjunction with these excavators is a suction pipe, also carried upon the ladder and connected with the suction pump on the scow by a peculiarly arranged joint which allows of the universal movement necessary in raising and swinging the ladder without disturbing the continuity of the connections.

PUMP.—T. J. Sparks, Magalia, Cal., assignor of one-half to F. M. Austin, San Francisco, Cal. No. 638,890. Dated Dec. 12, 1899. This invention is designed to improve the class of pumps having a plunger reciprocating in the pump cylinder, and two sets of suction and discharge pipes, and valves connecting respectively with the opposite ends of the cylinder and discharging into a common conductor. The pump is formed with independent heads in the form of cross-couplings, a detachable cylinder connecting one head with the other, the heads of lateral extensions and enlarged valve chambers fitting to said extensions. The valve seats are also removably fitted in the extensions and located exterior to the chambers. Valves which are removable with the seats have tail extensions projecting into the chambers, and springs acting against them to insure the quick closing of the valves. Bolts pass through the walls of the chambers and of the valve seats, and detachably fix the chambers and seats to the extensions of the cross couplings. A peculiar arrangement of packing is adapted to surround the plunger rod where it passes through the stuffing box.

WATERPROOF SIDEWALK, FLOOR, OR ROOF CONSTRUCTION.—P. H. Jackson, San Francisco, Cal. No. 638,870. Dated Dec. 12, 1899. This invention comprises a means for providing for expansion and contraction of the parts of a sidewalk, floor or roof which are subject to expansion and contraction due to atmospheric changes and to prevent the cracking of the concrete surface of the structure. It also comprises a base formed of corrugated metal plates overlapped and interlocking at the ends with supporting beams and metal bars extending parallel therewith, and means

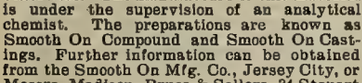
by which the bars are clamped across the overlapping ends of the seats. The filling of cementing material may be introduced between the interlocking ends of the seats to prevent the passage of water in the case of leakage from above, and a filling and surface of concrete is spread upon the corrugated plates or sheets. The upper surface of this concrete is formed with deep intersecting grooves, partially separating it into squares or other shapes, so that the upper portion may be subjected to expansion and contraction without affecting the lower portion.

DEVICE FOR MAKING CIGARETTES.—A. E. Buckingham, Oakland, Cal., eleven-sixteenths assigned to W. de Pons and F. Klingeberg of same place, and H. C. Sexton and A. Castelazo, of San Francisco, Cal. No. 638,904. Dated Dec. 12, 1899. This device for easily manufacturing cigarettes and the like consists of a tube closed at one end and open at the other, having a plunger slidable therein, and a stem extending outwardly through the closed end, and a head by which it may be reciprocated, and which also serves as a lock to retain the parts in position when not in use. The tube may be filled with loose tobacco when the plunger has been withdrawn to the head, and the paper of which the cigarette is formed is rolled around the exterior of the tube, the other end being folded and closed. By then forcing the plunger outward the tobacco is pressed into the wrapper, which is simultaneously forced off the tube so that when it leaves the tube it is filled with the tobacco which is properly packed within it. The open end may then be closed over the tobacco and it is in condition for use.

Commercial Paragraphs.

A. M. GRANT, Utah representative of the Colorado Iron Works Co. of Denver, Colo., has an order from the Anaconda, Montana, Co. for a set of 54x8 rolls.

SMOOTH ON is a metallic putty, so to speak, especially adapted for closing cracks in boilers, putting on patches, and other work where metal surfaces are to be brought together to form a solid piece. It is a dry, powdered composition; when mixed with water to the consistency of a stiff putty becomes hard and of much the same consistency as iron, so that it can be finished with a smooth surface. It will withstand heat and vibration and is affected by heat and cold the same as iron. It increases in bulk when unconfined about 5% when it hardens, and this action is what makes it perfectly tight when confined between two iron surfaces or in an opening or fracture. By remembering this action the mechanic in the use of this compound can utilize it in many ways in repairs in cast and wrought iron work, and on account of its strength to withstand heat, pressure and vibration. In ship, engine and boiler building plants there is a demand for a material that may readily be applied in the form of patches where fractures occur, and also in the case of boilers and piping for permanent joints, mainstay braces, stay screw nuts, etc. Every engineer knows the value of a reliable compound for these purposes as against the old-fashioned soft patch cement made of red lead and iron borings. The manufacturers say that the discovery and use of Smooth On Compound has met with success and has made easy many repairs that it would be difficult, if not impossible, to do otherwise. The manufacture of this material is under the supervision of an analytical chemist. The preparations are known as Smooth On Compound and Smooth On Castings. Further information can be obtained from the Smooth On Mfg. Co., Jersey City, or Messrs. Madison, Bruce & Sellers, 34 Steuart street, San Francisco, Cal.



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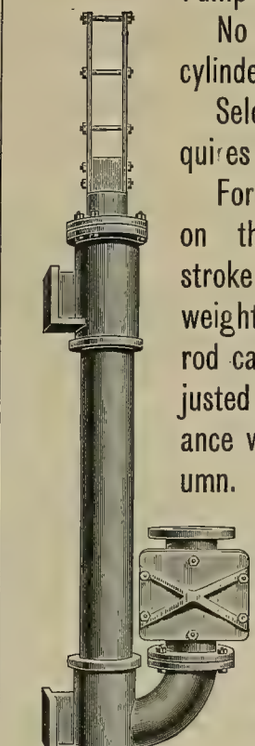


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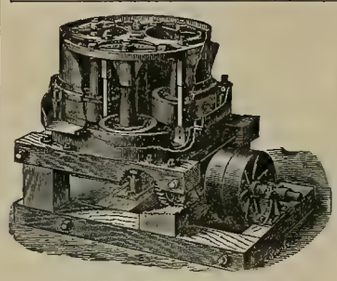
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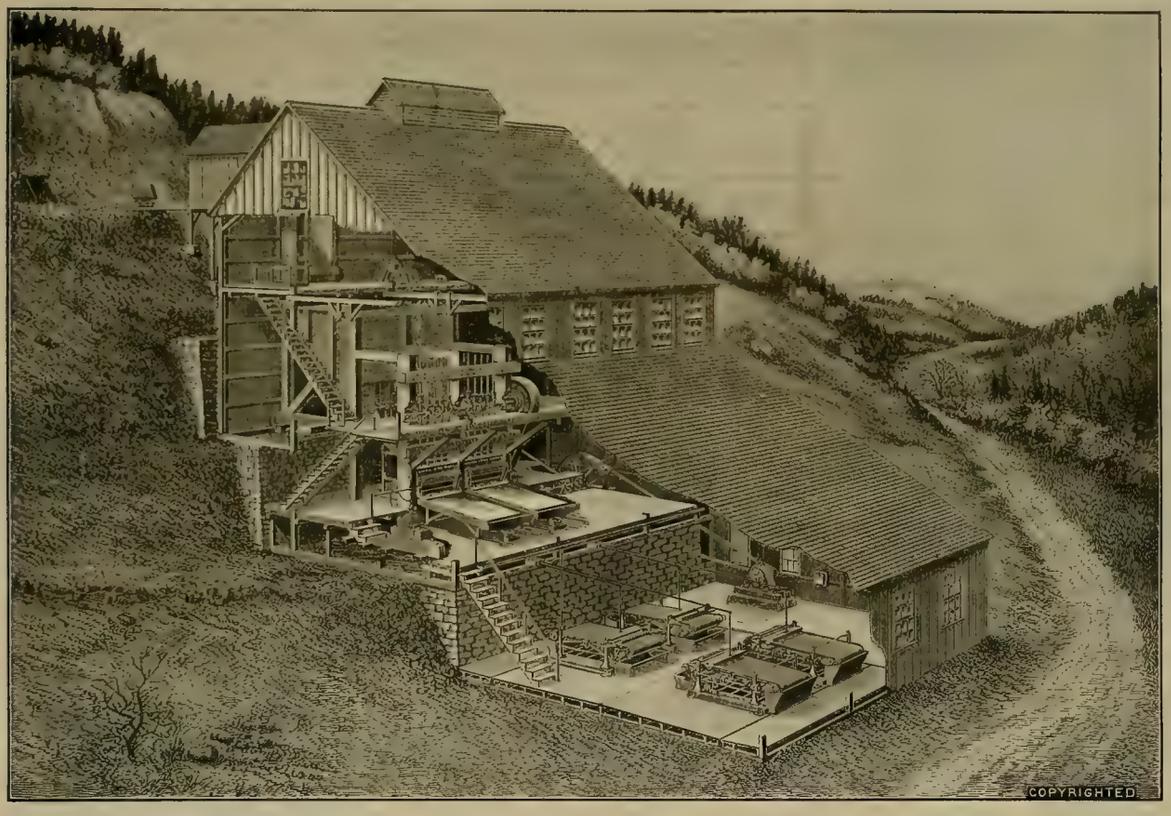
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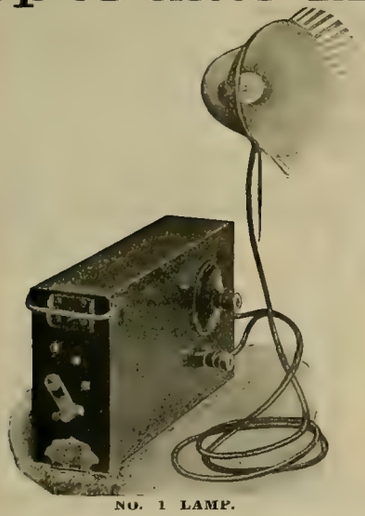
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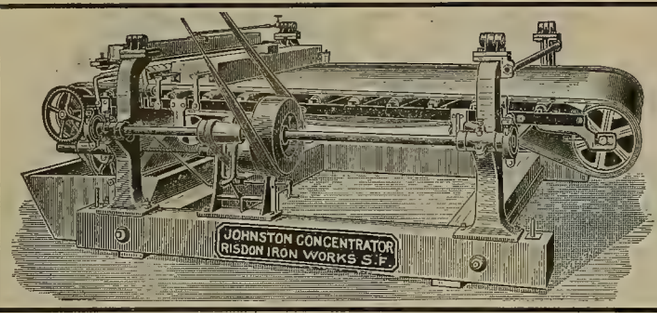
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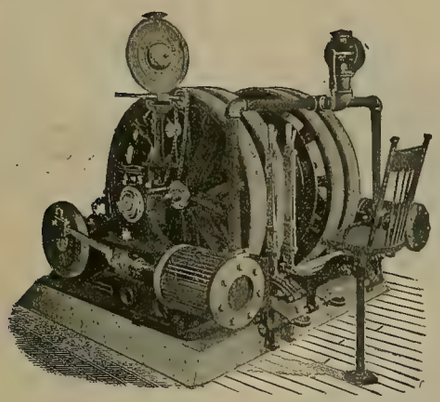
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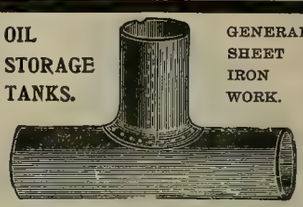
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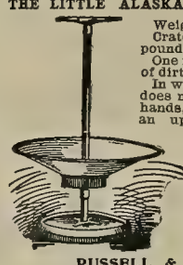
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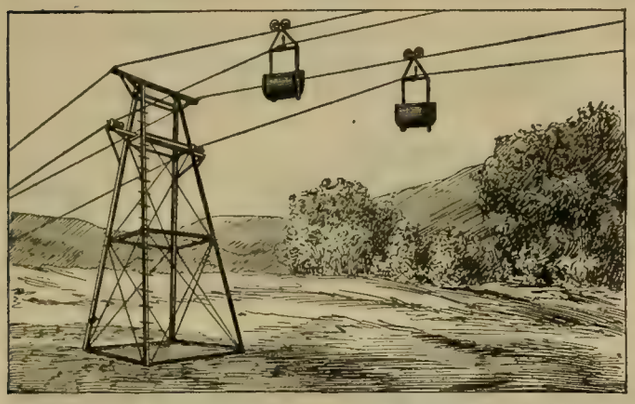
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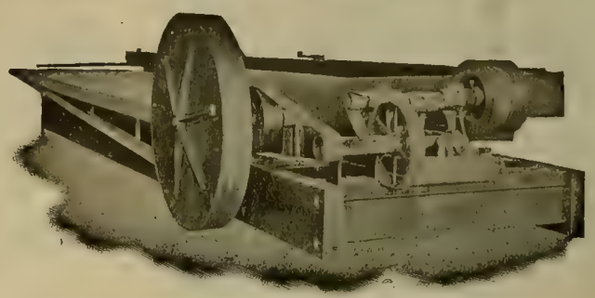
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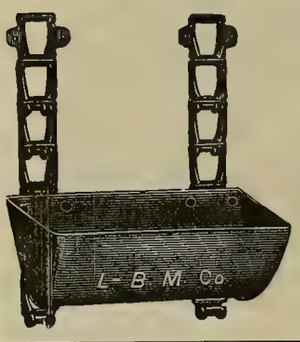
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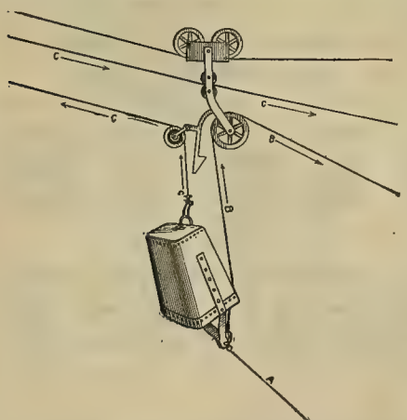


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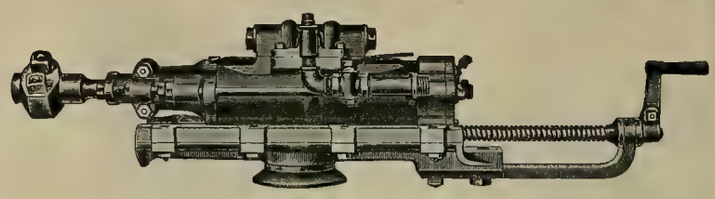
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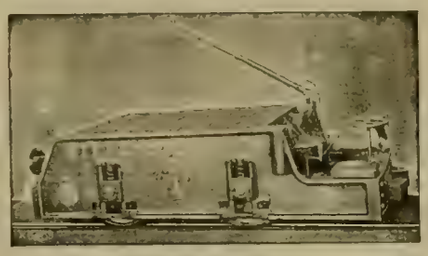
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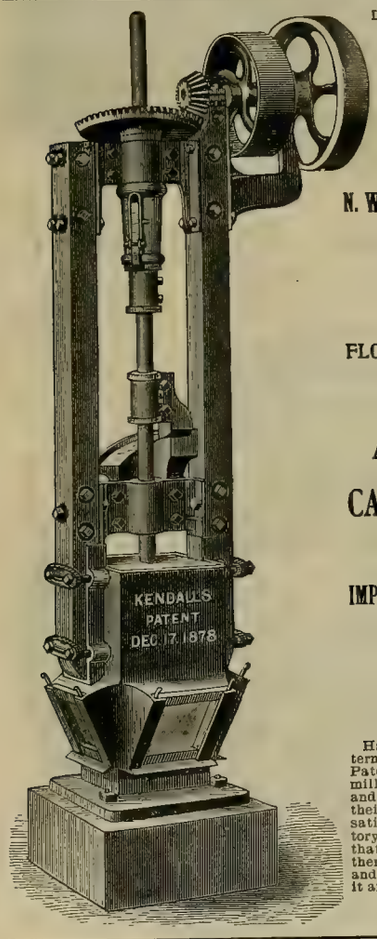
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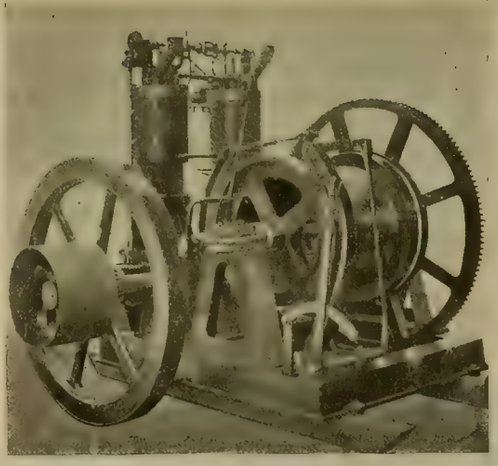
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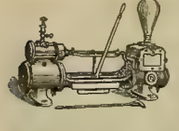
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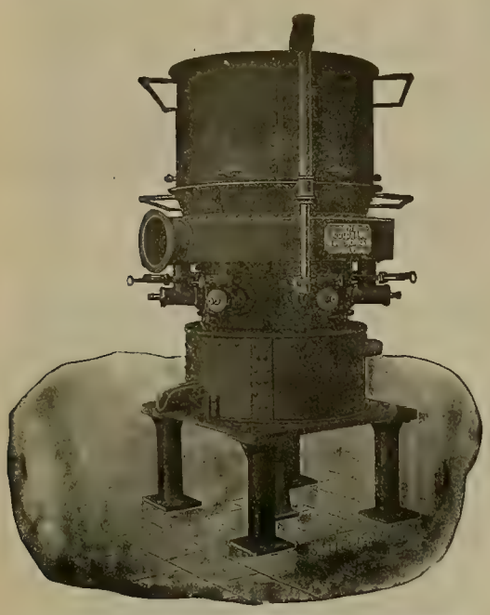


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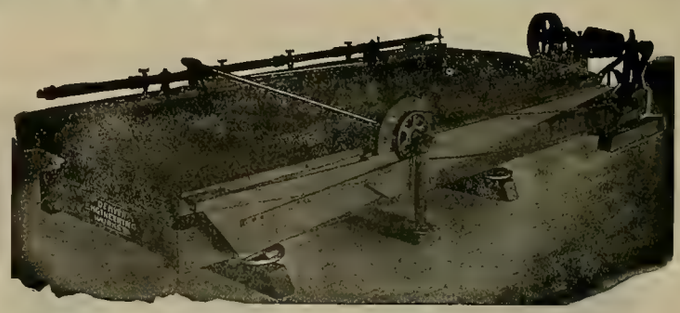
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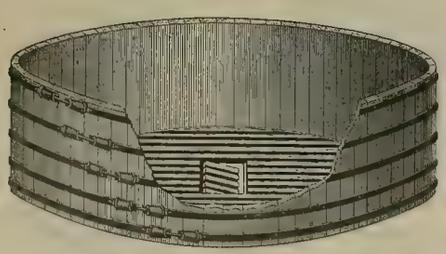
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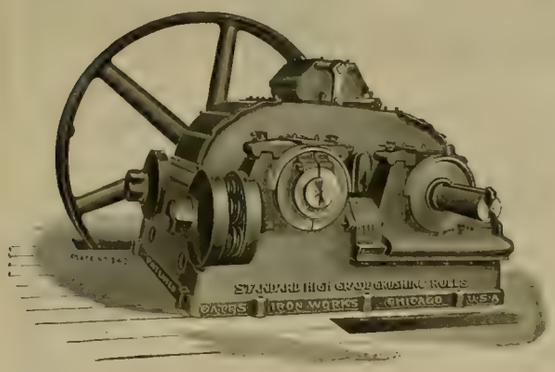
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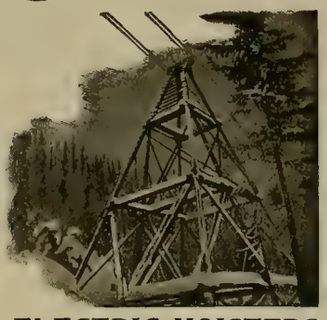
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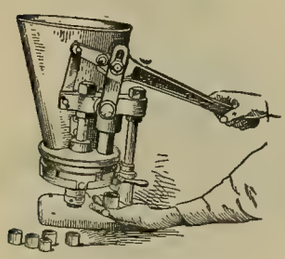
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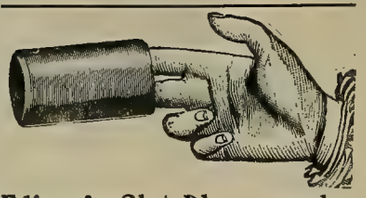
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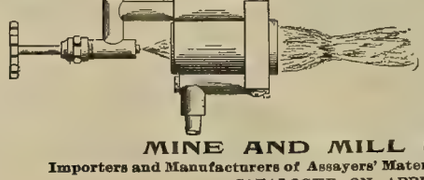
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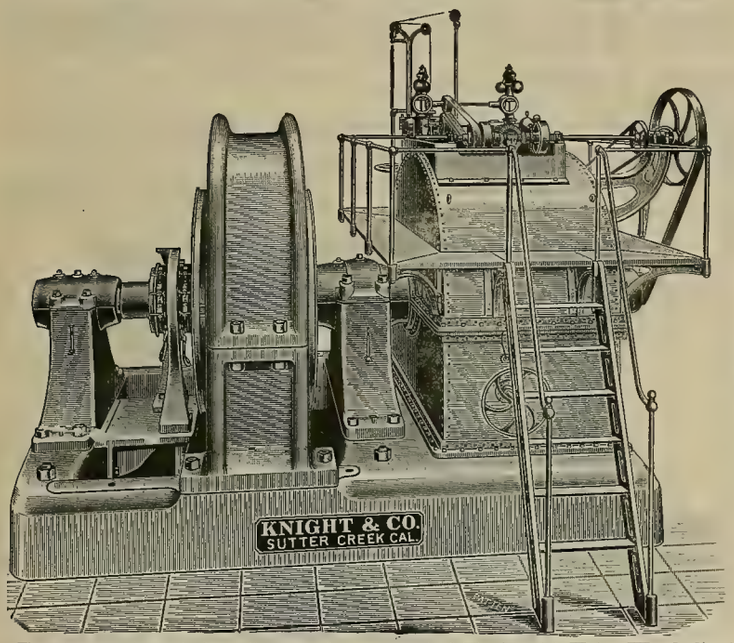
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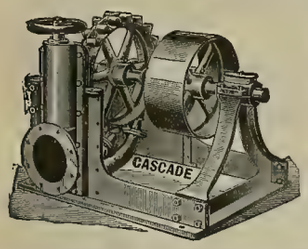
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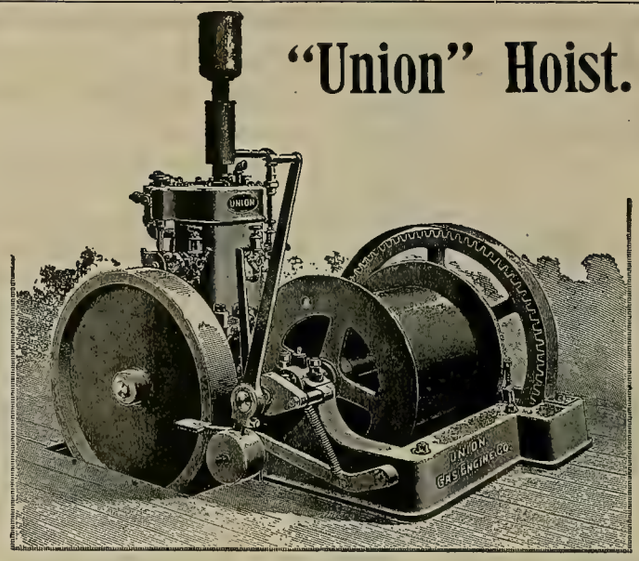
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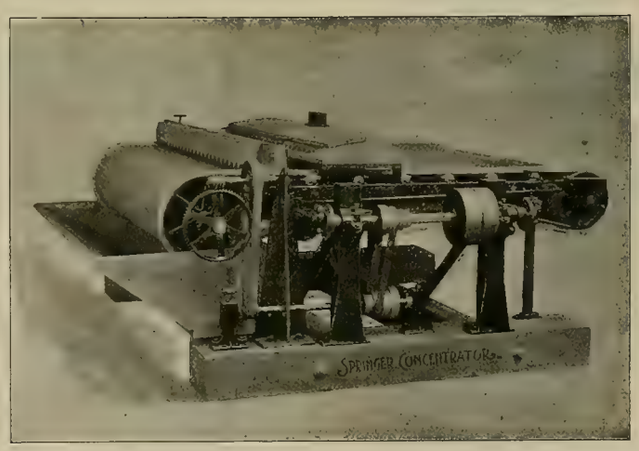
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The best 6-foot rubber belt machine in the market. You will see at a glance that this Concentrator embraces all of the best qualities of other good concentrators, besides many adjustments and improvements which none of the others contain. This machine is shorter than any other concentrator. See report of Supt. Lowring of Utica mine in "Mining and Scientific Press" of Jan'y 14, 1899, wherein he cut three 12-foot Frue vanners down to 8 feet in length and got a saving of 8 cents more per ton from the 8-foot than from the 12-foot machine after a thorough test of a run of thirty-five days. This is the strongest, simplest, most durable, less wear and tear, and takes less power to run than any other. It has only one-half as many pieces in its construction as in some concentrators. All belts are tightened by sliding boxes, and the shaking frame can be raised or lowered and leveled while running at full speed. Weight only 1500 pounds, thus a saving of one-half in transportation. This Concentrator is now running from Alaska to Mexico, and giving the best of results. All mining men should see thir Concentrator before purchasing any other. Price for 6-foot rubber belt machine, f. o b., $400. Address all correspondence to **AMOS C. SPRINGER, 976 Pine Street, San Francisco, Cal.**

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And Other Aquarious Chemical Solutions. OUR **FILTER PRESS** Removes all Slimes and Hastens the Deposition of the Metals.

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RISDON IRON & LOCOMOTIVE WORKS, San Francisco, Cal.,
C. B. BOOTHE & CO., Los Angeles, Cal., } Sales Agents.

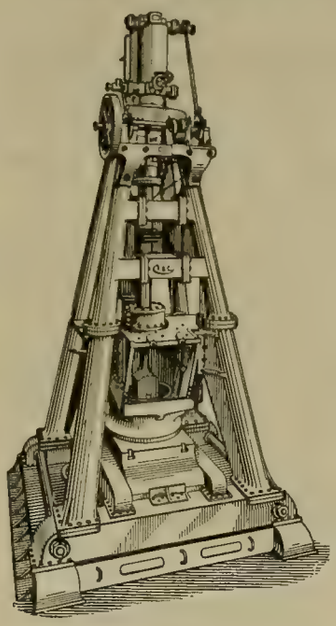
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GENERAL AGENCY FOR
GREEN BLOWERS.



We call attention to our new catalogues:

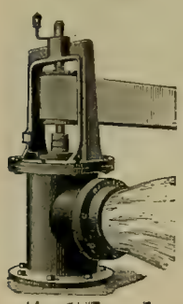
No. 3—ROASTING, SMELTING AND REFINING METHODS AND MACHINERY.

No. 8—CRUSHERS AND PULVERIZERS.

IN PRESS:

No. 4, 9th Edition—GOLD AND SILVER MILLS.

This has much new matter and will interest all mill men.





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PROPELLER PUMP
For Deep or Shallow Lifts.

CAPACITY 100 TO 15,000 GALLONS PER MINUTE.

A simple screw propeller pump without valves or complicated parts. Fits into oil well casing of from 6 to 12 inches diameter and larger, the pump occupying but this space in shafts and in wells without pits dug to water level, and may be operated on an incline or vertically. Specially adapted for sinking purposes, pumping out sumps and river bottoms, and for handling large quantities of water economically and successfully. In writing, state work required.

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The Utah mining camps are fast forging to the front. THE TINTIC DISTRICT, BINGHAM, PARK CITY, MERCUR, LA SAL AND GOLD MOUNTAIN are all located on the line of the
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Two trains daily from Denver via Denver & Rio Grande or Colorado Midland and RIO GRANDE WESTERN. For pamphlets, etc., write
GEO. W. HEINTZ,
General Passenger Agent, SALT LAKE CITY.

Market Reports.

SAN FRANCISCO, Dec. 21, 1899.

SILVER.—London (925 fine), 27½d; New York, 59; San Francisco, 59; Mexican Dollars, 47½@48¾; New York exchange, sight, 12½; telegraphic, 15 cents premium.

LEAD.—New York reports steady, $4.70 bid, $4.75 asked; brokers' price, $4.45.

London, Spanish lead, £17 3s 9d.

Local, pipe, 7¼@7½c; sheet, 7¼@8¼c; pig, 6¾c; bar, 6¾c.

COPPER.—New York reports Lake at $16.50; brokers' price, $16.75. Local—Mill copper plates, 23¾c.

Copper is lower than in several months past, being quoted at 16¾ cents. The production and export of copper for the month of November by United States mines was 19,817 tons; produced by outside sources, estimated, 13,400 tons; exports, 10,809 tons (all of 2240 pounds); produced by foreign reporting mines, 7896 tons.

Official government returns of copper exports for the year 1898 and the first ten months of 1899 are shown in the following table:

INGOTS, BARS, ETC.	1899, lbs.	1898, lbs.
United Kingdom	38,621,239	68,530,104
France	44,239,845	41,906,190
Germany	39,828,447	36,174,107
Other Europe	64,572,034	88,267,914
British N. America	849,445	1,264,818
Mexico	249,373	237,742
Other countries	27,450	171,749
Totals	188,388,333	236,552,624

COPPER MATTE.	Tons.	Tons.
United Kingdom	463	4,350
Germany	....	2
Mexico	2,169	3,026
Other countries	....	....
Totals	2,632	7,378

Total values of both $31,539,113 $27,636,060

IRON.—American, soft, $24@25.50 per ton; Scotch, $27.50 Local bar, 2¾c per lb.

STEEL.—11¼@20c per pound.

TIN.—Steady, $24.90 bid and $25.25 asked; pig, 36@39c per lb.

PLATINUM.—London, 66s per ounce; New York, $17.75; San Francisco, $17.25.

ANTIMONY.—In San Francisco 1000 pounds and upwards, 10c net; 300 to 500 pounds, 11@14c; less than 100 pounds, 15c.

BABBITT METAL.—No. 3, 8¾c.

QUICKSILVER.—Local, $51.50; export, $46.50@47; carload lots, special rates.

The price of quicksilver shows no change from last week. The only news of interest is the reported purchase and consolidation of the New Almaden and Guadaloupe mines in Santa Clara county and the new Idria mines in San Benito county, Cal., by a European syndicate. This report has not been confirmed, however.

ALUMINUM.—No. 1, 99% pure in ingots, for remelting, 37c per pound, in small lots; 35c per pound in 100-pound lots; 33c per pound in ton lots and over. No. 2 grade, 90% pure, cast in ingots for remelting, 34c per pound in small lots; 33c per pound in 100-pound lots; 31c per pound in ton lots and over. Aluminum castings, according to number, weight, moldings, etc., 45c per pound, upward. Aluminum sheet from 38c per pound upward. Lots of less than 50 pounds, 5c per pound higher. Nickel aluminum casting metal, 39c per pound in small quantities; 35c in 100-pound lots and 33c in ton lots.

ZINC.—Dull; $4.60 bid, $4.67½ asked.

ASSAY LITHARGE.—100 lbs., 12c.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17¼c. No. 1*, 60%, carload lots, 13¼c; less than one ton, 15¼c, No. 1** 50%, carload lots, 11¼c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9¼c; less than one ton, 11¼c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $5.10 per 1000 feet; double tape, $4.35; single tape, $3.45; Hemp, $3; Cement No. 2, $4.35; Cement No. 1, $3.45.

NAILS.—List per keg: No. 20 to 60d, wire, $4.45; cut, $4.15; 10 to 16d, wire, $4.50; cut, $4.20; 8d, wire, $4.55; cut, $4.25; 6 and 7d, wire, $4.65; cut, $4.35; 4 and 5d, wire, $4.75; cut, $4.45; 3d, wire, $4.90; cut, $4.60; 2d, wire, $5.15; cut, $4.85. In carload lots, special rates in carload lots 10c per keg less.

CHEMICALS.—Cyanide of potassium, 98%–99%, jobbing, 32@33c per lb.; carloads, 29@30c; in 10-lb. tins 37c; sulphuric acid, 1¾c per lb. 66% B.; soda ash, $1.60 per 100 lbs. 58%; hyposulphite of soda, 2½@2¾c per lb.; blue vitriol, 5½@6c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@1¾c; nitric acid, in carboys 8c per lb; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., 65c; sks., 60c per 100 lbs; chloride of lime, spot, 2.10@2.25c; nitrate of potash, in kegs, 8c; chlorate of potash, 25c; caustic potash, 10c in 40-lb. tins.

CANDLES.—Electric Light Candles—6s, 16 oz., 8¼c; 6s, 14 oz., 7¼c; 6s, 12 oz., 5½c; 6s, 10 oz., 5½c; Granite (Mining) Candles—6s, 16 oz., 9¼c, 6s, 14 oz., 8¼c; 6s, 12 oz., 7½c; 6s, 10 oz., 6¾c. Paraffine Wax Candles—1s, 2s, 4s, 6s, white, 10c; colored, 11c.

COAL.—San Francisco coast, yard prices:

Wellington	$8 00	Coos Bay	$5 00
Seattle	6 00	Southfield	7 50

Cargo lots, Eastern and foreign:

Wallsend	$7 50	Cumberland	$9 50
Brymbo	7 50	Cannel	9 50
Pennsylvania, bd.	14 50	Welsh Anthracite	12 50
Scotch	8 00	Rock Springs	7 00

COKE.—Foreign, $13; domestic, $12 per ton.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 55c; Linseed, strictly pure, boiled, bbl., 66c; cs., 71c; raw, bbl., 64c; cs., 69c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 61c; cs., 66c; raw, bbl., 59c; cs., 64c; lots of 5 bbls., 1c less. Kerosene—Pearl, cs., per gal., 20c; Astral, 20c; Star, 20c; Eocene, 22c; Extra Star, 24c; Elaine, 25c; Water White, bulk, in tanks, 14c; Mineral Seal, iron bbls., 21c; wooden bbls., 23¼c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86 deg. Gasoline, bulk, 21c; do., cs., 27c; 63 deg. Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 59c; cs., 64c; No. 1 bbl., 49c; cs., 54c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 53½c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, Natural White, 40c; Bleached do., 45c; Cocoa, cs., 55c; Pacific Rubber Mixed Paints, white and house colors, $1.25@1.35 per gal.; wagon colors, $2@2.25.

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 20, 1899.

9:30 A. M. SESSION.

200 Belcher	14c	900 Mexican	31c
100 Best & Belcher	27c	400 Ophir	74c
100 Caledonia	50c	100	75c
200 Challar	15c	200	76c
50 Con. Cal. & Va.	$1 55	500 Seg. Belcher	03c
300 Gould & Curry	11c	200 Sierra Nevada	44c

2:30 P. M. SESSION.

100 Andes	11c	300 Savage	08c
500 Best & Belcher	28c	300 Sierra Nevada	44c
250 Con. Cal. & Va.	$1 55	500	43c
800	1 50	50 Standard	$2 45
300 Gould & Curry	10c	200 St. Louis	08c
1300 Mexican	30c	400 Union Con.	21c
400 Ophir	72c	500 Utah	04c
500	71c	700 Yellow Jacket	09c

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage, **Money** loaned mines, **Mining** companies organized, their property exported, financed and managed, **Mines**, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated, **Examine** mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and Chemical work done. EDW. N. BREITUNG, Marquette, Mich., U.S.A. CABLE ADDRESS, EDBRE. CODES: LIEBB'S, BEDFORD MCNEIL'S, A B C UNIVERSAL COMMERCIAL.

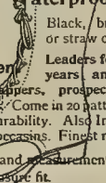
THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from B. F. Keith and J. and Wm. Gannon, in the Sydney Flat Gravel Mine, near Jacksonville, Tuolumne Co., to deposit tailings in Woods Creek and Tuolumne River; from the Eureka Lake and Yuba Canal Co., Cons'd, in a portion of the Consolidated Placer Mine, at Columbia Hill, Nevada Co., to deposit tailings in Spring Creek; from F. M. Thomasson, in the Chalk Flat Mine, near Pike City, Sierra Co., to deposit tailings in Chalk Flat Ravine; from Walter Boire, in the Boire Placer Mine, near Railroad Flat, Calaveras Co., to deposit tailings in a ravine below the mine; from Paris Bean, in a branch of Coffee Pot Ravine, in Yuba County near Clipper Mills, to deposit tailings in Coffee Pot Ravine; from J. W. Pinder, in the Little Gap Mine, near Hamilton, Tuolumne Co., to deposit tailings in Streamless Valley; from J. M. Gilbert and A. M. Colwell, in the Ben Franklin and Davis Consolidated Mine, at Yankee Jim's, Placer Co., to deposit tailings in an old pit; from Jos. Williams et als., in the Williams Ranch Mine, near Ono, Shasta Co., to deposit tailings in Watson Gulch; from O.W. Henderson et als., in the Southern Cross Mine, at Yankee Jim's, Placer Co., to deposit tailings in Mexican Gulch; and from A. W. Mellon et als., in the Cherokee Mine, at Cherokee, Butte Co., to deposit tailings in Dry Creek, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on December 26, 1899, at 1:30 P. M.

Quicksilver

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Hand Sewed Waterproof

Black, brown or straw color.

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WANTED—POSITION BY A MAN WHO IS expert in milling and concentration of gold ores. Understands assaying, retorting and melting. Highest of references. Address W. B. G., 626 McAllister St., San Francisco, Cal

WANTED.—Position as Superintendent or Foreman of Quartz Mine by practical all-round mining man. Could take full charge of quartz mill and mine. Would go to any part of the U. S., Mexico or Canada. Reasonable salary. Reference. Address PRACTICAL MINER, care of this paper.

WANTED, A POSITION AS

ASSAYER or CYANIDE PLANT MANAGER

by energetic and practical man with five years' experience. Address POTASSIUM, this office.

Bookkeeper and General Office Man, now employed by one of the largest mining and milling companies in Colorado, desires to make a change to a lower altitude on account of his wife's health. A position where loyalty and strict attention to business will be appreciated is wanted. Age 34 years. Address A. H. M., care this journal.

Position Wanted

By Experienced Metallurgist and Mining Engineer, preferable in charge of a cyanide plant or as chemist and assayer. Thoroughly familiar with all processes for gold extraction. Technical graduate. Best of references. Salary moderate. Address W. C. A., care this paper.

WANTED.

Wanted.—Foreman for Twenty-Stamp Mill.

One hundred and fifty dollars per month and board. Address THE WM. HAMILTON MFG. CO., 316 S. Euclid Ave., Oak Park, Illinois.

WANTED.--Address of Party Owning Diamond Drill and Oil Apparatus.

Big inducements to right party. Address A. D., this office.

WANTED.—A STAMP MILL MILLWRIGHT.

Permanent position; salary $1800 per year. Address F. T. SNYDER, The William Hamilton Mfg. Co., Nelson, B. C.

Wanted—Superintendent

To take charge, under a general manager, of a reduction plant for argentiferous copper ore. Plant consists of concentration works and reverberatory smelting furnaces with a capacity of about 100 tons of ore daily. Applicants state references, previous position and salary expected. Address S. C., care of Mining and Scientific Press.

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Single claims and groups. Large gravel properties, dredging and hydraulic. Undeveloped copper properties. PACIFIC MINING & DEVELOPMENT CO., Redding, Cal.

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For sale on very reasonable terms, or leasing proposals will be entertained, a group of gold and silver mines in the State of Durango, with excellent old records and some good modern machinery. For full particulars apply to MR. A. KEMPSON (Resident Agent), care of Mr. Stalcknecht, Durango, Mexico.

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PLACER MINING MACHINES,

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It repairs a blemish in iron castings with a durable metallic iron finish that can be polished and will withstand a red heat. It makes a superior flange joint for steam, water or oil.

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ACETYLENE SEARCH LIGHTS

COST 1 CENT PER HOUR
PROJECT LIGHT 500 FT. & OVER



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We buy Gold, Silver, Lead, Copper, Bismuth, Uranium, Wolframite, Cobalt, Molybdenite and Antimony Ores. We have modern sampling mills, also test ore for the new processes of ore reduction.

Our long experience in the market enables us to obtain the highest prices for all marketable ores. Write for our "Reference Book." Send analysis of your ore for prices and information.

BAILY & MONNIG, Managers.

Assessment Notices.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 10) of 1 cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 637 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—637 Sacramento street, San Francisco, California.

MARIPOSA COMMERCIAL AND MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Mariposa County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of November, 1899, an assessment (No. 14) of Ten ($10) Dollars per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 320 Sansome street, room 24, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOSEPH H. MOOSER, Secretary.

Office—320 Sansome street, room 24, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of November, 1899, an assessment (No. 21) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHARLES BOVONE, Secretary.

Office—217 Sacramento street, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras county, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of November, 1899, an assessment (No. 3) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 20th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. P. HEALD, Secretary.

Office—Heald's Business College, 24 Post Street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

GEO. W. DIXON, Secretary.

Office—Room 31, No. 214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 8th day of December, 1899, an assessment (No. 99) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

E. B. HOLMES, Secretary.

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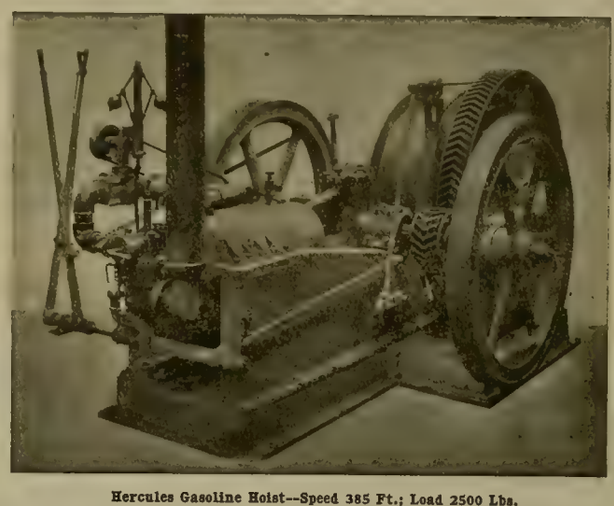
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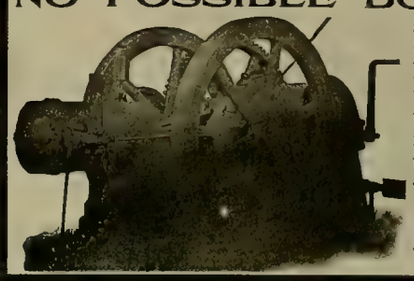
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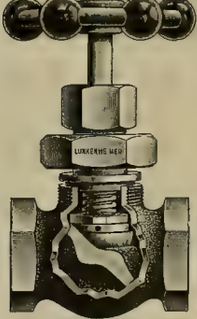
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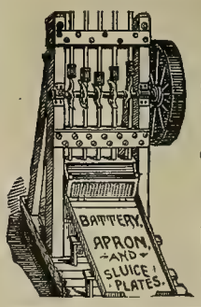
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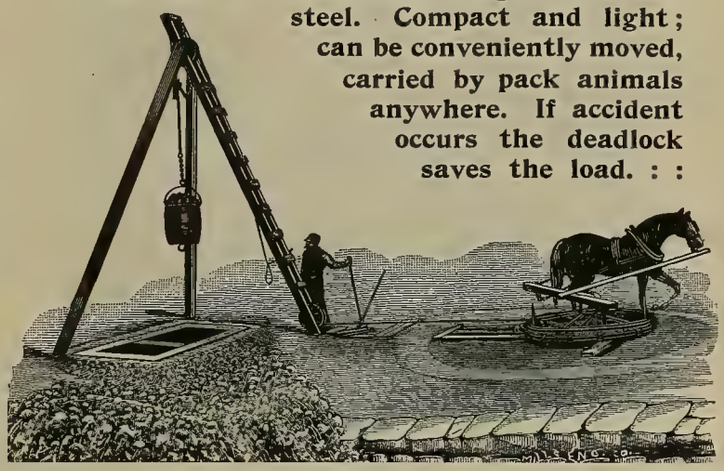
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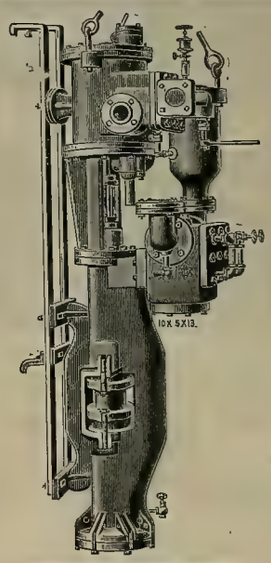
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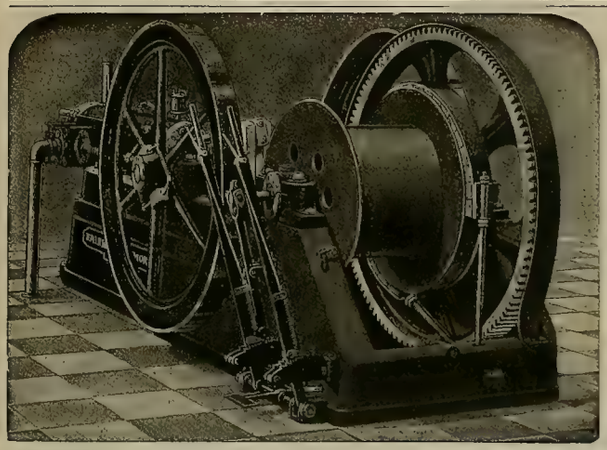


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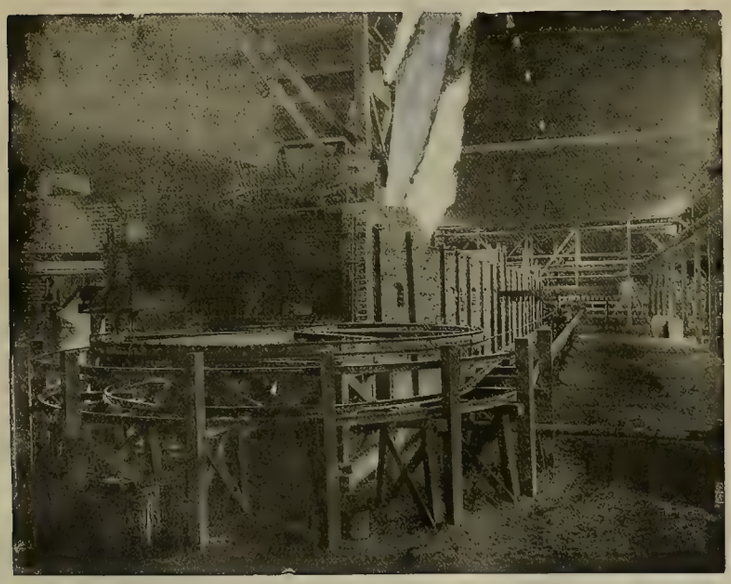
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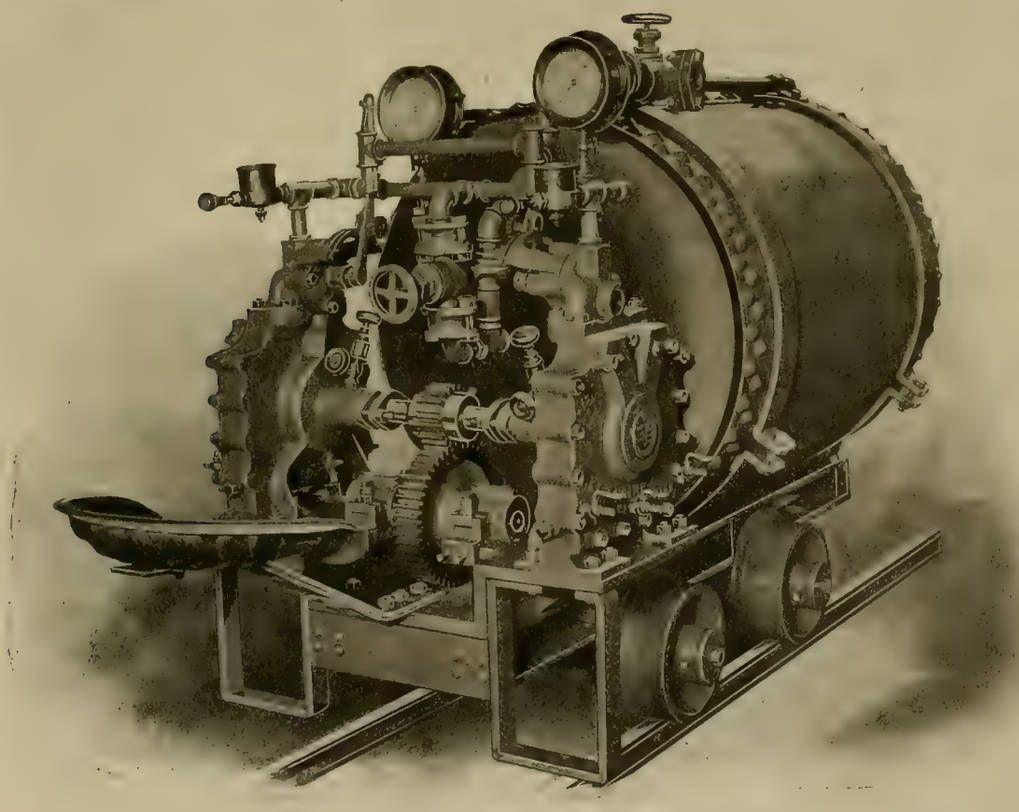
No. 2060.—VOLUME LXXIX. Number 27. SAN FRANCISCO, SATURDAY, DECEMBER 30, 1899. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Compressed Air Locomotive.

As a motive power, compressed air essays to supply the same demands met by steam and electricity. In many forms of industrial appliance such supply has been noted herein. The field of locomotion is an alluring one, and, stimulated by the success of the electric locomotive, compressed air essays equal advance. One form of compressed air locomotive is herewith illustrated. It was designed and built by E. A. Rix of San Francisco, Cal., for the Empire mine, Grass Valley, Cal., where it ran one-half mile into the breast of the drift and back again to the shaft, on its outer trip hauling five mining cars, each carrying one ton ore, the weight of the train being about 7½ tons, exclusive of the motor, which weighs 3000 pounds. The track was a winding one, and had in places a 3 per cent grade. The locomotive is said to have reduced the cost of haulage from 25 cents per ton to 6 cents, the track being 18-inch gauge, wheel base 30 inches; the receiver on the motor 35 inches diameter, 54 inches long. In connection therewith was used a trailer, carrying another receiver 35 inches diameter and 60 inches long. The sharp turns in the track, some with a 10-foot radius, necessitated this division of air storage. The pressure was about 400 pounds. Two 4 H. P. rectangular piston engines are connected, one to each end of the upper shaft, a pinion on which meshes into the large gear below. These reversible engines have an average speed of 550 rotations per minute. The axle connection, invisible in the picture, is by cut sprockets and chains, the motion of the engine shaft to the axle being 4 to 1. The motorman or engineer is duly accommodated with a seat resembling that of an old-fashioned mowing machine; the two rectangular straps hanging down near the track are for his feet.



A Hydraulic Mine in Trinity County, Cal.



A Narrow Gauge Compressed Air Locomotive

Hydraulicking in California.

Since so much has been said about the inhibition of hydraulic mining in California, many have gotten the impression that this class of mining has practically ceased in the State. While this branch of the mining industry has been placed under certain restrictions, still there are over 200 mines working in the area affected by these restrictions, operating under permits from the United States Debris Commission, which stipulate how mining shall be conducted, how debris shall be impounded, etc. In the northern counties, where the streams are not tributary to the Sacramento river, this branch of mining is carried on without restraint, and some large mines are at work. The accompanying engraving is that of a typical hydraulic mine in operation in Trinity county. It shows two monitors tearing down an elevated gravel bank of the present river system, lying at the foot of a mountain. The flumes and bed-rock drains can be easily distinguished as well as the buildings and piles of lumber used in the construction of the flumes, etc. The picture also shows the lower limit of the snow line. While the mountains are robed in a mantle of white it will be observed that no snow is seen about the mine or along the river bottom.

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J. F. HALLORAN.....Publisher.

San Francisco, December 30, 1899.

TABLE OF CONTENTS.

ILLUSTRATIONS.—A Hydraulic Mine in Trinity Co., Cal.; A Narrow Gauge Compressed Air Locomotive, 741. A Sheeted Laccolite; Typical Laccolite; A Postular Uplift, 745. Crushing Machine—For Breaking "Run-of-Mine" Coal; Mixing and Weighing Room, 746. Engine and Boiler Room, 747. Cross Section of a Cape Nome Claim; Sketch Showing Method of Wiring, 748. Building an Arrastra; The Miners' Home; Hoisting with a Horse Whim; The First Hoisting Plant, 749. Latest Mining and Metallurgical Patents, 753.

EDITORIAL.—Hydraulicking in California; A Compressed Air Locomotive, 741. A Century's Progress; Miscellaneous, 742.

MINING SUMMARY.—750-751.

LATEST MARKET REPORTS.—752.

MISCELLANEOUS.—Concentrates, 743. The Cripple Creek Gold Fields; Electroplated Steamships, 744. Laccolites and Their Relation to Ore Deposits; World's Production of Gold and Silver, 745. The Petrified Forests of Arizona; Utilizing Coal Waste, 746. A Theory of the Genesis of Ore Deposits; Zinc Deposits in Missouri, 747. The Coast of Alaska from St. Michael to Point Barrow; A System of Mine Signalling, 748. The Occurrence of Tin; Typical Mining Scenes, 749. Industrial Notes; Personal; Commercial Paragraphs; Recently Declared Mining Dividends; List of U. S. Patents for Pacific Coast Inventors; Notices of Recent Patents; Books Received, 751-752. Latest Mining and Metallurgical Patents; Spruce Wood, 753.

DURING the past year Leadville, Colo., has furnished a notable example of what may be accomplished by a local company. The Home Mining Co. of that city have successfully undertaken the unwatering and operation of mines abandoned by others and their success is acting as a stimulus to others to do likewise.

THUS far England has made no material progress in the war in the Transvaal; if the reported purchase of Delagoa bay and adjacent territory from Portugal be verified it will give England an advantage she did not previously possess, as she can then successfully blockade that port and reach the capital of the South African Republic. London considers the cessation of gold production in the Transvaal but temporary.

THE annual gold output of California for the past thirteen years has not fallen below eleven millions of dollars, the lowest being in 1889, when it was $11,212,913. From that date it steadily increased until 1896, when it had reached $17,181,562. The following two years production dropped a little below sixteen millions owing to dry summer seasons, and the year just closing has suffered from like cause, but it is believed that the output of '99 will exceed sixteen millions. During the past three years a number of old mines, which have been idle for many years, have been reopened, and the year 1900 will find a number of them on a producing basis, their mills being about completed or building, and still other old mines and numerous new ones are being opened. Whether the rain and snowfall of this season will be sufficient to admit of continuous mining operations throughout the year no one can foretell, but in the event of abundant and continuous water supply California's gold production should pass the twenty million dollar mark.

A GREAT many of the failures made in mining are due to the inexperience of the managers. A thoroughly trained business man who has had no experience in mining or metallurgy could scarcely be expected to outline the plant, mechanical methods and operation of a large mining concern, yet there are those who essay such tasks, as many failures attest. Where companies or individuals are seeking mining investment, it will pay them well not only to employ a man to report on the property, but also to engage a competent engineer of known experience to arrange the mining and milling plant; and, when built, to place each department of the concern in charge of an experienced specialist, who has achieved success elsewhere. This will insure the best results; and, having done this, if the venture prove unprofitable, it will be known that it can not be made profitable by others. When this policy is pursued, failure rarely results. One had as well select a successful merchant to design and erect a suspension bridge or a modern steel building as to engage such a man—successful though he may be in commercial affairs—to plan the development and equipment of a mine or a metallurgical plant.

A Century's Progress.

For convenience and necessity man divides what is called "time" into arbitrary periods. However interesting it might be to speculate on what æons of "time" have elapsed since human records began on this planet, it is manifest that the existing arrangements of days and years is the most convenient, based upon the daily revolution of the earth and its annual journey around the sun. It is customary to group a hundred of these annual revolutions, calling such aggregation a "century," and to look upon any one of those as a distinct period. Thus we speak of the "sixteenth" century, the "eighteenth" century. While, of course, there is no such absolute entity, yet it is the general custom, as universal as the naming of the days of the week or of the months of the year.

Hence we speak of the "nineteenth" century, of which one year remains before it rounds to completion, Dec. 31st, 1900.

The industrial progress of this century far exceeds in extent and import that of any similar period in the history of mankind. Science is organized knowledge; all the progress of the closing century has been along scientific lines; this elapsing hundred years may be styled "the century of science."

It is by contrast that advance can be most strikingly shown. Contrast Spain of 1799 with Spain of 1899. She then held South America, the Antilles Central America, Mexico, California, Texas, New Mexico, Arizona. Now she holds feeble sway over only a part of the Iberian peninsula. Take the United States in 1799, a fringe of settlements along the Atlantic sea coast—now a world power bounded only by duty and destiny. In 1799 there was no such nation as Italy, or Germany. Russia was still a Tartar camp, Japan and China were sealed, Australia merely a geographical fact. That last country is worthy of notice. It took this nation 200 years to assemble a population of 3,000,000; Australia did it in sixty years. In the last few weeks the different provinces have organized into a commonwealth. In another century it may become a first-class power.

Turning from politics to literature—another domain of science—the spread of popular intelligence is in shining contrast to the cramped diffusion of knowledge in the closing years of the last century. The printing press has been among the most potent factors in the world's progress, and, as compared with its predecessors, the press of the nineteenth century has been as much of this century's creation as many other inventions during that period.

Geography and exploration gave general knowledge of the globe's surface; chemistry created a new earth; the ban was taken off the human mind; men dared to think and act upon their convictions; they ceased to believe that a thing was so merely because they were told it was; fear, that great deterrent, became less powerful; timidity vanished, and all things became possible to the scientist.

Coming from the abstract to the concrete, the recreation of the world since the days of our grandfathers is manifest. At the beginning of this century means of locomotion were the same as in the days of Herodotus. Sail on the sea and the horse on the land marked the same limits of speed in the early years of the nineteenth century, A. D., that they did in 1900, B. C. This little earth seemed but recently a mighty void; now steam has dwarfed space and electricity has annihilated duration of time in communication. Then savage and civilized alike had the same means of making fire, but one remove from the stone age; then steel was a costly secret product. Now the Bessemer process has made it cheaper than iron formerly was. It is a long step from Lavoisier and Priestley's discovery of oxygen to the liquefaction of hydrogen; from the courier horseman to the battlefield cablegram, which publishes, 10,000 miles away, the details of the fight before the fallen have grown cold in death; from the frigate Constitution to the battleship Oregon; from Sir Humphrey Davy's electric spark to the eighty-mile California transmission of 40,000 volts; from the six months ox team mail across the Continent to the instantaneous reproduction of human speech over thousands of miles of desert and mountain; from the dark, chain-barred, narrow street to the broad, brilliant thoroughfare; from the fanciful dream of the eighteenth century technologist to the fruition of the plans of the nineteenth century engineer.

"There is nothing new under the sun," was almost as true in the first year of this century as it was in the days of Solomon. It is not exaggeration to say that more material progress has been made in the last hundred years than in all the preceding ages of man. While this century was heir to all the ages, it was but a scanty heritage; what this century bequeaths to its successors is a legacy of surpassing value.

To merely index by name the scientific achievements of the century would take many volumes; in the limits of a short article nothing is possible but briefest indication of the patent fact.

Probably no part of the domain of scientific progress is more marked than that of mining and metallurgy. Prior to this century the science and art of mining did not exist. The nineteenth century sees the experiments, trials and successes of modern mining methods; it has also seen the advancement of the miner from a serf and savage to a prince of profitable industry; it has raised, dignified and ennobled the miner and made him at least the equal of any other human creature who stands erect and assumes the godlike attributes of freedom and a man. The mining and scientific world is the creature of the closing century. When this century began the miner was degraded; the mining industry did not exist. Now it is the great basic industry of the world, and the miner is known as a potent factor in general progress, and in all the arts of peace or war his influence is felt and his power recognized. There is nothing great in this universe but man; there is nothing great in man but mind, and the mind of the miner has made subject the earth's resources, has transformed the face of nature, has made possible the present wealth and advancement and pioneered the progress of the human race in every land.

In this country is this most manifest. The great western commonwealths are the miner's creation; this entire west half of America owes its existence to the miner, thus creating markets for the rest of the nation to the great common benefit of the entire country. Without attempt to create an atmosphere in which to flap the wings of fancy it is fair to assume that this substantial progress due so largely to the miner only manifests continuation on even a larger scale of such development in the century that lies ahead. The miner of the twentieth century owes a great debt to his predecessor of the nineteenth, which he can best discharge by keeping up the same rate of progress, for mining is a progressive science, and what has been done is but an index of what is yet to be done. In science the "impossible" is simply something that has not yet been made possible. Much that seemed impossible has been done by nineteenth century chemists, miners and metallurgists. There are existing unsolved problems in the mining and scientific world that will doubtless be solved in the twentieth century. Every such solution in the nineteenth has been productive of increased wealth and comfort and a better way of living. The man who works with hand or brain is everywhere better off to-day because of such scientific advance than were his predecessors a century ago.

And, after all, this is the great achievement, the one thing that will make this century memorable—that the spirit of scientific progress has banished the demon of fear which so long dominated the human mind; has multiplied the sources of human comfort and given the lowliest what monarchs of the preceding century could not enjoy. This scientific progress gives promise as certain as the morning sun of a coming noon of a prosperous human life to which this century was but the dawn.

Long ago science ceased to be content with tradition, and is recently successful in silencing old expressions of belief; hence science is a present vital force, believed in (because successful) by millions who formerly believed in finer forms of faith. Unlike the latter it never deceives or deserts its devotees, and its horizon constantly widens. The past is so narrow; the future grows broader and broader.

Concentrates.

ANNEALED silver is believed to be the best known conductor of electricity.

RICH ore and gangue once mixed can never be satisfactorily separated by sorting.

IN building the Chicago drainage canal 40% dynamite was delivered at 10½ cents per pound.

THE delivery of property to the agent who negotiates the purchases is delivery to his principal.

SULPHATE OF ZINC is always present in roasted zinc ore, ordinarily about one-half of one per cent.

A ½ H. P. engine and 12-inch propeller should propel a finely built 12-foot boat at an hourly speed of 5½ knots.

IN the absence of a specific agreement for compensation a partner is not entitled to be paid for his services.

MONO CO., Cal., was awarded the gold medal at the Columbian Exposition in '93 for the best marble exhibited there.

A WRITTEN order for merchandise that does not specify the time of payment is an agreement to pay cash on their delivery.

THERE is no law that requires a business man to put his name upon his place of business as a prerequisite to its full ownership by him.

THE General Land Office holds that an outstanding patent of the United States presupposes all legal requirements in obtaining the patent complied with.

COMMERCIAL tin is never pure. It will ordinarily analyze about as follows: Tin, 99.20%; lead, 0.39%; copper, 0.12%; iron, 0.08%; other elements, 0.21%.

JAVELLE WATER or solution of hypochlorites, with a preliminary application of dilute sulphuric acid, will obliterate ink writing without injury to the paper.

IT has been demonstrated by scientific experiment that there is proportionately more gold in the waters of Salt Lake, Utah, than in the waters of the Pacific ocean.

UNDERGROUND mining machinery and working methods do not seem to be the subject of such great and constant improvement as milling and surface appliances.

IN Swedish mines the blacksmiths who sharpen the drills are paid by the number of meters bored, and not by the number of drills sharpened, or by the day's work.

A DEAD black surface can be produced on either copper or brass by using ½ oz. platinum tetrachloride dissolved in 1 oz. of water. The metal surface must be chemically clean.

WHERE the diameter of a belting driven sheave is 24 inches and it is revolving 80 times per minute the 16-inch driven sheave will make 120 revolutions per minute.

THE best known method of preparing proof gold and proof silver appeared as an original article written by the assayer of the United States mint in the issue of July 16, 1898.

A TEST for gold in cyanide solution is to evaporate an assay ton of solution in a tray of lead foil, roll up tight when dry and scorify with test lead, cupel part and weigh the gold.

OXYGEN is an antidote for carbonic oxide poisoning, and a small cylinder of compressed oxygen could well be kept for such possible use wherever men are exposed to this noxious gas.

ARIZONA shows about as much metallurgical process as any mining region, more especially in the present economical and profitable handling of gold sulphurets and copper development.

THE exhaust of a gas engine can be made almost inaudible by connecting with an iron box or cylinder of three or four gallons capacity, with several diaphragms of ½-inch mesh wire cloth.

ALL government mineral lands in the United States are open to occupation and purchase by any citizen or by any one who has declared his intention to become a citizen of the United States.

THE Mount Morgan gold mine of Queensland has repeatedly been described fully and technically in these columns. Its maximum production was ten years ago—the 1889 yield being 258,950 oz. gold.

SCALE may be removed from drop forgings of iron or soft steel by using a solution made of (by volume) sulphuric acid, 1 part; nitric acid, 1 part; water, 2 parts, applied warm. Either the solution or the iron may be heated.

PLATINUM is twice as heavy as silver and nearly three times heavier than cast iron. It is almost as soft as copper and is as ductile as gold. It resists the strongest heat of the forge fire, but can be fused by an electric current.

FULLY two-thirds of the annual accidents to miners are preventable, and greatly so by training the miner to think and presenting the elementary principles of scientific mining—a part of the province and the purpose of this paper.

NEXT to osmium platinum is the heaviest natural body, its specific gravity being 21.5. It is the only metal that can be used to conduct electric current through the glass bulbs of incandescent electric lamps. It is softer than silver, does not oxidize, fuses at 3255° F., is usually found only in the metallic state, and of the six or seven tons annually mined nine-tenths comes from Russia, the most of the remainder from California.

TATTOO marks may be removed from the body (if it has been put on with carbonaceous matter) by being first well rubbed with a salve of pure acetic acid and lard, then with a solution of potash, and, finally, with hydrochloric acid.

AN 850-pound stamp, dropping 95 times per minute, requires 1.4 H. P. An ordinary concentrator requires about 1.25 H. P. Each stamp per hour requires from 65 to 75 gallons of water; each concentrator per hour from 180 to 275 gallons.

THE discovery of a vein in a tunnel, worked according to the laws of the United States, gives a right to the possession of the vein to the same length as if discovered from the surface, and a location on the surface is not essential to a continuance of that right.

PURE TUNGSTEN can be readily filed and forged, it welds easily, has no action upon a magnetic needle, and has a melting point higher than chromium or molybdenum. The pure metal is readily obtained by the reduction of tungstic acid with carbon in an electric furnace.

IT has long been known that gold can easily be induced to deposit from its mineral salt to the metallic state on any suitable base, such as iron sulphide. Thus, in non-gold bearing rock gold can be artificially introduced in interstices and on the face in such a manner as to seem a natural product—a sort of scientific "salting," so to speak.

AT any time prior to January 1st if a United States volunteer soldier filed with the County Clerk or Recorder in the county or district in which his mining claim is located a statement that he is in the service of the United States, no one can legally "jump" his claim, it being deemed by the Government that so far as his interest is concerned his assessment work is done.

"SEND me the best mining paper in the world for another year," is the terse comment of a Colorado mine superintendent with his renewal. "I get others free, but pay for yours, because it is the best," is the statement of a leading Montana mining engineer. "Yours is the only one that has the real mining flavor about it," is what an Arizona subscriber says.

AN immediate need of the California miner is an amendment to the State Constitution declaring mining a "public use," to the end that the owner of a mining claim may maintain proceedings in condemnation in order to run tunnels and secure other necessary rights of way. The State Legislature has tried to do this, but has been overruled by the State Supreme Court.

TO SUPPLY power for twenty-five days to a 1000 H. P. engine, requires: Good coal, 413 tons, having a volume of 14,800 cubic feet; compressed acetylene, 106 tons, having a volume of 9,890 cubic feet, or calcium carbide 295 tons, with a volume of 4,770 cubic feet. Calcium carbide is a concentrated form of fuel that when properly safeguarded will be of recognized economic value.

ANY one who has entered 160 acres of land as a homestead, and secured patent therefor, is thereafter debarred from taking another homestead, and any one who has entered 160 acres as a homestead and abandoned the same before making final proof, is thereafter debarred from making another entry, unless reasons for such abandonment, satisfactory to the department, are rendered.

AN unusually loud noise made by the exhaust pipe of a steam engine indicates the exhaust is not large enough, and that the escaping steam is exerting a wasteful back pressure against the piston. The resistance due to such back pressure so generated by a constriction of the exhaust may amount to four pounds on the square inch, sometimes occasioning a loss of power equal to 5%.

INKING rollers for printing presses that can be recast are made of the following proportionate materials: Best quality glue, 10½ lbs.; honey, 2½ gals.; purified India rubber dissolved in oil of turpentine, 1 lb.; Venice turpentine, 2 oz.; glycerine, 12 oz.; vinegar, 4 oz. Good rollers can be made of 2 lbs. glue and 1 gal. molasses, but they cannot be used over again, that is, recast.

"MINERAL WOOL" is made by blowing steam or air through melted iron slag. This slag is a sort of impure glass, and the "wool" is, therefore, a mass of fine threads of glass, interspersed, usually, with globules. Unless the material is carefully handled small particles will get under the finger nails or into the skin, causing irritation, and dust from it incautiously breathed may occasion hemorrhage.

AT 60 miles an hour the resistance of a train is four times as great as it is at 30 miles—that is, the fuel must be four times as great in the first case as it is in the other. But at sixty miles an hour this fuel must be exerted for a given distance in one-half the time that it is at thirty miles, so that the amount of power exerted and steam generated in a given period of time must be eight times as great at the faster speed.

IT has been decided by the Supreme Court of California—Altoona Quicksilver M. Co. vs. Integral Q. M. Co., 45 P. R., 1048—that under the Revised Statutes of the United States, Section 2342, providing that, when one holds and works a mining claim for the time prescribed by the statute of limitations for mining claims of the State in which it is situated, he may obtain a patent "in the absence of any adverse claim." Such possession and working for the statutory period, before the adverse right exists, is equivalent to a location under the acts of Congress.

REFINED petroleum is sometimes used with good effect in boilers to prevent scale forming material attaching itself to the boiler. It appears to rot the scale, causing it to form a soft mud, which can be blown out or washed out. Crude oil should never be used, as it gives off inflammable vapors and leaves a tarry residuum, which may form with the scale a tough greasy deposit on the plates over the fire and cause them to burn out.

EXCEPT in the top logs of a tree, or very small and young timber, the heart wood is, as a rule, not as strong as the material farther away from the heart. This becomes more generally apparent in practice in large sticks with considerable heart wood cut from old trees in which the heart has begun to decay or been wind shaken. Beams cut from such material frequently season check along middle of beam and fail by longitudinal shearing.

DURING the year '99 there have appeared in this paper 1131 illustrations—half-tones, wood cuts, zincos, etc., most of them original, many of them from photographs specially taken or drawings specially made for the purpose. It is believed that in point of number this amount of illustrations is unequaled by any similar journal anywhere in the specified time. As to their character and quality, the commendatory letters weekly received indicate their favor in the mining world.

URANIUM is used in the manufacture of gun metal, in producing an oxide imparting fluorescence to glass, and as a pigment in decorating china. As uraninite or pitchblende it occurs mostly associated with lead, silver, sulphur and arsenic; the pure mineral contains only the oxide of a golden yellow color. The metal itself is white, malleable, a little softer than steel, fuses at a cherry-red heat, and tarnishes slowly. It is found in paying quantities in Gilpin Co., Colorado.

GOLD COIN that has lost less than one-half of ten per cent by wear is received at any United States mint or depository at its full value; any gold piece light one-half of one per cent or more is received by weight only. United States assay offices advance 90% on the gold left there, and when the actual value is determined settles by check on the treasury. American, French and German gold coin is nine-tenths fine, British eleven-twelfths. All settlements are made on the basis of "fine gold."

A LODE may be defined as a zone, belt or body of quartz or other rock lodged in the earth's crust, and presenting two essential and inherent characteristics, viz.: 1. It must be held in place within or by the adjoining rock; and, 2, it must be impregnated with some of the minerals or valuable deposits of which cognizance is taken in the Federal statutes applicable thereto. The finding of such a lode is a discovery within the meaning of those statutes, and will authorize the location of a lode claim.

ROSSLAND, B. C., ores are chiefly pyrrhotite, with a diorite gangue, and sometimes pyrites, marcasite, chalcopyrite, mispickel, magnetite, with quartz and calcspar intermixed. The ore for assay is crushed to pass through a 100-mesh sieve, and a flux used made of 6 lb. soda bicarb., 4 lb. litharge, 2 lb. borax glass, or 6 lb. soda bicarb., 4 lb. 13 oz. litharge, 3 lb. powdered borax. A 20-gramme crucible is used, and for an assay half an assay ton of ore and two assay tons of the mixture, adding nitre and silica when necessary.

PARTINIUM is the latest alloy, being aluminum alloyed with tungsten. The resultant metal is claimed to have a specific gravity of 2.89 cast and 3.09 rolled; the elongation varies from 6% to 8%; its tensile strength is given as from 45,500 to 52,600 pounds per square inch. Dr. Mach reports an alloy of aluminum with magnesium. A 10% magnesium alloy resembles zinc, a 15% brass, and a 25% a compound bronze. It is stated that this alloy can be soldered, makes good castings and will resist the action of the atmosphere. It can be worked as well as brass, and is even lighter than aluminum.

ON the last four pages of this issue appears an index of the contents of this paper for the preceding volume of six months of 772 pages. The value of such an index is sufficiently manifest to need no notice, but it is referred to because of its time-saving property. The editorial office is in constant receipt of requests for articles on some particular subject of mining or metallurgy that appeared at some date indefinitely designated. It would save time if the questioner had the index for reference. Thousands of our readers annually or semi-annually have their volumes bound, but thousands more do not, and it is the latter class of readers who are urged to preserve their papers and have them bound. In no way can a cheaper or more valuable compendium be secured of everything that any one connected in any way with mining and metallurgy wants to know. The paper for the year 1899 contains 1460 pages—sent postpaid, weekly, for $3—and its contents are of constant value. The attention of those who may have overlooked this important matter is respectfully directed to the scope and character of the contents of this paper as shown in the index on pages 769, 770, 771 and 772 of this issue. And those who are not regular readers are also respectfully informed that for $3 they can receive weekly, postpaid, fifty-two numbers of this paper, with just twice the amount of valuable data as is indexed for this Volume LXXIX, the last half of the fifty-two issues of 1899.

The Cripple Creek Gold Fields.

NUMBER III.

Written by T. A. RICKARD, State Geologist of Colorado.

THE TREATMENT OF THE ORES.—Most of the gold of commerce has been won from simple ores, those in which the precious metal occurs in a native condition encased in quartz. Stamp milling, accompanied by amalgamation, is the process ordinarily employed to reduce them. Another type, of greater importance every year, is represented by the ores in which the gold occurs intimately associated with iron pyrites, but so minutely disseminated as to be rarely visible even under the microscope, and therefore inviting the supposition that it is chemically combined in a condition as yet not understood. A modified form of stamp milling is employed for some of these ores, but for the most part they afford a field for great diversity of practise, including chemical and smelting processes of many kinds. The third type of gold mining, and in many respects it is the most modern, is represented by ores in which the gold is known to be chemically combined in definite proportions with the element tellurium. Several mining regions produce these telluride ores. Transylvania in Europe, Colorado in the United States, and West Australia in the Antipodes are the principal localities. The new phases of metallurgical practise inaugurated by the recent discoveries of telluride ores have given a great impetus to this technical science, the aid of which is now thoroughly appreciated by the miner and capitalist alike.

The changes which have occurred since 1891 in the treatment of the ores produced by the mines of Cripple Creek are a fitting illustration of the fact that the development of metallurgical practice, like all true progress, is a slow evolution from simple beginnings to a full fruition. The chlorination process was first applied in 1857 by Deetkin in California. It took a quarter of a century of patient endeavor to place it on a safe commercial basis. McArthur and Forrest's application of potassium cyanide was used at the Crown mine in New Zealand as early as 1889, but the chemical reactions which occur in the cyanide process are still incompletely understood to-day, and the development of this method of ore treatment cannot be said to have ceased.

The first ore broken at Cripple Creek was carried on the backs of prospectors to Colorado Springs or Florissant, and forwarded to the smelters of Pueblo and Denver. Subsequently larger lots in wagons were similarly consigned, but the costs were high and the proportion of ore capable of yielding a profit under such conditions was small. The miner felt the necessity of extracting the gold by milling it nearer the place whence it came. He fell back on his previous experience in other localities and put up a stamp mill.

The stamp mills were built on the model of those of Gilpin county, the oldest gold mining district in Colorado, and therefore had light stamps, 400 to 500 pounds; a slow drop, 30 to 35 per minute; a long drop, 17 to 20 inches; and a deep discharge, 12 to 15 inches. The ore was broken by hammers and fed by hand into the batteries, except in the case of the Rosebud mill, which was provided with rock breakers and automatic feeders. Amalgamation, on copper plates, both inside and outside of the mortars, followed the stamping.

Ten mills, with a total of 270 stamps, were built. In April, 1897, only 50 out of this number were dropping, and to-day all are idle, having been replaced by large leaching plants.

The first ores came of course from the surface, or near it, and were oxidized. The gold occurred in a free state, having been liberated from its combination as a telluride. It affected the milling seriously, because gold having this origin is coated with a film of the telluride of iron, which is a serious obstacle to amalgamation. The extraction in the stamp mills was soon found to be low, and attempts were made to remedy the incompleteness of the treatment by employing bumping tables and Frue vanners to arrest the gold escaping amid the tailings. When this failed blankets were added, and these in time became a recognized addition to the mills. Even then the best extraction barely reached 50 per cent of the gold in the ore, as shown by assays, and a great deal of good ore was wasted in an ineffectual effort to win a profit. The usual rate for treatment was $3 per ton, delivered at the mill.

Early in the development of the district there came men who recognized the unsuitability of stamp milling for the treatment of telluride ores, and in 1893 W. S. Morse of the Russell Lixiviation Works, at Aspen, made the experiments which formed a basis for the erection of a chlorination plant built by Edward Holden, at Lawrence, two miles from the town of Cripple Creek, at the close of the same year, 1893. Holden purchased an old stamp mill at Lawrence and altered it to a chlorination plant, which, although it was crude and incomplete, successfully demonstrated the suitability of the process employed. This was barrel chlorination on the model of the practise of South Carolina and Dakota. The first well-designed plant, using this process, was completed in January, 1895, and had a capacity of fifty tons per day.

The cyanide process had been already tried, with results not wholly satisfactory, because of the variable composition of the ores and the inexperience of the men who organized the first milling enterprise. The local company built a cyanide mill of forty tons capacity at Brodie, in 1892. It was remodeled in 1894. In 1895 the Metallic Extraction Co.'s mill was built near Florence. It has been enlarged from time to time and now has a capacity of 8000 tons per month. The cyanide process made less progress than barrel chlorination, so that while two mills now employ this method, six use the other. The Colorado-Philadelphia chlorination mill was built at Colorado City in 1896. It has a capacity of 6000 tons per month. The El Paso mill, with a capacity of 3000 tons per month, was built at Florence in 1897. The Gillett mill doubled its capacity in 1898.

THE MILLS OF THE CRIPPLE CREEK DISTRICT.

Name.	*Location.*	*Date of Erection.*	*Capacity per day. Tons.*
Chlorination—			
Lawrence	Cripple Creek	1893	30
Gillett	Gillett	1894	80
Colorado-Philadelphia	Colorado City	1896	200
El Paso	Florence	1897	100
Colorado	Arequa	1897	75
Kilton	Florence	1897	50
Cyanidation—			
Brodie	Cripple Creek	1892	60
Metallic Extraction	Florence	1895	270
Page	Florence	1896	20

The Lawrence mill was burnt down in 1896, and the owners of it built the El Paso, at Florence, immediately afterward.

The trend of events indicates that the future growth of the milling practise will favor an increase in the chlorination mills rather than in cyanide establishments. At first, cyanidation was conducted upon raw ores, but this gave good results only when they were oxidized. Roasting is now considered a necessary preliminary, and it has removed the advantage which in the earlier years of the district cyanidation possessed over chlorination, a process always preceded by the roasting of the material subjected to it.

The chlorination practise of the district has undergone no radical changes during recent years. It is typical barrel chlorination. In the matter of the recovery of the gold from solution there is a difference, the Gillett mill, for instance, using charcoal as a precipitant, while the Colorado-Philadelphia plant uses sulphuretted hydrogen. The mills at Florence enjoy an important advantage in the use of oil residuum instead of coal in their roasting furnaces. The residuum comes from the distillation of petroleum and costs about $1 per barrel now, although a few years ago the price was much less. There is an increased demand for it because it affords a fuel peculiarly adapted for roasting, permitting of a nice and quick adjustment of the temperature of the furnace.

During recent years the metallurgical practice in the chlorination plants has remained fairly constant, the improvements being in the direction of large capacity and better mechanical arrangements rather than in any changes in the chemical department.

The cost of treatment at one of the larger mills, having a capacity of 3000 tons per month, is, per ton of ore treated:

Labor and salaries	$1.20
Chemicals and supplies	0.78
Fuel	0 65
Wear and tear	0.55
Incidentals	0.28
	$3 46

Add to this interest on investment, general expenses and deterioration of plant, and the total costs will approximate $4 per ton. The above figures are based on chloride of lime costing $2.40, and sulphuric acid $1.25 per 100 pounds. Roasting alone costs from 45 to 60 cents per ton. This item has grown as the mines have become deeper, the sulphur contents having increased from an average of 1 per cent in 1895 to 2½ per cent at the present time. The improvements in other departments of the milling have more than balanced this change.

Two interesting features of Colorado practise have been brought out by the treatment of the Cripple Creek ores, the first being the greater use of mechanical roasters, such as the Pearce, Ropp, and other furnaces; and, secondly, a modification of the methods employed to sample the ores. The material produced by the mines is, as compared with the typical ores of other districts, high grade and variable in its gold contents. This variability is due to its mode of occurrence as a telluride in minute seams irregularly scattered, and, of course, extremely rich, rendering it difficult to apply the law of averages and obtain a satisfactory sample of a large lot of ore. In its passage from the hands of the miner to those of the smelter, the ore usually goes through the sampling works, the owner of which may be considered a broker whose business it is to see that both parties in the transaction get those values in the ore which one sells and the other buys. It was soon found that Cripple Creek ores were most unsatisfactory to sample, the results being unreliable and erratic. This became remedied in process of time by crushing a larger part of any particular lot of ore and taking the pains to pulverize the final pulp sent to the assayer to 100 mesh (that is, 10,000 holes per square inch), instead of 60 or 80 mesh. It has been found that, on account of the variability of the ore, it is good business for the mine owner to let all his product pass through the sampler on its way to the smelter, and this has led to the erection of half a dozen sampling works in the Cripple Creek district. The usual cost of sampling is 75 cents per ton.

(TO BE CONTINUED.)

Electroplated Steamships.

The Navy Department has received a full report showing the record of the American steam tug Assistance, which for four years has been used as an experiment in electroplating with copper as a method of protecting iron ships' bottoms, says the Journal of the Franklin Institute. The iron plates of this vessel were covered by a thin copper coating applied by means of electricity. The Assistance, after being electroplated, was launched in Jersey City on February 22, 1895, and from that time until a few days ago, she was constantly in the water, and no attempt was made to clean her bottom. Upon being hauled out of the water at the Norfolk Navy Yard the craft was found to be remarkably clean. The bottom was entirely free from barnacles or marine growth of any kind. For the year just past she has been towing in the lower waters of the Chesapeake, and while other tug boats made it a practise to haul out to clean bottoms every four weeks the Assistance remained constantly at work.

As a result of the successful outcome of the Assistance test, it is thought to be quite probable that the Navy Department will order the electroplating of the bottoms of the new warships now building. The electroplating process can be carried out on the plates before they are fitted to the frames. In this process the copper is, figuratively speaking, fused into the steel plates to a depth of about 1-32 of an inch. The time required to treat a plate is about forty-eight hours.

The cost of applying the copper in this manner is said to be about $3 per square foot. The cost of the method of sheathing now commonly used is about $5 per square foot. By sheathing is meant the English system of planking the outer skin of an iron or steel vessel, countersinking the boltheads, and then fastening the copper plates to the wooden planking after the manner followed on wooden ships. If the copper plates were applied directly to the skin of an iron or steel vessel galvanic action would result, hence the necessity of the interlayer of wood. The disadvantages attending sheathing are the increased weight of the hull and the disturbance of a vessel's speed lines.

For a vessel 250 feet long there would be required about twenty tons of copper, by the electric process. If covered by the old style sheathing of wood and copper the added weight is more than 100 tons. It has even been found that the use of wooden sheathing between the iron plating and the copper sheathing forms a galvanic pile, as the wood in time becomes water-logged, thus establishing a current between the copper and the iron.

If the process develops no unexpected drawbacks, the value of this comparatively simple method of overcoming one of the most serious difficulties in iron and steel vessels, can hardly be overestimated. It is claimed that as much as $20,000 is yearly expended by various ships in the transatlantic trade as the result of overcoming the added friction caused by fouling. To dock one of the big ships of several well-known lines only twice a year, at $7,500, would bring the total loss per craft up to $35.000 as a yearly penalty for unprotected bottoms. The frictional contact of water against copper is considerably less than against iron, as a painted surface can never be made as smooth as a burnished copper surface. An iron vessel with a speed of twenty knots per hour, if coated with copper, would have, it is calculated, a speed of twenty-one knots per hour.

IN the Carclaze mine, near St. Austell, the granite is traversed by thin strings of quartz and schorl, which carry tinstone. They strike in all directions. The upper portion of the deposit was greatly weathered and decomposed, but as it was quarried away it became harder. It is a typical stockwork, and the strings of quartz and schorl seem to have been formed almost contemporaneously with the granite. Formations resembling this are found in other parts of Cornwall. Near Bodmin the granite is traversed by small stringers, which vary from mere threads to a width of 2 or 3 inches. They are rarely more than a couple of feet apart, and many preserve independent courses for considerable distances; but sometimes they branch out in various directions, or intersect and form floors and lenses. In the Carrigan mine a dyke of greisen 150 feet wide occurs, and is intersected by a network of quartz and schorl strings carrying iron, copper, arsenical pyrites, fluorspar, and about a quarter per cent of cassiterite per ton.

Laccolites and Their Relation to Ore Deposits.

Written for the MINING AND SCIENTIFIC PRESS.

One of the most interesting features in geology is the occurrence of sheets of intrusive, eruptive rock intercalated with the strata of sedimentary beds. In most cases these igneous masses were ejected from below as a central mass or core, breaking through underlying old crystalline formations, reaching overlying, non-conformable, horizontally-disposed sedimentary beds, and uplifting them en masse in the form of a dome, the eruptive material being ejected between the sedimentary rocks and the underlying crystalline terrane. Often such uplift of the sediments causes fractures at one or more places in the roof of this dome-like structure and the molten magma ascends to higher levels, crushing, upturning and tearing the rocks and sending out sheet after sheet from the uncleal mass into the parted sedimentary beds.

In another instance the intrusive rock may not disturb the sedimentary rocks at their point of contact with the older underlying formation, but burst through to a higher horizon and send out the first sheet between the strata of the sedimentary beds where they part most readily, and often this occurs between two rocks of unlike character, as limestone and quarzite. Fig. 1 represents this occurrence.

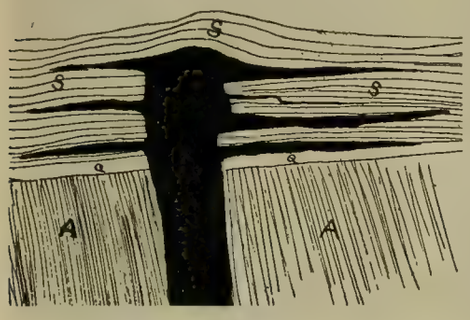


Fig. 1.—A Sheeted Laccolite.

A.—Algonkian. Q.—Quartzite. S.—Sandstone.

A third phase of the occurrence of these peculiar intrusions of eruptive rock is their accumulation between the parted beds of the sedimentary formation in the form of a great dome-shaped mass sending out no flat sheets, though sometimes small dykes are thrust upward into the fissures formed in the overlying strata by their uplift and consequent tension. See Fig. 2.

These intrusions of molten magma are called laccolites, of which the latter is the typical illustration, and they form a prominent and important feature of the geology of portions of the Rocky Mountain system.



Fig. 2.—Typical Laccolite.

Attention was called to this form of eruptive intrusion by G. K. Gilbert in his monograph on the Henry mountains of Utah, published in 1877.* Gilbert's explanation of the facts as he observed them in the Henry Mountains is that "in a region of extensive sedimentary beds lying horizontally molten magma ascended from great depths to various horizons in the complex of strata, where they spread out as sheets or in larger dome-shaped masses, more or less pronounced, lifting up the load of sediment above them. By expansion or stretching the sediments remain unbroken above these laccolites, while in other cases a rupturing of certain beds took place and the fissures were filled with magmas, forming dykes, usually of limited extent."

In the first observation in a field in which a laccolite has performed an important part in the geological structure the observer may reach the erroneous conclusion that certain sheets of igneous rock were the result of overflow from a volcanic outburst (though failing to find the crater) and that the sheets were contemporaneous in origin with the laying down of the strata. That such a condition may exist cannot be disputed, but where such occurrences are found in the Rocky Mountain region and as far west as the Great Basin it is fairly safe to assume that the intercalated sheets owe their existence to a laccolitic intrusion.

Erosion usually has greatly modified the topography of the country after the injection of the laccolite and only remnants of it may exist. The co-extensiveness of sheets may be interrupted by the erosion of canyons and the uncleal mass may lie buried deep beneath the overlying sediments of a mountain.

Laccolites are of many sizes, some being relatively small, the central mass being but a few feet in extent while the sheets penetrate but a few hundred feet from the central core. Others are of vast magnitude, the uncleal mass constituting a great mountain, and the horizontal sheets radiating from it reaching many miles on all sides.

Some of the important localities in which laccolites occur beside the Henry mountains are the following: The West Elk mountains in Colorado, of which Mt. Marcellina is an important example, though isolated from the main Elk mountain range; Mt. Wheatstone, Mt. Axtell and the Anthracite range are also included in the laccolitic mountains of the range; Crested Butte is the most easterly of the West Elk group, and is a typical laccolite, as is also Gothic mountain. Seventy miles southwest of the West Elk group are the San Miguel mountains, also in Colorado, and these include a group of laccolitic uplifts. Twenty-five miles further south the La Plata mountains forms another group of similar geological interest. Ute Peak, in El Late mountain, is a laccolite.

In Utah, close to the Colorado line, are the La Sal mountains, to which attention has recently been drawn by reason of important copper discoveries. The group comprises some thirty peaks, the summits of which range from 11,800 to 13,000 feet altitude. They constitute an isolated group in the high plateau country. In this group no laccolites appear on the exposed slopes of the canyons, but it is the belief of geologists that the uplift is due to the presence of laccolitic intrusions at greater depth. The Mosquito range in Colorado lies between South Park and the upper portion of the Arkansas Valley. In this region are the mining districts of Leadville and Ten Mile, and in this section laccolites are important factors in the geology of the region, as also at Aspen in Pitkin county.

In the Black Hills of South Dakota, in Lawrence county, are found numerous laccolites, the largest and most important being that of Terry Peak, the dominant mountain of the northern hills. Many small laccolites occur in this region to which reference will be made later.

In Montana, in the Yellowstone Park and in the Little Belt mountains, are occurrences which have been referred by United States Geologists J. P. Iddings and Waldemar Lindgren to laccolitic uplift.

In addition to the several instances cited are numerous others which may or may not be of true laccolitic type, they not having been determined owing to lack of sufficient exposure or in some cases to lack of careful study. Spanish Peaks, Colo., are supposed to be of laccolitic origin, but this has not been positively determined.

There are other forms of intrusive uplift which do not assume the distinctive laccolitic type. In the Black Hills region in South Dakota and Wyoming are found a number of these postular outbursts, the character of which indicates that while possessing sufficient force to raise the overlying sedimentary beds—several thousand feet in thickness—they did not assume the laccolitic type by reason of lack of force, or possibly the fluidity of the magma and the duration of the period of uplift and injection did not favor it. At all events these intrusive masses now form prominent landmarks at various points on three sides of the Black Hills, being separated from the hills proper by several miles of plain or low-lying foothills. The most important of these are Bare Butte, a few miles northeast of Sturgis City; Crow Peak, six miles west of Spearfish; The Devil's Tower on Belle Fourche river, northwest of the Hills; Sundance mountain and Inyan-Kara mountain on the western side of the Hills in Wyoming.

The geological occurrence of each of these is essentially similar, consisting of rudely circular or oblong, intrusive mass of eruptive rock of trachytic character thrust upward beneath the sedimentary beds of the Cambrian, Carboniferous and Jura-Trias. Crow peak is nearest the Hills and here are found the Cambrian quartzites and sandstones and Carboniferous limestones reared upon the shoulders of a great mass of trachytic rock. This occurrence is illustrated by Fig. 3. The other peaks lie at greater, though varying distances from the Hills, and the paleozoic rocks are not exposed, but the series overlying them—the Jura-Trias and Cretaceous rocks are found encircling the volcanic uplift from which the sedimentary beds dip away on all sides toward the surrounding plains. The most remarkable in appearance of these several hills is the Devil's Tower. It stands back about two miles from the Belle Fourche river on a comparatively level table land. The eruptive neck rises with nearly vertical sides 800 feet above the plain, is nearly circular in form and is striated from top to bottom by the columnar structure assumed by the rock—sanidim-trachyte. The sedimentary beds (Jurassic) through which it has broken are but slightly uplifted and the weathering of the mass of eruptive rock has resulted in the accumulation of a deep talus about its base. From a distance it greatly resembles the stump of a huge tree. Bare Butte, near Sturgis, viewed from the eastward, has the shape

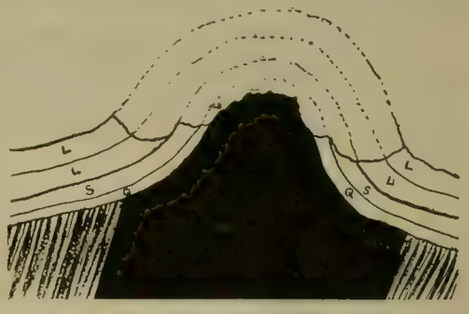


Fig. 3.—A Postular Uplift.

Q.—Quartzite. S.—Sandstone. L.—Limestone.

of a haystack and may be seen over a hundred miles, and few who for the first time have seen this odd hill, approaching from the direction of Pierre, have not mistaken it for a haystack on a neighboring ridge, though 100 miles distant.

Inyan-Kara peak is similar to Bare Butte, but the central eruptive core has lifted the sediments evenly on all sides and erosion has resulted in cutting out a circular valley around the core, between it and the harder rocks of the sedimentary beds lying upon its flanks. In form it resembles a cinder cone within the crater of a volcano. A crevasse eroded on one side of the sedimentary uplift affords drainage to the circular valley.

It has been recently reported that valuable mineral deposits have been discovered on Inyan-Kara Peak, but the report lacks confirmation.

From the above description the distinct difference between these postular uplifts and the true laccolite will be readily understood. Undoubtedly the former, like the laccolites, were erupted prior to the erosion which has swept away the Tertiary, Cretaceous and earlier formations down to the Carboniferous. There is no evidence that the eruptive material ever reached the surface and outpoured upon it. Indeed, such evidence as can now be studied tends to the belief that the eruption was wholly subterranean, and that the sedimentary rocks extended over the uplift in the form of a quaquaversal fold. It seems reasonable to assume that these uplifts resulted in a greater or less fracturing of the rocks forming the summits of the domes, and that as a consequence they have been eroded, exposing the uncleal cores and the sedimentary beds upturned about them. W. H. S.

(TO BE CONTINUED.)

*U. S. Geog. and Geol. Survey of the Rocky Mountains

World's Production of Gold and Silver.

The report just issued by the Director of the French Mint contains some important facts on the coining of gold and silver, reports John C. Covert, United States Consul. The production of monetary units in the Mint of France has been steadily increasing for a number of years. In 1894, the number of pieces of money coined for France, her colonies, and foreign countries was 46,000,000; in 1895, 54,000,000; in 1896, 62,000,000; in 1897, 111,000,000; and in 1898, 98,000,000. The Mint can double this output. Russia alone has had 82,000,000 coins struck in France since 1896. The French Mint has also done work during the past two years for Indo-China, Tunis, Ethiopia, Morocco and Bolivia.

The quantity of gold produced during the last fifteen years is placed at 13,000,000,000 francs, or, in round numbers, $2,500,000,000, of which amount the Transvaal is credited with a production of 2,000,000,000 francs ($386,000,000). It is believed that not less than 200,000 pounds have been used in the arts. The weight of gold struck annually into coins varies between 660,000 and 1,320,000 pounds. The quantity recoined is to be added to this. But in spite of the increase in the output, a well-known economic writer declares that the war in the Transvaal will cause a scarcity of the metal in many commercial centers, the result being a great falling off in the quantity used in the arts.

The report notes a constant increase in the output of silver. The writer just quoted, in speaking of this, says:

"No one can see where the masses of silver are going which continue to pour out upon the world, or where they are to be used. The old 15½ standard is now but a myth, and the price has fallen from 220 francs for 1 kilogram ($42.46 per 2.2046 pounds) of fine silver to 100 francs ($19.30). In the presence of such a decrease in price, one would expect a diminution in production; but the case is just the reverse. The fact that the yield steadily increases proves that prevailing rates are remunerative."

The production of silver has risen from 3,000 tons

in 1888 to 6,000 tons in 1898. Of this, it is estimated that 2,250,000 pounds are absorbed in the arts and general industry, divided among countries as follows: In the United States, 580,000 pounds; in France, 330,000 pounds; the same in Germany and England; in Russia, 210,000 pounds; and in Austria-Hungary, 115,000 pounds.

It is asserted in the French economic journals that cargoes of silver go to the Orient every year, where it is in all probability hoarded in ingots, the Mints of Calcutta and Bombay being closed to it. Specialists estimate the amount thus disposed of at about 2,250,000 pounds. The calculations leave 2,100,000 pounds to be accounted for.

The Petrified Forests of Arizona.

The petrified forest of Arizona has in the past few years attracted much attention from geologists and others interested in kindred phenomena of nature, says the Flagstaff Sun.

There are several thousand acres of this forest scattered over the sand deserts of northern Arizona, in the vicinity of Holbrook. In the last year the railroad company has established a station called Adamana, and from that place the traveler can reach the wonderland by a six-mile drive, though the greater part of the forest is twelve miles to the south of the station.

At what is known as the first deposit several sections of land are covered with the fallen trunks of the trees, checked and broken, and up on a bluff of clay, 100 feet or more from the valley below, is the petrified tree forming a natural bridge across from one edge of the bluff to another 50 feet in length. The earth has gradually washed away from beneath its center, leaving both ends resting upon a sandstone formation. Its trunk and one end may be followed for some distance with the eye until it is completely covered by the earth. Near the west end the great log is cracked all the way through, only its weight keeping it in place. A cowboy recently rode his pony across the bridge and the weight did not affect it in the least. It is one of the most perfect and the largest sound log in the forest, being over 5 feet through at the butt.

Most visitors are taken to this forest only and do not see the larger forests to the south, which have been uncovered by erosion. The greater part of the wood at the first deposit is badly shattered and in small pieces of a dull red color.

At the second deposit to the southeast are found many large trees in a better state of preservation, having apparently been more recently exposed to the elements. They are broken into sections of from 5 to 6 feet in length and not so completely shattered as at the first deposit. There are several hundred acres in this deposit, though pieces of petrified wood may be found for a distance of 200 miles east and west, all apparently being a part of the same forest, but not all exposed as are the three deposits.

The third deposit is the largest of them all. It is mainly in the bottom of a canyon several miles in width; here are thousands upon thousands of the agatized trees lying half buried in the sands, exposing untold beauties to the eye of the traveler. Bright pieces are scattered in all directions exhibiting all the colors of the rainbow; pearly crystals, some pink, others white or delicate blue, gleaming in the sunlight from the hearts of old trees that have laid beneath the earth for years; other broken sections of huge trunks show beautiful combinations of colors, including red, green, velvety reds, pinks, pearly white, dark blues, yellow streaks circling the entire trunk; the bark is still perfect, making a delicate framework for the blended colors within.

You may walk in places for 100 yards upon the trunks of the trees. The limbs seem to have been either rotted or washed away before petrifaction, as but few of them can be found. Only the largest and most hardy remain to tell the story of long ago. The entire country surrounding has the appearance of having been at one time the bottom of a large body of water, for petrified bones and shells are found in great numbers here; in places the trunks of trees may be seen protruding from the broken banks of clay 20 feet under earth and beneath a ledge of sandstone.

The canyons surrounding them are called the "bad lands," as they are in truth. Not a vestige of herbage grows upon these hills that form the sidewalls of the great park. They are a dull grayish color, and are washed round at the top with great gullies and seams cut through their sides. On the top of many of them are large boulders clinging to a slender foundation of earth underneath; others standing like the Egyptian Sphinx, with their narrow neck and bulging domes, saved from being toppled over into the canyon below by the protecting pillar of earth beneath. The rim of the mesa surrounding them has washed away and great rocks have tumbled down in profusion all along its sides.

The large trees are broken in most instances in blocks from 2 to 3 feet in length and as round as a grindstone, and look as if sawed into lengths for stove wood. The wood greatly resembles the pine here, with some few trees of a dull gray color that are taken to be cottonwood or aspen. Pieces are found partially petrified, but these lack the colors of pieces thoroughly petrified, and are dark and charred as if partly burned.

Utilizing Coal Waste.

All over this country wherever hard or soft coal is needed are great heaps of waste. They contain possible wealth, just as mine tailings contain values when properly treated. Numerous attempts have been made to put the coal dust in those waste heaps in shape to burn, and in some cases a degree of success has been reached. A California company has successfully experimented in San Francisco and Los Angeles, and has produced little chunks of compressed coal that burn readily. For sixty years efforts have been made to produce a "briquette" in every way satisfactory, and over a hundred patents have been taken out. The fuel question is universally an important one, and though in the soft coal regions coal can be mined and delivered for $2 per ton, yet for steam purposes competitive manufacture requires fuel at a much lower figure. In Europe the briquette manufacture is a great industry, especially in France, Belgium and Germany. About 20,000,000 tons were made in 1898. The copper smelting works of the Boleo Company, Santa Rosalia, Lower California, are supplied with fuel by German made briquettes. In this case bitumen is used as a binder, occasioning smoke and dirt. An American company is making briquettes at Chicago under the Corning patent, and claim to be able to furnish these little oval balls of compressed coal, smokeless and readily combustible, at a price that should insure their general use as a cleanly and economical proposition. This week a small box of them received by express from New York city was used for fuel in this office. The briquettes burned readily, with little ash, and appear to be excellent fuel in every way. They are made of 93 per cent anthracite and bituminous coal, 7 per cent binder. They weigh 5½ ounces each, there being 5840 in a ton. They retail for $4.50 per ton in Chicago. At that figure there ought to be money in it for the manufacturing company and a great saving for consumers. Millions of tons of this coal waste can be bought at the mines for 10 cents per ton in Pennsylvania, Ohio and Illinois. Wherever heat is required, whether for steam, cooking or warmth, there is a tremendous daily demand for a cheap fuel free from fumes. This demand would seem to be supplied by the Chicago Briquette Coal Company. The accompanying illustrations give graphic idea of the manner of manufacture and use. The subject is one of considerable economic interest.



Crushing Machine—For Breaking "Run-of-Mine" Coal.



Mixing and Weighing Room

A Theory of the Genesis of Ore Deposits.

TO THE EDITOR:—In these days, when the United States Geological Survey is gathering and compiling such a mass of valuable information concerning the rocks and mineral resources of the United States, it seems a pity, from a prospector's point of view, that there is no rational system of geological nomenclature in use. It would help to avoid a great deal of confusion if a system of geological names after the plan of modern chemical nomenclature could be devised and adopted, for with a few years more of such progress as geologists have been making recently it will be desirable that geological writers include with each paper a glossary of the terms used therein, according to their understanding. If the science is to be of any value to the nation at large its value must lie in enabling men to calculate, more or less correctly, as to character and constituents of underlying formations. To obtain the best results the science should be stated in such form and terms that men of fair intellect and an average education would be able to understand, after a few weeks of study, a scientific description of the formation in their own neighborhood, at least.

A classification of rocks according to the mode of their formation and the source whence their materials were derived would also be of value to well-informed prospectors. To the gold hunter of the present day it is a small matter whether a certain area of slate and schist was formed in the Cambrian or the Cretaceous age; but a more important question is, Was it made from glacial mud, river silt, decomposed pumice, or otherwise?

Other problems of far greater importance are: What is the cause of volcanic action? Whence is the force derived, and how applied to produce such varied effects as the mountains bear witness of? For it is only by a correct solution of these problems that we may hope to explain the genesis of metalliferous veins and deposits, as these, with exception of the sediments, are invariably closely connected with the records of eruptive action or allied movement. Flowing springs of water are frequently found on or near the summits of high mountains, much higher than any probable source of water supply. What keeps them flowing? Not having been able to find a satisfactory solution in print, I would suggest a line of investigation to such as are in a position to study the matter, faintly hoping that it may lead to a fair understanding of the subject in due time.

The force called gravitation is directly and indirectly the cause of all geologic phenomena of the earth; the sun and moon being the engines of construction and destruction of the rocks, water being the implement through which the force is mainly applied.

Recent press reports give an account of a movement taking place along a fault plane in Butte City, Mont., whereby walls were cracked and buildings wrenched, which serves to show that such movement is possible at any time, though not frequently observed.

Every miner is familiar with the polished and striated faces of fault planes and sheared zones in the rocks of nearly all mines, where the rock has been crushed and moved in a manner that must have been accompanied by great friction and much consequent heat, and it is on such record that this theory of igneous action is based.

Given a fault plane where such movement is frequent or constant, it follows that heat will be generated, and if water is present it will be expanded, and hence will rise along the easiest outlet, being replaced by cooler water, thus producing a flowing spring at the outcrop of the fault plane or fissure, unless there be some other outlet offering less resistance. Such springs may be classed as the quiet stage of volcanic action, which, if the water supply is sufficient, may continue with variations for ages, with little geologic effect. If the movement be greater or the water supply insufficient, the heat must be absorbed by the contiguous rocks until the local pressure due to expansion is so great as to disturb the surrounding strata, forming new faults and fissures attended by earthquakes. Such might be called the vibratory phase. If for any reason the circulation of water is prevented while heat is being generated in such a fault plane, then vaporization of the water present may be effected, until the pressure may become so great as to overcome the strength and weight of the superincumbent rock, when an explosion must result, producing a crater, with eruption of fragmentary rock.

An active movement of an open fault plane with fair supply of water must pulverize the rock between the walls, producing a mass of mud and breccia which may or may not be ejected at the surface as the expansive force of both solids and vapors must depend on a variety of conditions and give various results.

If water be in excess the ejection may be hot mineral water, or it may be like the slimes of a quartz mill and leave a deposit on the surface such as is abundant in volcanic regions. Again, there may be only sufficient water present to prevent complete fusion of the rock before the ejection of the same is forced by expansion of the vapor. Or again, the seat of action may be at such depth that by reason of the pressure complete fusion of the rock may be effected before the expansive force of the included gases becomes such as to eject the overlying matter, and thus an active volcano, boiling constantly, but ejecting lava at irregular periods, is supported; presenting all the phenomena of an inverted reduction furnace on a grand scale. The solid rocks of the fissure walls are broken under such pressure that the frictional heat produced is sufficient to melt them completely and vaporize their volatile materials.

As the depth of an active lava-producing volcano may be reckoned as 30,000 to 70,000 feet, the water contained naturally in the rock is unable to expand very greatly, even though the heat be sufficient to decompose it; yet, as it is inherently much lighter than other minerals, it will rise, thus assisting circulation in the molten mass, carrying up the lighter and less fluid portions of the lava to be ejected first, and permitting the heavier and more liquid parts to settle toward the bottom of the fissure.

It is probably by reason of such action continued throughout the ages that while astronomers reckon the specific gravity of the earth at about 6, mineralogists find that the surface averages less than 3.

Now, if such action be long continued in a given district, or in a certain fault plane, a considerable body of easily fusible material, rich in metals, will be collected at the bottom thereof; and when comparative quiet is restored by removal of the center of disturbance to some other region, it will naturally not be the first to cool and harden.

While a volcanic region is cooling the rocks must contract, and subsidence of surrounding country is to be expected, which must be irregular, as various rocks vary much in the amount of resistance they offer, and rifts and fissures are a natural consequence. Some of these may extend from the surface to the semi-fluid mass, remaining in the base of the old volcano and furnishing outlets for the same, thus forming dykes of rock worthy a miner's attention. Other fissures will likely also be formed, to be filled with quartz by a process of infiltration, or perhaps be opened and filled simultaneously. Then, again, in some cases there may be a volcanic upheaval not accompanied by ejection of any form of lava other than water, and yet of sufficient force to melt or metamorphose the neighboring rocks and cause uplifting of hills and mountain ranges, with consequent contortion of overlying strata, causing opening and filling of fissures and crevices and the intrusion of granitic masses, which may be exposed by later erosion, the infinite variety of effect being shown on the present surface of the earth.

As to the genesis of ore deposits, there are at least three generic principles to be considered. They are eruption or insertion, sublimation or volatilization, and infiltration or lixiviation. Nearly all known ore deposits are the result of at least two of these forces, and in considering the genesis of any particular deposit it is well to inquire under what condition of volcanic action it was formed.

Ores occurring in basic dykes and consisting of sulphides evenly distributed throughout the mass may be considered as insertions. If pockets occur in them, then they have been modified by one or both of the other forces.

While quartz is usually the product of infiltration, occasionally it is metamorphosed sediment, and more rarely it may be the residue of lixiviation.

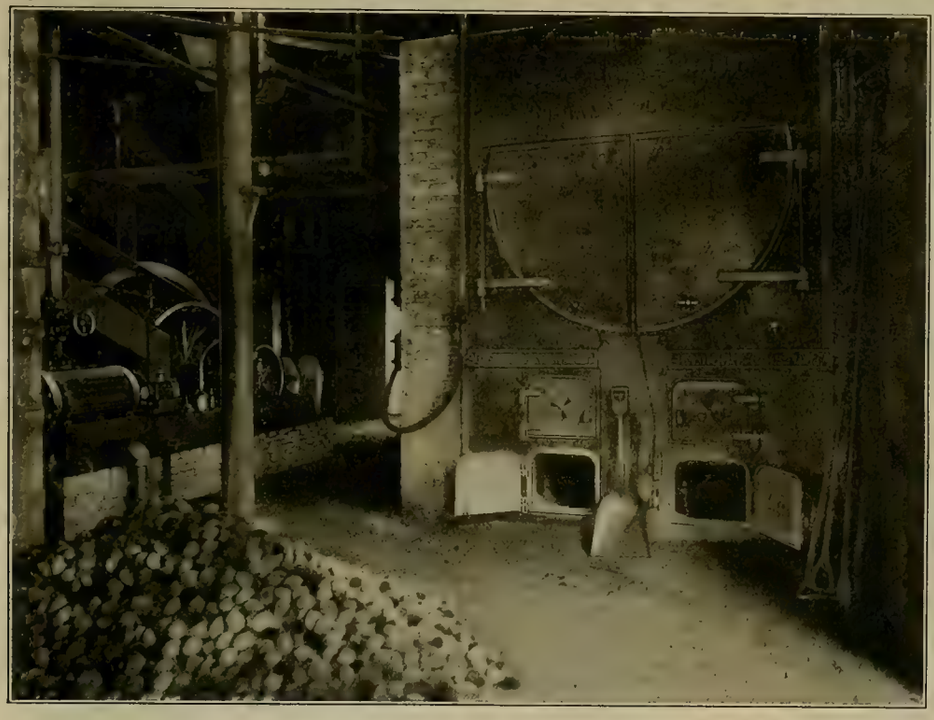
The question of sublimation is to be considered only in connection with volatile ores, such as those containing mercury, arsenic, tellurium, chlorine, zinc, bismuth, lead or other factors, which make up volatile compounds with the fixed metals, thus enabling their removal in gaseous form from place to place.

The subject as a whole is eminently worthy of the study of metallurgists. Another generic principle of great importance is that of precipitation of metals in sediments, which has produced some of the greatest mines known, such as those of the Witwatersrand in South Africa, the Calumet & Hecla of Michigan, and perhaps many others. Some may object to this theory on the ground that the cause assigned has not sufficient force to produce the effect, but it appears to me that a force which is sufficient to roll up a tide against the shore twice every twenty-five hours, when assisted by variations of atmospheric pressure, is likely to cause some vibration. A simple calculation will show that the arrival of a tidal rise of 15 feet is equal to an additional pressure of approximately 13,000,000 tons per square mile, while variations of atmospheric pressure may be nearly one-eighth of that amount. And when we consider that the same force that does this work is operating even more strongly against the land areas, it does not appear unreasonable that the earth should tremble just a little where the mountains offer a good leverage.

Incidentally, I would like to inquire concerning the fossils on the classification of which the present structure of geologic theory rests. Is it not possible that many of these varieties of animal life and vegetable growth which are assigned to widely different ages might have had contemporary existence on different parts of the earth's surface, the habitat of each being defined by local conditions of climate and situation? Also, concerning the glacial period, is there any evidence to show whether or not the same has been many times repeated? May not, in fact, all the various phenomena of geology as recorded in the rocks be due to eccentricities of the earth's orbit?

PHILIP MINOR.

Seattle, Wash., Dec. 23d, '99.



Engine and Boiler Room.—(See opposite page.)

THE enormous zinc deposits in Joplin district, Missouri, are, according to some electrical experts, the cause of the trouble which the Western Union Telegraph Company has been having with its service between Kansas City and Joplin. Some time ago the Western Union Company decided to introduce a system which permits the sending of four messages simultaneously over the same wire, two each way. This system has always worked successfully wherever introduced, but in this instance it failed. Efforts to ascertain the cause of the trouble resulted in the company's representatives being forced to the conclusion that the mineral deposits, especially zinc ore, are responsible for the failure. If such is the case and the trouble is caused by zinc deposits a new field of electrical investigation has been opened for scientists as well as practical engineers.—Electricity.

The Coast of Alaska from St. Michael to Point Barrow.

That the rush to Cape Nome in Alaska during the spring and summer of 1900 will far outstrip any previous exodus to the "Land of the Midnight Sun" is generally believed. For several years past, particularly since the discovery of the Klondike gold field, each spring has seen an army of gold seekers, fortune hunters and adventurers turn their faces northward, and they have opened to the world a new country the value of which is being each year more appreciated as its great possibilities become realized. Telegraph lines have been built, railways constructed and much else that characterizes modern progress has been accomplished in that region. The gold along the beach deposits of Cape Nome, the extent of which is as yet unknown, is the chief feature of next season's attractions, however.

Gold occurs at many places along the coast of the Pacific from southern California to Cape Prince of Wales, Alaska, and thus far the experience of those who have practically investigated these shore deposits shows that their richness increases going northward. The beach deposits of northern California are richer than those of the southern part of the State, and those of Oregon are said to be of greater value than those of California. Those occurring along the southern end of Alaska afford variable results, but when Cape Nome is reached, on the edge of the Arctic circle, the gold-bearing sands found there are of unprecedented richness among littoral deposits.

The accompanying sketch illustrates the succession of layers as they have been found to occur in Cape Nome district. The gold in greatest amount is found associated with the layers of ruby sand, which is heavier than the gray sand and clay. Its occurrence in several layers simply indicates that the process of concentration has taken place at several periods, a deposit once accumulated being subsequently covered by shifting currents, which carred the lighter sand upon that previously laid down, or sand driven before the wind piled up dunes over the gold-bearing layer. The growth of moss now found covering the region lying just back from the beach has evidently protected the sand strata from material change for centuries past.



CROSS SECTION OF A CAPE NOME CLAIM.

The following brief description of the coast line from St. Michaels to Cape Barrow will interest those contemplating the northern trip. The data, compiled by J. E. Spurr, under direction of the United States Geological Survey, was obtained before the discovery of gold on the beach at Cape Nome:

TOPOGRAPHY.—In the vicinity of St. Michael the country consists of low, bare mountains of volcanic origin. These same hills run northward parallel with the coast, being usually of only trifling height, although at a distance inland some peaks become probably 1000 or 1500 feet high. Golovin bay, on the north side of Norton sound, is shut in by two high promontories, Cape Derby and Stony cape. The head of Golovin bay is low, and from here a portage extends, by lakes and rivers, to Grantley Harbor. This is the best harbor in northern waters and has been long used by the whaling fleet. The whole coast from here to Cape Prince of Wales is ordinarily low and rocky, and the shore from Cape Prince of Wales to Cape Espenberg, on the southern side of Kotzebue sound, is sandy. On Kotzebue sound the mountains at times come quite down to the shore, especially the Mulgrave hills at the mouth of the Noatak. From Cape Krusenstern, on the north shore of Kotzebue sound, to Cape Lisburne, the coast is generally low and rocky, with sandy intervals. Point Hope is a long sandy tongue of land, backed by steep cliffs at its landward end. From Cape Lisburne to Point Barrow the coast is also low and rocky, with many sandy stretches.

EXPLORATIONS.—The Bering straits were first passed by the Russians in 1648, and again by Vitus Bering, in the Russian service, in 1728. Neither saw America. Captain Cook, in 1778, discovered Cape Prince of Wales, and pushed a long distance northward along the coast. In 1816 von Kotzebue, a German in a Russian ship, discovered the sound which bears his name. Since that time many expeditions have sailed along these shores, especially such as in the early days were seeking a northwest passage, or those which later were engaged in Arctic exploration. For many years this whole coast has been known to whalers and to Government revenue cutters. In the winter of 1897 Lieutenants Jarvis and Bertholf, and Dr. Call, of the Revenue Marine Service, made a remarkable trip with dogs and reindeer from Cape Vancouver to Point Barrow, while two mates of whalers in distress at Point Barrow, Tilton and Walker, made long overland trips—the former reaching Katmai, on Shelikof straits, and the latter, by way of the Arctic coast and the Mackenzie mouth, reaching Edmonton, on the Canadian Pacific. Last summer many prospectors were in Kotzebue and Norton sounds.

NORTON SOUND.—St. Michael is an ancient and well-known trading post and requires no mention. The country within a considerable radius of St. Michael has been reserved for military purposes by the Government. There is a trading post of the Alaska Commercial Company at Unalaklik, and there are missions of the Swedish Evangelical church at Unalaklik, at Kangekosook, and at Golovin bay.

Gold was long ago reported on the Fish river, which heads in Golovin bay, but no mining was attempted. On the same river, thirty miles above the mouth, the Oonilak mine of silver bearing galena was discovered long ago and the Golovin Bay Mining Company, of San Francisco, formed to work it. There was difficulty, however, in getting the ore down the shallow river to the vessel which took it to San Francisco; and, in addition to this, two vessels, with all on board, were lost by the company previous to 1885. In 1890 operations were suspended, owing to the report of experts that there was no continuous vein, but in 1891 work was renewed. The overflow of the Klondike rush turned prospectors into Golovin bay, and in the summer of 1898 many claims were located on the Fish river and other streams in the district. The gold is said to be fine, but of high grade, and to be easy of access; and it is reported that there is plenty of water for sluicing. There were 300 or 400 people in Golovin bay last summer, and last winter probably 200 prospectors spent the winter on the peninsula between Kotzebue and Norton sounds.

ST. LAWRENCE ISLAND.—St. Lawrence is a large island off Norton sound, south of Bering straits. It is comparatively barren, and is inhabited only by natives, with the exception of a few Presbyterian missionaries.

CAPE PRINCE OF WALES AND VICINITY.—At Port Clarence, already mentioned on account of its splendid harbor, is the Teller reindeer station, established by the Government in 1892 through the efforts of Dr. Sheldon Jackson. Mr. Wm. A. Kjellman is the principal superintendent, and there are a number of herders imported from Lapland. There is also a reindeer station at Cape Nome, on Norton sound. The herd increases very slowly, and a large part of it was driven to Point Barrow in 1897 to relieve the distressed whalers. Cape Prince of Wales, the westernmost point of the American mainland, is a bold promontory. Here is the Congregational mission of the American Missionary Society, in charge of W. T. Lopp, and a village of 500 or 600 Eskimos.

KOTZEBUE SOUND.—At Kiktarak, north of Cape Blossom on Kotzebue sound, there is a Quaker mission. The "Fort Morton" appearing on the maps does not exist and never has existed. Near Chamisso island, on the mainland, there is a small trading post for natives. Kotzebue sound, as already noted, was early visited by explorers, and the ice cliffs, especially those in the vicinity of Elephant Point, where the ice plays the part of a geological formation, have been described by many writers. The region has a fairly numerous native population, who speak the Eskimo tongue. On the north shore, however, between Cape Krusenstern and Cape Sepping, there are no natives. In the country between Norton bay and Eschscholtz bay there are also no inhabitants, although a village—Attemut—has been represented on maps.

During the summer of 1898 discouraging reports from the Klondike reaching the west coast, many prospectors turned their attention to unknown parts of the Territory, and a large number poured into Kotzebue sound. Probably 1000 men prospected there during the summer, ascending also the various rivers which empty into the sound. So far as learned, however, no one had any luck, although fine gold exists on some of the streams; the conclusion was reached by most, therefore, that the region is worthless as a gold mining country.

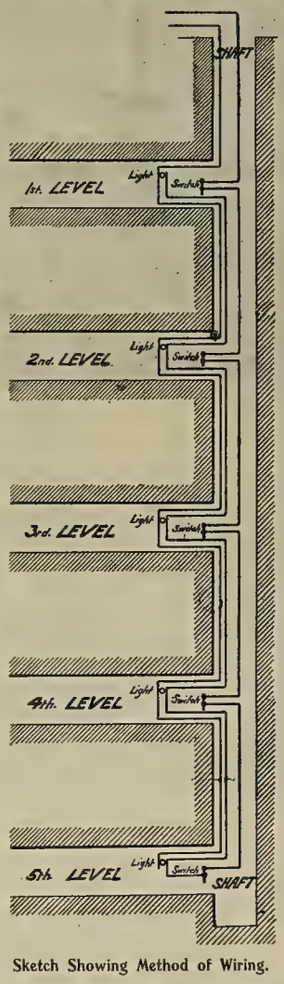
POINT HOPE TO POINT BARROW.—At Point Hope there is an Episcopal mission, and between Point Hope and Point Barrow are several whaling stations, the principal one fifteen miles east of Point Hope and owned by Liebes & Co., of San Francisco. Between Cape Lisburne and Cape Sepping there are occasionally small Eskimo villages, and around the mission at Point Hope there is a large village. Between Icy Cape and Cape Lisburne there are no natives, and very few between Icy Cape and Point Barrow. At Cape Beaufort, and in many places thence northward to Point Belcher, coal of good quality, probably belonging to the Carboniferous period, has been reported. The climate along here is extremely bleak, large packs of floating ice being in the sea all summer. At Point Barrow and at Point Hope the lowest winter temperature is only about 30 degrees below zero, while at Point Hope the average winter temperature is 15 degrees below zero. At Point Barrow there is a Government relief station, designed principally for whalers.

A System of Mine Signalling.

Written for the MINING AND SCIENTIFIC PRESS by S. I. HALLETT.

We are using on the Smuggler Mine in Aspen, Colo., a system of signalling not in use elsewhere that might, under certain circumstances, be used with value in other mines where the shaft is lighted by electricity.

In working the cage we have a cage tender who alone is authorized to ring the signal bells to the engineer at the hoister. The trammers bring the loaded cars to the stations and leave them there, the cage tender loading his double-decked cage and sending these cars to the surface. Should the cage be desired at any level we have adopted the following system of signalling the cage tender. We have found by long experience that electric bells in a wet shaft are very apt to get out of repair on short circuit, and generally be very annoying; that around pumps and machinery a noise is not apt to be heard, and it is very unpleasant to wait for the cage for any length of time. But we have also found that if a man is left in the dark that he pays very particular attention to it. There is no chance of his making any mistake; so we run our electric lights down to each level where they are constantly burned. By putting in a switch, no matter where we are, we can send a signal to the cage tender to come to any particular level with the cage. For example, if we desire the cage at the fifth level we flash the light five times, the third level, three times, etc., the cage man answering the signal so that we may know that he has received it.



Sketch Showing Method of Wiring.

The only ingenuity displayed in making this system lies in running three wires down the shaft in place of two, as usual. Were two wires alone run down the shaft by throwing the switch at any level all the levels below him would be left in darkness, but it would have no effect upon the levels above him where the cage might be. If he were at the bottom of the shaft he could make no signals for the levels above him at all, but by the introduction of the third wire

running all down the shaft, and fastening your switches to the third wire, no matter on what level you may be, by throwing a switch you make a flash of the light on every level of the mine whether at the top or the bottom.

By reference to the diagram as given above it may readily be understood. The two wires supplying the light are connected at the bottom of the shaft in place of the top, allowing the third wire to do all the work.

The Occurrence of Tin.

Tin, although one of the most useful of metals, is found in only a few localities, and its modes of occurrence present many singular features, says A. S. Brown in the Australian Mining Standard. In Europe it is principally mined in Cornwall, and in small quantities in the Erzgebirge, between Saxony and Bohemia, in Sweden, Spain, France and Italy. No tin deposits of importance have been discovered in Africa or in North America; but in South America a tract of country about 1000 miles in length, starting in Peru and running in a southeasterly direction through Bolivia, is tin-bearing. Asia is rich in tin lands. Tin is found in Bengal, China, the Malay Peninsula, the islands of the Malay Archipelago, and Japan. Australia possesses larger tracts of tin country than any other part of the world. The tin-bearing areas of Australasia are four times larger than those of Europe, and nearly eight times larger than those of Asia. The principal Australian tin fields are in Tasmania, Queensland and New South Wales.

The principal sources of tin supply are Cornwall, the Malay Peninsula and Archipelago, and Australia. The average production of tin, calculating on the returns for the years 1890-1898, is 80,000 tons per annum. Of this amount the following countries contribute: Straits Settlements and East Indies, 79.6 per cent; Australasia, 7.9; Cornwall, 6.1; Bolivia, 6.0; the minor producers, 0.4. The Australian yield is divided as follows: Tasmania, 35.85; per cent; Queensland, 32.70; New South Wales, 25.90; West Australia, Victoria and South Australia, 5.45.

Tin is almost entirely obtained from the native oxide cassiterite or tinstone. Cassiterite is frequently found in brown, ruby, reddish, or black short prisms, with four or eight pyramidal summits, and in reniform-botryoidal, fibrous and granular masses, and sometimes as pseudomorphs, after the quartz crystals and the other mineral constituents of granite and porphyry, and after hematite and magnetite. Often in lodes where the quartz is crystallized cassiterite fills in the interstices, and specimens can often be obtained of a quartz-tin porphyry in which the cassiterite forms the ground mass. Cassiterite is rarely pure. The principal impurities are shown in the following results of analyses. A is the composition of a dark-colored, almost black, crystal of cassiterite found in Vegetable creek, New South Wales; B is the result of assay of a crystal from Cornwall; C is the assay by Berzelius of a crystal found in a Swedish mine:

	A.	B.	C.
Oxide of tin	80.92	99.00	93 6
Oxide of iron	2.30	0.25	1.4
Alumina	6.75	0.00	0 0
Silica	0.80	0.75	trace
Titanic acid	0.69	0.00	0.0
Columbic acid	0.00	0 00	2.4
Peroxide of manganese	0.00	0.00	0.8

Tin occurs also in the form of tin pyrites; both in amorphous masses and in minute cubical crystals of a yellowish-grey color. The following is the result of an analysis of a group of crystals: Tin, 25.55 per cent; copper, 29.39; iron, 12.44; sulphur, 29.64. Tin pyrites is found in few localities in small quantities and does not form a commercial ore.

Cassiterite is generally associated with quartz, orthoclase feldspar, bismuth, magnetite, molybdenite, iron, copper and arsenical pyrites, zincblende, fluorspar, calcite, zircons, garnets, beryl, topaz, tourmaline, tellurium, wolfram, manganese, barytes, chlorite, mica, and sometimes with diamonds, thorium, platinum, the platinoid metals, and the cerium earths. In minute quantities it is a constituent of a large number of minerals, and particularly of augite, hornblende, lepidolite or lithia mica, and other minerals found in granite, gneiss, eurite, porphyry, greisen, or other igneous rocks. Cassiterite is found in alluvial deposits, in lodes, and scattered in rock-masses. The greatest quantity of tin is found in alluvial deposits. The most important alluvial deposits are in the Malay Peninsula; the average of the annual shipments of Malacca tin from the Straits Settlements during the year 1890-97 was over 44,000 tons of 68 per cent ore.

The alluvial deposits of this region are found in most of the valleys running from the mountain ranges, and are composed of pebbles of quartz, igneous rocks, clay and coarse tinstone. The wash varies in depth from a few inches to 20 or 30 feet. In places it is covered by a thick overburden of clay. The value of the wash varies considerably, but the average may be taken to be about 30 pounds or 40 pounds of tinstone to the ton. The principal metallic impurities in the concentrated tin are ilmenite or titaniferous iron, and to a much less extent wolfram. As the specific gravity of ilmenite is generally under five, and that of cassiterite is nearly seven, they can be separated by careful washing.

In other parts of the world alluvial tin deposits are similar in character, but sometimes they are overlain by igneous rocks, chiefly basalt, and in Australia they often contain gold and plantinum, and sometimes diamonds and other gem stones. In New South Wales tin occurs in association with diamonds in Tertiary river drifts, and in cements formed in old river channels in different geological periods.

Typical Mining Scenes.

When looking at the large and expensive plants erected at great mines the early history of the property is often lost sight of entirely, being overshad-



The First Hoisting Plant.



Hoisting With a Horse Whim.



Building an Arrastra.



The Miner's Home.

owed by the magnitude of operations. Every mine, no matter how great or how rich, had a beginning, and many of them when discovered were located in the midst of forest-covered, rugged mountains, many miles distant from the nearest town. Into this wilderness the prospector forced his way and made a discovery. His first step is to locate the vein and the next to develop it to a greater or less extent as his means and the character of the prospect will allow. Having proven the new discovery valuable he builds a cabin and sets up a windlass. Assuming that his prospect develops satisfactorily, he later builds a horse whim and continues his shaft. Perchance the ore is rich enough to pay by primitive methods, and he accordingly builds an arrastra and makes the prospect, now developing into a mine, pay its own way. Thus, step by step, he builds up what in time may become a great industry. Others are attracted to the vicinity by his success, and other mines are opened and a town is started which grows with greater or less rapidity and becomes permanent or transient in direct proportion to the success and length of life of the mines. The accompanying engravings illustrate familiar scenes in the mining regions.

MINING SUMMARY.

ARIZONA.

MARICOPA COUNTY.

Fifty miles north of Phœnix and six miles west of Hot Springs Junction on the Santa Fe, Prescott & Phœnix railroad, a new copper strike has recently been made, which is being developed. A company has been formed by the owners, which is known as the Aztec Mining Co., with J. G. Evens president.

YAVAPAI COUNTY.

G. P. Harrington has completed repairs to the Tiger mill, which, after an idleness of four years, has started up again. The mill was equipped with pans and settlers for the treatment of silver ore. It has been changed to a gold mill.

The new forty-ton furnace of the Big Bug Smelter has been successfully blown in. Mr. Clifford says he will add another stack. He also reports another discovery in the Lone Pine, at a depth of 225 feet, where a crosscut has been run which cut an ore body 27 feet wide. There are streaks in it which assay 25% in copper, and the average is 6% in copper and $8 per ton in gold.

The report is again in circulation, emanating from Boston, to the effect that the Amalgamated Copper Co. is negotiating with W. A. Clark for the United Verde.

MOJAVE COUNTY.

The Merrimac concentrator at Chloride is about completed. A large amount of ore has been accumulated during the installation of machinery, and there are reported several thousand tons blocked out above the 300 level in the mine.

The Midnight mine at Chloride has developed within the past few months from a promising prospect into a shipping mine. A large body of silicious gold ore has been developed on the 200 level.

M. L. Requa and M. D. Rochford will sink a 500-foot shaft on the property recently bought by them near Stockton Hill.

While doing assessment work recently on the Little Chief mine, near Stockton Hill, a rich vein of silver ore was found.

GILA COUNTY.

The United Globe mines are shipping two to three carloads of ore per day to the Copper Queen smelters at Bisbee.

F. Trego has run a crosscut tunnel 260 feet and has cut 25 feet of low-grade ore, averaging 4% to 5% copper, near Globe. There remains 50 feet to go to strike the main ledge.

Native copper has been found in the Alliance mine, in Lost gulch, adjoining claims of the Black Warrior Co. It is being developed by the Lost Gulch Copper Co. The ore is from a winze down 45 feet from the tunnel level.

PINAL COUNTY.

N. S. Wight, formerly of California, is shipping ore to El Paso from the Cuba mine, near Mammoth. The ore is rich in copper, silver and lead. A new shaft has been started on the apex of the lead and struck high-grade ore at 10 feet.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—Prof. Blackledge has started a school of chemistry and metallurgy at Pine Grove and the mining men of the district have not been slow to take advantage of it.

Messrs. Cox & Heydenfeldt spent the past week here testing a machine for saving fine gold. It was so much of a success that they will make arrangements to take 500 of them to Cape Nome, where they are to return in the spring.

The Volcano Ditch Co. have almost completed their extensive repairs to flumes, pipes, etc., and it is expected the water will be turned in before many days, after which mining will be resumed with some energy in this section.

The crosscut in the lower level in the Spagnolia shaft is now in 70 feet and the ledge is expected to be tapped within the next 10 feet.

Wieland, Dec. 26th, '99.

H. W. Tangermann, owner of the Clinton gravel mine, near Wieland, is working one giant. The property includes the Boyrie mine.

CALAVERAS COUNTY.

The water is out of the Sheep Ranch mine, and, after some repairs to the shaft have been made, the opening of a new level will be commenced at the 1200 station. The mill will be completed about the 1st of February. The mine was closed in 1893, after the shaft had been sunk to 1200 feet. Supt. Garbarini says he found good ore in the faces of several levels.

It is reported that the Edna mine, three miles northeast of San Andreas, has been sold to a Dutch syndicate. The Edna is developed in a large gold-bearing dyke, the pay rock following a zone of sheeting and crushing. On the western side and forming a part of the zone is a quartz vein of large size.

In a crosscut east from the shaft at the 300 level of the Commodore mine, a mile north of San Andreas, Supt. Clarey has cut the ore shoot, and a mill is being talked of for this new mine.

C. & G. Snyder have developed a claim near El Dorado. They have started the Rose Hill mill, on the Emery mines, running on their rock.

Work on the Ritter, near El Dorado, has been temporarily suspended, pending the building of a 5-stamp mill on this property. The tunnel is in 450 feet. M. C. Rigney is in charge.

The Utica M. Co. have secured control of the Confidence mine, adjoining the Utica, at Angels.

Henry Beagan claims to have discovered a quartz ledge on his claim, near the Calaveras Big Tree grove, the ore running $3 to the ton.

San Andreas Citizen: The sinking of the main shaft of the Demarest mine, south of San Andreas, from the 400 to the 600 level, has commenced.

EL DORADO COUNTY.

Teamsters are hauling slate from the Strahle quarry at Kelsey to Placerville.

At the Pioneer copper mine, near Pilot Hill, twelve men are employed on development work. New buildings have been built. The ore contains gold and silver and 8% copper.

A full force is employed at the Cambrian and the 10-stamp mill is running. In the last six months many improvements have been added to the property.

The old Tobner tunnel at the American River mine, below Coloma, is now in 160 feet. There is a 5-foot ledge which is reported to show good prospects. The mine is run by Casey & Sons.

A strike is reported at the Schneider mine, near El Dorado. The mine is bonded by Hill & Bryant. A tunnel has been run 750 feet. Recent developments exposed a vein 3 feet in width showing gold.

At the Blue Gouge the framework and roof of the mill are up and most of the new machinery is in place. Thirty men are employed. Some delay has been occasioned by unusually cold weather.

At the Griffith Con. mine, in Diamond district, a test run is being made from the several levels of the mine. It is said the company intend to sink the main shaft from 700 to 1200 feet.

MADERA COUNTY.

Placer bars along the Chowchilla creek, two and a half miles from Grub Gulch, are to be hydraulicked next summer. A ditch will convey 1000 inches of water to a point near the mines. The giants will operate under a 250-foot head. The Chowchilla, though a good sized stream near its headwaters, sinks in the foot hills bordering the plains of the San Joaquin, and the debris from the mines would never reach the San Joaquin.

RIVERSIDE COUNTY.

It is reported that the English company controlling the old Gavilan gold mines on the San Jacinto estate have arranged to buy the Santa Rosa mine, two miles distant. The latter property has had many vicissitudes, though having the appearance of a valuable mine.

The Indian Queen mine, five miles west of Perris, has been developed into a promising property by Mr. Anderson. The ore is high grade.

The Menifee mine, eight miles south of Perris, has passed into the hands of Chicago capitalists. Development work will be resumed, new buildings erected and a new milling plant installed. The main shaft is down 130 feet with drifts, and the ore is mostly stoped and worked from the 65-foot level to the surface. The new management will run the main shaft down 500 feet. The vein was opened by several former workers, who took out about $15,000 with a small mill, but quit, owing to water.

SAN BERNARDINO COUNTY.

R. M. Furlong and J. R. Taylor, of Pasadena, have commenced operations on the Copper Bullion mine, owned by W. G. Hixon, near Manvel, the northern terminus of the Nevada Southern railroad. This deposit consists almost wholly of chrysocolla (copper silicate) in limestone. The ore occurs irregularly, but is found at numerous places on the low ridge upon which the claim is located. The new owners will ship the ore.

SAN DIEGO COUNTY.

Recent discoveries of gold and silver-bearing veins and of other minerals in this county at various places between the Cuyamaca range and the coast has stimulated prospecting. The discovery of new kaolin deposits on the Jamul ranch is reported. The construction of the large cyanide plant for the Golden Cross mines at Hedges is in progress. It is thought it can be completed by Feb. 1, 1900.

SHASTA COUNTY.

A miner is working a continuous discharge arrastra and will put in a concentrator.

F. H. Dakin and B. M. Newcomb have sold to Spier & Miller of New York City a tract of land near the mouth of Squaw creek, near the Uncle Sam mine. The purchase includes a large mill or smelter site and is conveniently located to receive ore from a number of mines in the vicinity. It is also reported that Mr. Dakin had sold the Uncle Sam mine for $50,000. A long crosscut tunnel is to be driven to open ore shoots on the Uncle Sam.

SISKIYOU COUNTY.

It is reported that H. J. Barton has sold the Poverty Point mine, at Oak Bar, to W. O. Linhard and others.

TUOLUMNE COUNTY.

At the Buchanan mine, near the main Tuolumne river, twelve miles southeast of Sonora, workmen recently cut a large vein of gold rock in new workings. The identity of this shoot is uncertain, as there are several veins in the property in close proximity. The old workings are extensive and 800 feet deep. These are filled with water, and the new shaft and workings extending from it are close to these old stopes and workings, and the situation appearing one of unusual risk, the miners quit, refusing to work under existing conditions. Several old mines in California which have been opened in recent years have had a similar experience, and in each case it was shown that the unwatering of the old works was the only solution of the problem.

COLORADO.

BOULDER COUNTY.

Ward Miner: At the Pennsylvania mill at Sunnyside the steam power plant and electric plant are being installed. The shaft has been unwatered and men will be at work in a few days running the 200 and 300 levels both ways from the shaft. This work will soon be supplemented with the driving of a crosscut 75 feet from the lower level to cut the Brooklyn lead, which has a fine surface showing.—The old Smuggler mine at Ballarat is putting up a power house and mill on the Middle St. Vrain, at the mouth of Ballarat gulch. In it will be installed an electric plant to furnish power for mine and mill. A tram road one mile in length will run from the mine to the mill. The old property has taken on a new lease of life and is looked to as a steady producer. Twenty pounds of closely sorted ore from the mine recently returned $265.

LAKE COUNTY.

The Iron Silver mines and mill are making an output of about 200 tons per day, 6000 tons being the output of November, and that of December will duplicate it.

The Best Friend mine, after a long idleness, is to resume operations under lease and bond to Johnson & Co.

The Miner Boy at Leadville is shipping gold-bearing lead carbonate ore. The ore occurs in a fissure traversing the sulphide ore bodies and is supposed to be associated with the Colorado Prince fault, which at various points along its course carried ores.

Leadville Miner: It is reported that negotiations are pending for a lease of the Long and Derry mines to a company of Leadville miners and Eastern capitalists, and if the negotiations are completed preparations for starting up will begin in January.

OURAY COUNTY.

Denver Republican: The most important mining enterprise projected in Ouray county the past year has recently been consummated through the sale of the Blaine group of sixteen claims, north of Mount Sneffels, to a Canadian syndicate, which has commenced to develop the property and has a large force at work at the mines and in road construction. The shipping and receiving point being Ridgway, it is necessary to construct eight miles of road, and men are paid $2.50 per day and board to work on the same. The sixteen mines and two mill sites at the head of East Dallas creek originally belonged to Dr. Judd. Louis Sherbino purchased the group from the heirs of Dr. Judd and transferred it to the Canadian syndicate. In 1893 Sherbino let a contract to T. H. Brown for a tunnel 1000 feet long, which was completed. Another contract for a 1000-foot tunnel has been let by the present owners. Some valuable ore was shipped from the original tunnel and this fall several shipments were made, the ore running high in silver, with gold.

PARK COUNTY.

Mining in Park county is more active about Alma than in many winters past, and much dead work is being accomplished. The developments of the past season have proven the continuity of the gold belt from Leadville over Mosquito pass into Park county. At Park City the Brownlow gold mines are being developed, the shaft being unwatered, and the levels extended.

TELLER COUNTY.

The Homestake mine on Big Bull hill is again to be developed. The property has been secured under lease by Rogers and associates. There has been some ore shipped from this property in the past, but attempts to find the ore shoot have been unsuccessful.

A shipment of eighty tons sent out by the Alert Leasing Co. from the Hardwood of the Damon Co. last week is estimated at two ounces to the ton.

A fifty-ton shipment of three-ounce ore was sent from the Clements lease on the Dante last week.

At 2:30 P. M. on the 18th inst., at the dam site of the Pike's Peak Power Co. on West Beaver creek, six miles east of Victor, 100,000 cubic feet of granite were torn from Vesuvius butte and dumped into the stream below, where the fragments may be utilized in the construction of the steel-sheeted dam. To accomplish this a tunnel was driven under the butte at the proper level, from which crosscuts were run. When completed 600 pounds of dynamite and 30,000 pounds of black powder were placed in the excavation and the entrance tamped. The blast was fired electrically and the top of the hill arose and slid into the stream. The noise of the explosion is described as a subdued rumble and the shock to the observers 1000 feet distant was scarcely noticeable. The operation from an engineering standpoint was a success.

On the Burns claim of the Acacia Co. Lessee McGill has struck a 15-inch vein running over $200 per ton.

IDAHO.

BLAINE COUNTY.

At the Red Cloud group of mines preparations are made for all winter; the mill will run continuously.

BOISE COUNTY.

A gold strike in the Willow Creek district is reported near the Checkmate mine. No details have been received.

IDAHO COUNTY.

A strike has been reported in the Magnolia group, in the Miller district, where the ledges in the Magnolia and Joe Jefferson, the principal mines of the group, had been tapped by the crosscut tunnels and rich showings made. Beyond the footwall of the Joe Jefferson ledge, it is stated, a rich streak of ore was found. All the assays run high, one being over $600 a ton. Assays of Magnolia ore also run high.

SHOSHONE COUNTY.

A report comes from the Banner mine that galena occurs in the country rock in the face of their crosscut tunnel, though they have not reached the vein.

The Silver King mill has been making trial runs for several days and a number of changes were found necessary. The supply of water is insufficient. The gulch does not furnish enough water for power at all seasons, but will run the little mill most of the time.

MONTANA.

SILVER BOW COUNTY.

At Butte on the 28th the District Court decided the suit of the Montana Ore Purchasing Co. against the Boston & Montana M. Co., to settle the ownership to certain veins of copper under the Rarus and Johnstown claims, owned by plaintiff, and the Pennsylvania, owned by defendants, in favor of the plaintiff. The trial of the action was before the court without a jury and occupied ten weeks. The judge has had the case under consideration two months. The Ore Purchasing people contended in this action for an east-and-west vein system apexing in their ground, and the Boston & Montana people contended on the other side for a north-and-south vein, which would cut off the rights of the Ore Purchasing Co. to follow the veins from their apex upon the dip to the south. It is said the trial and preparation for trial in development work represented an expenditure of over $500,000. The case will be carried to the Supreme Court of the State for review, and possibly to the Supreme Court of the United States. Attorneys for the plaintiff say the decision will be followed at once by suits for about $1,500,000 damages for losses sustained by reason of work being stopped while the Boston & Montana injunction was pending. It is also stated that as soon as several lateral points are settled work will be started on the veins so long in dispute and 500 men put to work.

Judge Clancy, sitting in chambers, dissolved an order issued by him recently restraining and enjoining the Anaconda M. Co. from working certain portions of the Copper Trust mining claim, which, it is

alleged, overlaps part of the St. Lawrence and Anaconda locations. The signing of the restraining order was one of the adjuncts to the suit instituted by Burdette O'Connor against the Anaconda Co. for $2,000,000, the value of ore alleged to have been stolen by the Anaconda from the veins having their apex within the lines of the Copper Trust lode claim.

NEVADA.

LINCOLN COUNTY.

A strike was recently made in the Crown Point, three-fourths of a mile above the town in Stateline district, between the Johnny and the Sunflower. J. R. Smithson, owner of the claim, did the assessment work this year in the old shaft, which is 60 feet deep, where the work has been done on the claim for four years. After finishing work he went up the hill along the ledge about 40 feet to store some powder and tools in a cleft of rock. He broke off a piece of quartz sprinkled with gold, and on investigation the ledge proved to be 5 feet wide.

NEW MEXICO.

SANTA FE COUNTY.

The Gallisteo M. Co. will install new electric machinery. Mr. Burns has men preparing the grounds upon which to operate the excavators, which are to handle 30,000 cubic yards of gravel daily when completed. The excavators are to convey the gravel to trommels, which will concentrate the smaller heavy gravel and gold. These concentrates will then be placed in separators operating entirely by the process invented by Mr. Edison. In addition to the placer machinery this company will open up ten lode claims and establish an electric generator at its coal mines, two miles from the center of the gold mining properties. All power used in mining operations will be by electricity.

OREGON.

BAKER COUNTY.

(Special Correspondence.)—It may interest the readers of your paper to know that in the course of my work on the ores in this section I have determined the occurrence of free gold with the mineral scheelite (tungstate of calcium). The mineral is found in quantity in the massive form in the Cliff mine, in the Virtue district, a few miles east of Baker City. At water level the vein matter seems to be entirely scheelite, and single specimens assay as high as $100 per ton, the gold being almost entirely free and of a very high grade. CLARENCE S. KING.

Baker City, Or., Dec. 24th, '99.

[In the Black Hills of South Dakota gold occurs associated with tungsten ores, particularly with wolframite, at the Grantz' Hidden Fortune, the Durango and other mines near the Homestake, at Lead City.—ED.]

The sale of the Diadem mine was closed on the 21st inst., after having been under bond for a few weeks, the final payment of $40,000 being made. The ledge consists of soft, decomposed rock, which requires little blasting. The main shaft has been sunk 50 feet and has 36 inches of ore, carrying $165.56 in gold, with silver, lead and copper.

SOUTH DAKOTA.

The annual report of the State Inspector of Mines recently issued shows the output of gold in the Black Hills for the year 1899 to be $9,131,436. This is an increase of $2,000,000 over the output of the previous year.

CUSTER COUNTY.

Another rich strike is reported in the Holy Terror mine in its lowest workings.

The Vigilante M. Co. has struck a vein of rich copper ore in its mine, five miles from Custer. The ore is found on the 300-foot level. The width of the vein is 10 feet.

Custer Chronicle: The Grand Junction mine, which is held and operated by J. C. Spencer and C. C. Crary, is undergoing development, and considering the unusual hardness of the rock is making good headway. It is a free milling and concentrating proposition, and the ore exhibited shows free gold, much of which is coarse. The shaft is over 65 feet below the level of the tunnel, and the water is coming in rapidly. This mine was sold in 1879 by the discoverers, when less than $2000 worth of development had been done for $125,000.

LAWRENCE COUNTY.

Two companies were organized in Deadwood last week to operate in the phonolite district west of that city. Colorado capitalists are interested in each.

Sylvanite ore has been found in the Ironsides mine, on Squaw creek, nine miles northwest of Deadwood. This mine was purchased by the Colorado & Deadwood M. Co. for $75,000. This company will have its new plant installed at the mine by Jan. 1st and a tunnel will be run in several hundred feet. There is considerable rich ore on the dump, which will be shipped to Denver when the wagon road is finished from the mine to the railway station on the Burlington road.

C. D. Wood of Denver has bonded the McDermott claims near the Ironsides mine, in Spring gulch. A force has been put to work following a streak of ore. A shaft has reached a depth of 80 feet.

R. W. Griswold of Colorado Springs is working a vein on the Granite Mountain claim, on Squaw creek, and ore followed resembles the sylvanite found in the Ironsides mine. F. Wilbur of Cripple Creek is Supt.

A cyanide plant of 1000 tons daily capacity is being built for the Homestake Co. near Lead City, in Gold Run. Owing to the steepness of the hills in the narrow gulch, heavy retaining walls are necessary. The plant will not be completed for several months. It will take tailings directly from the mills, there being no tailings accumulated.

PENNINGTON COUNTY.

The sale of the Alta-Lodi mines at Altaville is reported. This property was sold by the discoverers years ago to an Eastern company, which built a large mill, spent many thousand dollars uselessly and closed down, condemning the mine and the country. A few years later the property came into the possession of James Cochran, who worked it alone, crushing his ore in a rotary mill and made it pay, the large mill having been removed to the Lookout mines on Castle creek. The new company now taking the mines are to build a large mill. The ore is quartz mica schist, and though not rich is abundant.

Ore was first discovered in Hornblende Camp in the summer of 1897. The ore is hornblende and free milling. The gold-bearing shoots occur in broad zones of hornblende schist.

UTAH.

SALT LAKE COUNTY.

The Highland Boy is shipping about 120,000 pounds of base bullion weekly. It consists of copper containing a variable amount of gold and silver.

J. S. Pine has made a payment of $10,000 on the Queen of Utah group, in Dry canyon, the purchase price being $40,000. It is said to be in the same geological horizon as the Mono mine.

UINTAH COUNTY.

R. A. Kirker is developing deposits of hydrocarbon in the Whitmore canyon section.

Jos. Leiter is in Salt Lake in the interest of the elaterite deposits in which he is interested.

WASHINGTON COUNTY.

The Grand Gulch copper mines, near St. George, are shipping high-grade ore. The ore runs nearly 40% copper.

The new smelter of the Apex Copper Co., near St. George, was blown in on the 16th inst., and at last accounts was running successfully. G. A. Walker, manager.

WASHINGTON.

FERRY COUNTY.

The last payment of $17,000 on the bond of the Review mine, Meyer's Creek camp, has been made by McEntire, McDonnell & Co., of Spokane. The Review G. M. Co., of Spokane, now owns the property. J. Mulhollan and R. Allison were the locators and sellers.

STEVENS COUNTY.

The Deer Trail No. 2 mine is under new management. C. D. Rand is Pres. and N. B. Buckler Sec'y and Mgr. Upon the organization of the new board the nineteenth dividend of $2500 was declared, payable Dec. 25, making a total to date of $47,500. The ore is rich in silver and is shipped.

WYOMING.

CARBON COUNTY.

The company which bonded the Kurtz-Chatterton mine, near Grand Encampment, have agreed to put in a 25-ton smelter within six months of the date of the bond and lease. There are 1600 feet of development work on the property.

A controlling interest in the Eureka mine has recently been sold to an Eastern company for $20,000. The property comprises eighty-five acres four miles from Grand Encampment. Additional machinery will be placed on the mine.

A 2-foot vein of copper ore has been struck on the Bragg claim, the property of the Copper Belt Copper M. Co., in the Battle Lake district.

LARAMIE COUNTY.

Copper ores are being shipped from Rawhide Buttes to Aurora, Ill. These mines were discovered in 1878 by J. Hildreth and party, and at that time a large amount of development work was done; but lack of cheap transportation made it impossible to work to a profit at that time. The ores occur in a slate formation similar to those found in the Black Hills of South Dakota.

FOREIGN.

AUSTRALIA.

The gold yield of New South Wales for the first eleven months of 1899 amounted to 449,000 ounces, being 163,000 ounces in excess of the yield for the corresponding period in 1898.

The Queensland gold returns for the month of November are as follows: Charters Towers, 76,600 tons crushed, producing 48,200 ounces; Croydon, 3000 tons, 2300 ounces; Gympie, 9400 tons, 8000 ounces; Mount Morgan, 20,900 tons, 18,300 ounces; other fields, 17,400 tons, 6000 ounces; Alluvial, 1000 ounces. Total, 83,800 ounces.

BRITISH COLUMBIA.

It is now reported that the alleged discoveries of gold, copper, etc., in the Great Slave Lake country were much overrated. Parties returning from there report no gold and little copper, but say galena ores were found in limestone.

Porto Rico mine is owned by the Canadian Pacific Exploration Co., and has been worked for eighteen months. The ledge is 5 feet in width and the ore high grade, carrying free gold. A 10-stamp mill is in operation and thirty stamps are being added. Fifty men are employed at the mine and twelve at the mill.

J. F. Herrick, manager of the Iron Mask Co., reports that the shift working in the winze in the 400 level has broken into the ledge.

J. E. Saucier has interests in East Kootenay, which he has recently examined. He reports that on the Pay Roll three shifts are at work. The tunnel is in 140 feet. The ledge is 7 feet wide and the ore high-grade galena.

Col. Baker, who recently returned from London, reports that he and his associates will erect a smelter in the spring at some central point in East Kootenay. Mr. Baker is one of the largest stockholders in the Theo Gold-Copper Co.

MEXICO.

Chihuahua Enterprise: Manager Long is engaged in making preparations for operating several new mining properties belonging to the Hidalgo Co. Their works will be largely increased for the coming year.

NEW ZEALAND.

The New Zealand gold output for November was 26,829 ounces, valued at £204,072, as compared with 16,721 ounces, valued at £64,056 in November, 1898. The increase in the output of the colony for the past eleven months, as compared with the first eleven months last year, is 100,479 ounces, of the value of £400,617.

It is only about ten years since the cyanide process was first introduced on a commercial basis at the Crown mine.

SOUTH AFRICA.

The November output of the Robinson, Bonanza and Ferreira Deep mines on the Rand is stated to have been 12,000 ounces. The mint at Pretoria is coining 100,000 sovereigns monthly.

Commercial Paragraphs.

THE Union Iron Works of San Francisco will erect a 40-stamp mill and cyanide plant for the Octave G. M. Co. at Weaver, Ariz.

THE Edward P. Allis Co. of Milwaukee, Wis., will in future be represented in Spokane, Wash., by F. D. Howe and Edmund Juessen.

THE Westinghouse Electric and Manufacturing Co. of Pittsburg, Penna., now has its London office in the Westinghouse building, Norfolk street, Strand, W. C.

M. SELIGSON, Denver, Colo., has a method of producing chlorine-ammonia gas and passing it through a mineral pulp to dissolve the slimes which carry the values.

MCFARLANE & CO., Denver, Colo., have commenced the manufacture of a new geared hoisting engine of the gyratory-reciprocating type, designed by Harold J. Bell, C. E. The first one completed is to be installed at the Baxter mine, Gilpin county, Colo.

THE University of Minnesota has recently added to its laboratory a Calkin's automatic cupel machine and two L. & C. assayer's furnaces, manufactured by F. W. Braun & Co., Los Angeles, Cal., who have also received an order for one of Calkin's automatic cupel machines to be shipped to London, England.

HENRY E. WOOD, assayer and chemist, Denver, Colo., has established ore testing works, which include wet and dry crushing, amalgamation, concentration, chlorination and cyanidation. In this plant is also an exemplification of the Webster system of heating, adapted to mills and reduction works. Mr. Wood is equipped to test ores in carload lots.

Industrial Notes.

—The U. P. R. R. will open another coal mine at Rock Springs, Wyo.

—Alaska is to have a $500,000 Government appropriation for lighthouses.

—The Santa Fe expects to be operating its through lines into San Francisco by March 1st, 1900.

—The Butte County, Cal., Electric Light and Power Co. expect to supply consumers February 15, 1900.

—Hydraulic mining is now nightly carried on in Trinity county, Cal., by use of acetylene gas light.

—Hawaii and South Africa ask for even more lumber from the Pacific coast in 1900 than they took in '99.

—The last spike of the Santa Fe & Grand Canyon railroad, Arizona, will be driven February 15, 1900.

—The Standard Oil Co. is trying to lease 180,000 acres of oil land in Indian Territory for $57,000 per year. The Indians protest.

—California built 209 miles of railroad in '99, New Mexico 125, Montana 88, Colorado 130, Oregon 71, Washington 78, Arizona 75.

—The Congressional Industrial Commission will investigate manufacturing business and labor conditions on the Pacific coast next February.

—British Columbia engineers have accurately surveyed, determined and marked the Atlin boundary line between British Columbia and the Yukon territory.

—The average cost in foreign countries of all sugar imported into the United States in the fiscal year 1872 was 5.37 cents per pound; in 1899, 2.39 cents per pound.

—Several large American manufacturing establishments will not be represented at the coming Paris Exposition, being too busy filling orders to attempt preparation of appropriate display.

—The Mammoth Mining Co., Tucson, Ariz., will put in an electric power plant on the Aravaipa river, fifteen miles from Mammoth, to run the mill, tramway, hoist, etc., and light the works.

—A bill for laying a cable to Hawaii, Guam and the Philippines is before Congress, in which the cost is limited to $8,000,000, and a preliminary appropriation of $500,000 is made to begin the work.

—The Postmaster-General calls for bids for furnishing improved mail service between San Francisco and Sydney, N. S. W., for an optional term of either five or ten years, beginning November 1, 1900.

—The Southern Pacific and Santa Fe roads will not accept freight cars over 41 feet in length for points south of Portland, Or., unless the freight cannot be accommodated in shorter cars, when special arrangements must be made.

—The United States Supreme Court has affirmed the opinion of the Court of Claims in the case of the claim of the Los Abra Silver Mining Co. against the Republic of Mexico, holding that claim to be fraudulent and unfounded. The claim was for about $4,000,000.

—The largest ice plant ever built in the United States goes to Manila on a Government transport, leaving San Francisco on the 3rd prox. It will daily produce fifty tons of ice and 6000 gallons distilled water, besides refrigerating a room designed to hold 5000 beeves, 7500 sheep and 100 tons each of salt meats, butter, eggs, etc.

—American refrigerating machines, American pumping machinery, American mining machinery, run by American miners, an American dynamite plant, 150 miles of American railroad, laid with American rails on California redwood sleepers, and American water lines, are some of the American products at the South African mines.

Books Received.

"Mine Drainage," by Stephen Mitchell, 4to pp. 369, second edition, rewritten and enlarged, profusely illustrated, a practical treatise on detailed methods of draining mine workings by direct-acting steam pumping machinery; a new and improved form of a standard English work on that subject. Pumping engines, horizontal and vertical, are thoroughly discussed; their make, merits and application gone into in detail, and nearly everything in direct or indirect connection therewith comes in for exhaustive mention. To the American reader much said relating to styles and methods has a foreign flavor, and not all of the statements will be wholly accepted. In scope and treatment the work is a valuable one, and will attract deserved attention. It is published by Crosby Lockwood & Son, London, and furnished to the American trade by D. Van Nostrand Co., 23 Murray St., N. Y. City; price $10.

Personal.

A. F. HOLDEN has been elected Pres. Centennial-Eureka, Utah, M. Co.

WALTER HOVEY HILL has returned to Grangeville, Idaho, from Newsom.

JAS. H. KINKEAD is now Supt. Best & Belcher M. Co., Virginia City, Nev.

J. B. CORBUS of the Alaska-Treadwell mine, Douglas Island, Alaska, is in San Francisco.

W. P. MILLER is making a professional examination of the Balaklala mines of Shasta Co., Cal.

C. W. MERRILL of Alameda, Cal., who is erecting a cyanide plant at Lead, S. D., has returned home.

THOS. W. FOSTER has been appointed Supt. Bennington group of mines near Keswick, Shasta Co., Cal.

H. D. CRIPPEN, Mgr. of the Jackson Drill & Mfg. Co., Denver, Colo., will be at his New York office during the winter.

RICHARD A. PARKER has been elected Pres. American Zinc, Lead & Smelting Co., succeeding A. F. Holden, resigned.

P. P. BUSH of Denver, Colo., Western Mgr. of the Canton Steel Co., is visiting the home office of the company, Canton, Ohio.

W. A. STEVENS, who built the cyanide works at Bland, N. M., is in Denver, Colo., making experiments on various kinds of ore.

F. H. BOSTWICK, head salesman for the Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo., has returned from a business trip through Arizona.

W. A. CLARK expects that his new mill at Ophir, Utah, will be in operation about Feb. 15th, when the daily 350-ton production of the mine will be worked.

BEN WILLIAMS, the retiring Supt. of the Copper Queen M. Co., Bisbee, Ariz., was, on the 15th inst., given a memorial gold cup by his former associates.

J. F. WEBB of the Pneumatic Cyanide Process, Denver, Colo., recently made examination of copper properties in southern Utah for parties in Paris, France.

CHAS. BUTTERS, who won fame and fortune as a cyanide manager on the Rand in South Africa, is in San Salvador, C. A., where he has large mining interests.

C. P. SCHUMACHER of Leadville, Colo., recently secured an option on a large tract of coal land in Larimer county, Colo., where an extensive ledge of lignite is found.

T. C. MARTIN has been selected by the American Institute of Electrical Engineers to represent that body at the World's Congress of Electrical Engineers at the Paris Exposition.

Recently Declared Mining Dividends.

Tamarack C. M. Co., Michigan, $6 per share; Dec. 28.

Lillie G. M. Co., Cripple Creek, Colo., $11,250; Dec. 20.

Pennsylvania M. Co., Grass Valley, Cal., $10,300; Dec. 25.

Modoc C. Co., Colorado, $5000; Dec. 18; and $10,000 Dec. 23.

United Verde C. Co., Arizona, 50 cents per share, $150,000; Dec. 21.

Parrot C. M. Co., Butte, Mont., $1.50 per share; payable Jan. 10, 1900.

Deer Trail No. 2 S. M. Co., Washington, $2500; Dec. 25. Total to date, $47,500.

Boston & Colorado Smelting Co., quarterly dividend of 1½%; payable Jan. 1.

Boston Q. M. Co., California, 10 cents per share, $10,000; payable Jan. 1, 1900.

Amalgamated Copper M. Co., quarterly dividend of 1½% and extra dividend of ½%; payable Jan. 22.

Ætna Q. M. Co., California, regular 10 cents and extra 5 cents per share, $15,000; payable Jan. 1, 1900.

New Idria Q. M. Co., California, regular 10 cents and extra 10 cents per share, $20,000; payable Jan. 1, 1900.

Napa Con. Q. M. Co., California, regular 10 cents and extra 10 cents per share, $20,000; payable Jan. 1, 1900.

American Smelter & Refining Co., New York, quarterly dividend 1¾%; payable Jan. 9, 1900, on the preferred stock.

Homestake G. M. Co., South Dakota, regular monthly 25 cents and extra 25 cents per share, $105,000; Dec. 26. Total to date, $8,143,750.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DISPENSING CAN FOR LIQUIDS.—C. M. Husted, Prescott, Ariz. No. 639,393. Dated Dec. 19, 1899. This invention relates to a dispensing can for oil, gasoline or other liquids. The can has a screw cap for the introduction of the liquid; a pouring spout extending from the bottom upwardly outside the can, with an inwardly turned end above the level of the top of the can. A horizontally fixed cylindrical spout extends partly across the top of the can, and beyond the inturned end of the upwardly projecting spout, which inturned end is enclosed within a horizontal spout. A spring-pressed valve or stopper closes against the inturned end of this spout, and a lever or suitable connecting mechanism serves to withdraw it when it is desired to pour liquid, then by tilting the can the liquid flows up the spout from the bottom and through the inturned end, thence passing out through the horizontal spout. The filling opening preferably has a strainer extending down from it into the can to prevent the introduction of heavy or foreign substances.

SASH FASTENER.—G. W. Manuel, Oakland, Cal. No. 639,419. Dated Dec. 19, 1899. This invention relates to a device for fastening windows so as to make them burglar-proof, and also to prevent their rattling. It consists of a spring-pressed bolt slidable horizontally through the rail of one sash, and having lugs projecting radially from its outer end, a keeper fitted to the rail of the companion sash with an opening through it adapted to admit the lugs of the bolt, and having inclined or cam-shaped surfaces so that when the bolt is turned the lugs engage these surfaces and draw the sashes together, locking them firmly in place. The keeper has an upward extension inclined rearwardly, so that when the sashes are closed, the projecting end of the bolt striking this incline will be pushed inward sufficiently to allow the sashes to pass each other, after which when fully closed the bolt will be shot forward by its spring and will thus latch the window to prevent its being opened. The turning of the bolt afterwards insures such a locking as will hold the two firmly together.

BOILER. — Benjamin Holt, Stockton, Cal. No. 639,390. Dated Dec. 19, 1899. This invention is intended to provide improvements in portable boilers of that class having water legs extending down upon each side of the furnace and combustion chamber for the whole length of the boiler. As usually constructed the connection between these water legs and the shell of the boiler is such that the strain upon the boiler caused by the swelling motion of moving over rough grounds wrenches and disengages the fastening so that such boilers rapidly become leaky. In this invention the inner sheet of the water leg has its upper end curved into an arc or segment, this curved end extending a short distance inwardly below the boiler, and it is riveted to the shell of the boiler along the line of contact. This curvature forms a strong base for the boiler, and in addition provides a much more complete and open connection for the rapid circulation of water within the water legs.

RAILWAY ORE PULVERIZER. — H. Mann, Piute, Cal. No. 639,418. Dated Dec. 19, 1899. The object of this invention is to provide a means for crushing ore on a large scale and an economical application of power, so that low grade or other ores can be reduced in large quantities and with rapidity. It consists of a single circular trough of short segments abutting and forming tight joints at their meeting ends, said segments having upwardly divergent sides with flanges at the top. Upon these flanges rails are secured and a mortar or car of any description is adapted to travel upon these rails. This car is connected with its axles by loose links, heavy spiked and smooth rollers, one following the other, so that as the car travels around the circumference of the apparatus these rollers serve to pulverize the ore within the trough. Behind these rollers a heavy drag or drags are made to follow, being also connected with the car, and thus the ore is finally pulverized as finely as may be desired.

DETACHABLE LEAF LEDGER.—E. Marsky, San Jose, Cal. No. 639,420. Dated Dec. 19, 1899. This invention relates to detachable or loose-leafed ledgers. It comprises metallic bars having toothed clamps or other fastenings coincident with slots, which are made in the inner edges of the loose leaves, and through which said clamps are adapted to pass. A slidable locking strip or wire is adapted to engage the sections, so as to secure the leaves in place. The sections are attached to flexible strips of bendable material, which strips are bent so as to form a book of any desired number of sections. Each leaf or leaves of the independent sections may be removed single or together, and others may be replaced so that the book can be perpetually kept up by adding new leaves as soon as the old ones are removed and filed.

Latest Market Reports.

SAN FRANCISCO, Dec. 28, 1899.

SILVER—Per oz., Troy: London, 27d (standard ounce, 925 fine); New York, bar silver, 58⅝ cts. (1000 fine); San Francisco, 58⅜: Mexican dollars, 48c.

COPPER. — New York Lake, $16.50; electrolytic, $16.25; casting, $16.12½; St. Louis, $16@16.25; San Francisco, 17½@18. Mill Copper plates, 23¾c; bars, 25½@27c.

LEAD.—New York, $4.75; St. Louis, $4.60; San Francisco, $4.65; pipe 7½, sheet 8¾, bar 6½c. London, Spanish Lead £16 7s 6d=4.55½c per lb.

SPELTER. — New York, $4.60; St. Louis, $4.55; San Francisco, ton lots, 5¾c; 100-lb lots, 6½c.

ANTIMONY. — New York, 9½c; San Francisco, 1000-lb lots, 10c; 300 to 500 lbs., 11@14c; 100-lb lots, 15@18c.

BABBITT METAL. — San Francisco No. 3, 6½@8c.

IRON. — Pittsburg, American soft, $25.25; Scotch, $26.50; San Francisco bar, per lb., 3¼c.

STEEL.—San Francisco bar, 11¼@20c per lb.

QUICKSILVER. — New York, $52.00; London, £9 13s; San Francisco, local, $51.50 ℔ flask of 76½ lbs.; export, $47.

PLATINUM.—San Francisco crude, $6 @12 ℔ oz.; manufactured, $19@22.

FERRO-MANGANESE. — San Francisco, ℔ ton, $30.

ASSAY LITHARGE.—San Francisco, 10c ℔ lb.

TIN.—New York, pig, $24.50, San Francisco, 29½c ℔ lb; bar tin, ℔ lb, 35c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c.

NICKEL.—New York, 40@45c ℔ lb.

BISMUTH.—New York, ℔ lb., $1.50; San Francisco, $1.60.

MAGNESIUM.—New York, $3 ℔ lb.; San Francisco, $3.25.

TUNGSTEN.—New York, ℔ lb., 75c; San Francisco, 90c.

FERRO-TUNGSTEN.—New York, 60c; San Francisco, 75c (60%).

CANDLES.—Granite 6s, 16 oz. 9¼c; 14 oz., 8¼c; 12 oz., 7½c; 10 oz., 6½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 34@36c ℔ lb.; carloads, 29@30c; in 10-lb. tins, 40c; sulphuric acid, 1¾c ℔ lb. 66% B; soda ash, $1.60 ℔ 100 lbs. 58%; hyposulphite of soda, 2¾@3c ℔ lb.; blue vitriol, 5½@6c ℔ lb.; borax, concentrated, 7@8c ℔ lb.; chlorate of potash, 12@13c; roll sulphur, 6c; alum, $1.90@2.00; flour sulphur, French, 2¼@2½c; California refined, 1¾@2c; nitric acid, in carboys, 8c ℔ lb.; caustic soda, in drums, 3@4c ℔ lb.; Cal. s. soda, bbls., $1.00; sks, 95c ℔ 100 lbs.; chloride of lime, spot, $2.35@2.50; nitrate of potash, in kegs, 8c; caustic potash, 10c in 40-lb. tins.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15¼c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11¾c; less than one ton, 13¾c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, $1.50 per keg; less car lots, $2 per keg.

CAPS.—3x, $5.50 per 1000; 4x, $6.50; 5x, $8; Lion, $9.

FUSE.—Triple tape, $4.35 per 1000 feet; double tape, $3.70; single tape, $3.45; Hemp, $2.55; Cement No. 2, $3.70; Cement No. 1, $2.95.

OILS.—California Castor, pure, cs., $1.15 per gal.; bbl., $1.10; pure, No. 2, cs., 90c; bbl., 85c; Baker's AA Castor Oil, in case lots of 200 gals. and upward, $1.24; less than 200 gals., $1.28; in bbls., 4c per gal. less than case; Baker's Crystal, $1.45; China Nut, 73c; Linseed, strictly pure, boiled, bbl., 66c; cs., 71c; raw, bbl., 64c; cs., 69c; lots of 5 bbls., 1c less; Lucol, boiled, bbl., 61c; cs., 66c; raw, bbl., 59c; cs., 64c; lots of 5 bbls., 1c less. Kerosene —Pearl, cs., per gal., 20c; Astral, 20c; Star, 20c; Eocene, 22c; Extra Star, 24c; Elaine, 25c; Water White, bulk, in tanks, 14c; Mineral Seal, iron bbls., 21c; wooden bbls., 23½c; cs., 26c; Mineral Sperm, 27c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 22c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 15½c; do., in cs., 21½c; Lard Oil, Extra Winter Strained, bbl., 55c; cs., 60c; No. 1 bbl., 45c; cs., 50c; Neatsfoot Oil, bbl., 55c; cs., 65c; No. 1 bbl., 50c; cs., 52½c; Crude Petroleum Oil, 8c; cs., 13c.; Whale Oil, bleached, 45c; Cocoa, cs., 55c.

COAL. — San Francisco coast, yard prices: Wellington, $8; Seattle, $6; Coos Bay, $5; Southfield, $7.50. Cargo lots, Eastern and foreign: Wallsend, $7.50; Brymbo, $7.50; Pennsylvania, hd., $14.50; Scotch, $8; Cumberland, $9; Cannel, $9.50; Welsh Anthracite, $12.50; Rock Springs, $7.60.

San Francisco Stock Board Sales.

SAN FRANCISCO, Dec. 28, 1899.

9:30 A. M. SESSION.

100 G. & C.....24c	500 Overman....10c
250 C. C. & V.$1 40	300 Andes.....11c
100 Sierra Nev..41c	200 St. Louis....06c

2:30 P. M. SESSION.

300 G. & C.....25c	100 Belcher.....14c
200 B. & B.....27c	200 Union.. .....28c
300 C. C. & V.$1 45	

List of U. S. Patents for Pacific Coast Inventors.

REPORTED BY DEWEY, STRONG & CO., PIONEER PATENT SOLICITORS FOR PACIFIC COAST.

FOR THE WEEK ENDING DEC. 19, 1899.

639,341.—VIOLIN KEY—C. J. Beauvais, Phœnix, Ariz.

639,350.—LABEL HOLDER—E. L. Brown, S. F.

639,525.—PRUNING SHEARS—A. W. Conatser, Los Angeles, Cal.

639,534.—VESSEL COVER FASTENER—R. W. Crocker, Seattle, Wash.

639,550.—HEATER—J. R. Froberg, Grass Valley, Cal.

639,370.—BOOK HOLDER — T. J. Gary, Oregon City, Or.

639,377.—CUTTING TOOL—G. M. Grant, Valley Springs, Cal.

639,380.—STEP LADDER—J. D. Hall, Bostonia, Cal.

639,388.—MITER BOARD—P. A. Holmberg, Los Angeles, Cal.

639,390.—BOILER — B. Holt, Stockton, Cal.

639,393.—DISPENSING CAN—C. M. Husted, Prescott, Ariz.

639,257.—OIL BURNER—H. Luckenbach, Snohomish, Or.

639,418.—ORE PULVERIZER — H. Mann, Piute, Cal.

639,419.—SASH FASTENER—G. W. Manuel, Oakland, Cal.

639,420.—LEDGER—E. Marsky, San Jose, Cal.

639,260.—BANDAGE—G. A. Mattern, Berkeley, Cal.

639,690.—ELECTRIC CANE—W. N. Sherman, Merced, Cal.

639,302.—OIL BURNER—J. F. Shultz, San Jacinto, Cal.

639,310.—ANIMAL TRAP — J. B. Stout, Stewart's Point, Cal.

639,463.—CORSET STAY—Mary E. Thompson, S. F.

639,471.—FAUCET FILTER—G. W. Van Alstine, Los Angeles, Cal.

639,474.—STEAMER AND BOILER—R. W. Welty, S. F.

639,475. — WASHER AND CLEANER — Whalen & Warner, Portland, Or.

639,375.—FRUIT WRAPPING MACHINE—J. C. Wilson, Los Angeles, Cal.

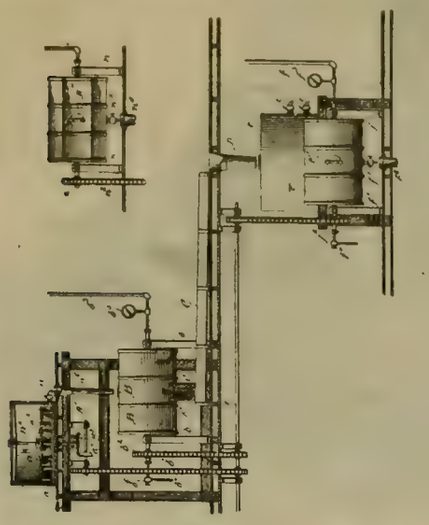
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Patents Issued Dec. 19, 1899.

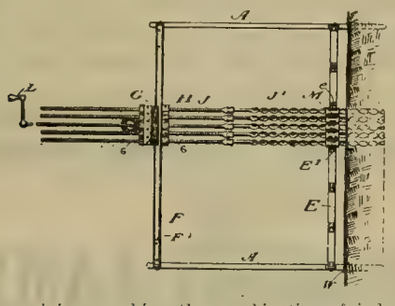
Specially Reported for the MINING AND SCIENTIFIC PRESS.

MANUFACTURE OF LEAD OXID.—No. 639,209; W. E. S. Bunn and E. J. Case, Peoria, Ill.



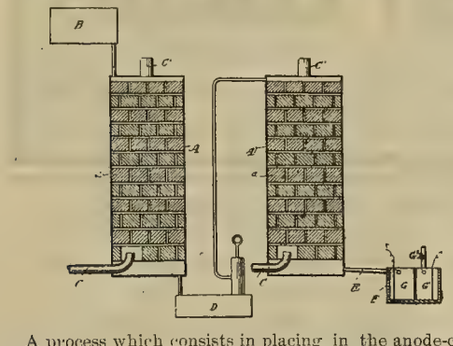
An improvement in making lead oxid and white lead, continuously, consisting in, first, reducing metallic lead by attrition and agitation in water; second, conducting the comminuted lead, mixed with water, into a separate vessel and therein subjecting the same to a rolling and tumbling motion in the presence of compressed air; third, settling the non-oxidized metallic lead and floating off of the lead oxid, and then subjecting the lead oxid, mixed with water, to a further rolling and tumbling motion and to the action of carbon dioxid under pressure.

MINING MACHINE.—No. 639,267; W. T. Moss, Walsall, Pa.



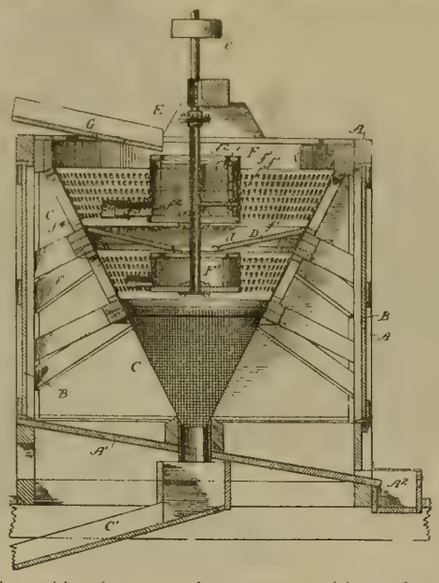
In a mining machine the combination of independently adjustable and reversible vertical standards, each having a C-slot in one end, and the horizontal drill-press carried by C-slots and provided with bearings at opposite ends thereof. A framework comprising the posts A, the four standards secured to the same, a pair of horizontal supports carried by the standards and parallel with each other and with the vein to be drilled, a hanger slidable along one of supports and carrying a multiple drill-press, a guide-block for the other end of the drill-press and projections upon the other of the supports carrying the guide-block. The combination of the posts A having eyes a, the vertical standards B and B′ having pluralities of eyes b adapted to register with eyes a, the laterally-open C-shaped slot in one end of each vertical standard, and the horizontal drill-press supports resting in and sustained by the C-shaped slots. The combination of the standards having laterally-open C-shaped slots, the horizontal supports E and F carried in the C-shaped slots, the drill-press hanger carried by the support F, and the guide-block carried by C-shaped slots on the said support E.

PROCESS OF RECOVERING ZINC FROM REFRACTORY ZINC-BEARING ORES.—No. 639,579; J. Jones, East Melbourne, Victoria.



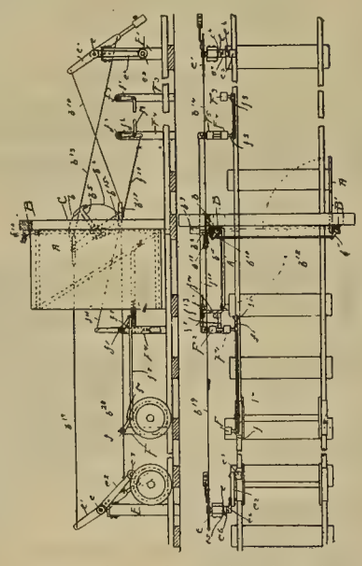
A process which consists in placing in the anode-compartment of a cell having a suitable diaphragm, a mixture of sulphate of zinc and sulphate of ammonium, placing in the cathode-compartment an acid solution containing sulphate of zinc, passing an electric current through both solutions, whereby zinc and ammonium are set free at the cathode, and continuously adding to the cathode solution sufficient acid solution containing zinc sulphate to neutralize the ammonium liberated in solution and to maintain in the solution a low degree of acidity.

ORE SEPARATOR.—No. 639,433; A. Pratt, Butte, Mont.



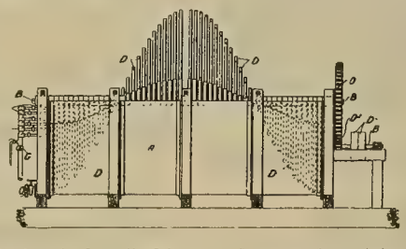
A machine for separating ores comprising a funnel-shaped screen and a rotating bucket or distributor centrally disposed within screen, bucket or distributor being divided by partitions into separate compartments, compartments having floors at different heights, and each of compartments having an opening in its side wall above its floor through which the material is thrown against the screen.

MINE-GATE.—No. 639,629; W. H. Tschantz, Orrville, Ohio.



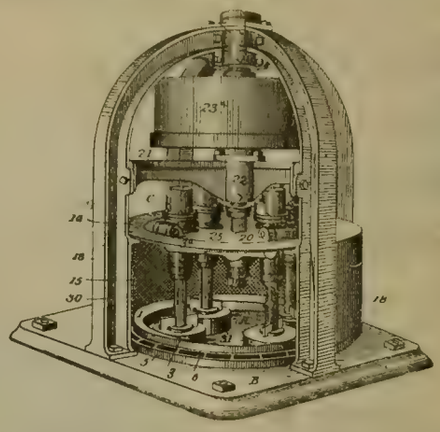
In a mine-trap door, the combination of oppositely-disposed gates mounted upon vertical shafts, provided with crank-levers coupled together, depending oscillating clutch-levers, journaled at the side of the track, and upon both sides of the gates, a bevel-gear train communicating with one of the vertical shafts, and wires connecting the gear-train with the oscillating clutch-levers.

MEANS FOR MIXING AND AERATING SANDS OR TAILINGS WHILE UNDER TREATMENT BY SOLVENTS.—No. 639,540; W. Duncan, Day Dawn Ridge, Charters Towers, Queensland.



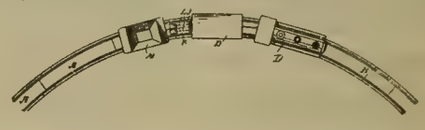
The herein described improved means for mixing and aerating sands, tailings and the like, comprising a semicircular vat, a horizontal rotatable shaft journaled therein, arms helically arranged on which depend into close proximity to the bottom, a plurality of outlets arranged at varying levels and uniting in a common pipe leading to the sump, a cock in pipe and an independent pipe leading from discharge pipe to a filter, and having a cock and a discharge sluice for draining said vat.

JOURNAL BOX FOR PULVERIZING MACHINES.—No. 639,360; J. C. Clark, Atlanta, Ga.



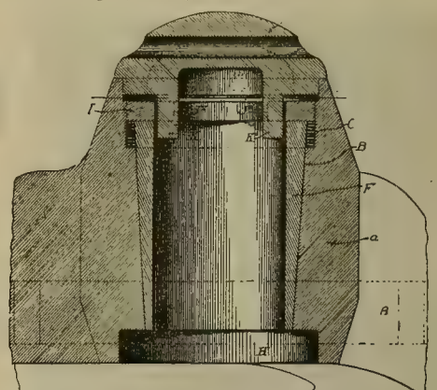
The combination with a shaft having a collar below its end, of a box enclosing the end of the shaft, a brass fitted within the box below collar, and a second box fitted within the box above the collar, oil chambers within the box, one with an opening leading to the collar, and the other with an opening leading to the upper brass.

RAILWAY ORE PULVERIZER.—No. 639,418; H. Mann, Piute, Cal.



In an ore-crushing apparatus, a circular sectional trough having the rails of a track fixed upon the flanges forming the top of the trough, a motor, the wheels of which are adapted to travel upon track, a second car connected with and drawn by motor, links loosely connected with the front and rear axles, and inclining backwardly therefrom, a spiked crushing and digging roller, the shaft of which is journaled to the front set of links, a corrugated crushing roller similarly connected with the rear set of links, a plurality of heavy, flat-bottomed drags with chains extending from the front of the tracks to the rear of the car, and a mechanism by which the drags may be moved to or from each other.

ROCK AND ORE BREAKER.—No. 636,558; E. E. Hanna and T. W. Capen, Chicago, Ill.



In rock and ore breakers, the combination of a gyratory shaft, a spider portion provided with a central hub having a tapered axial opening, a portion of such opening being counterbored and threaded and the upper portion being bored to form a true concentric cylindrical surface, a longitudinal split tapered bushing in the tapered portion of the spider opening with its longitudinal edges in rigid engagement with each other, a ring nut in the threaded opening for adjustably holding the longitudinal edges of the tapered bushing in rigid contact with each other and the bushing in rigid engagement with the spider, and a cap in the upper smooth bore of the spider opening engaging with the ring nut to operate the same.

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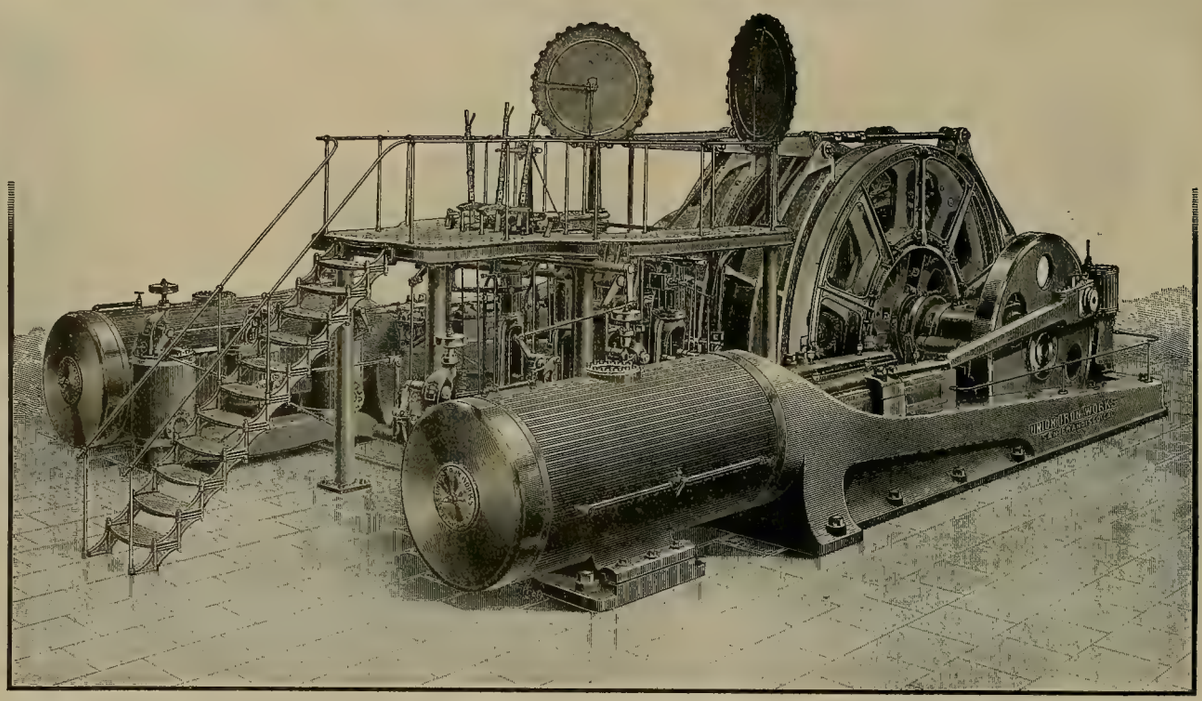
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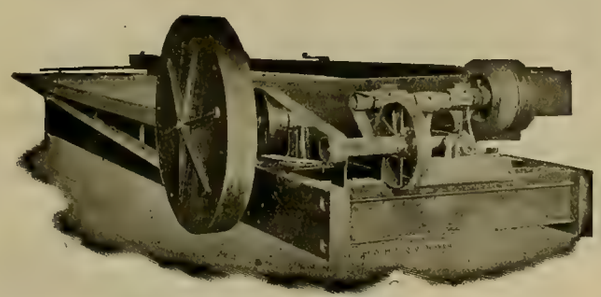
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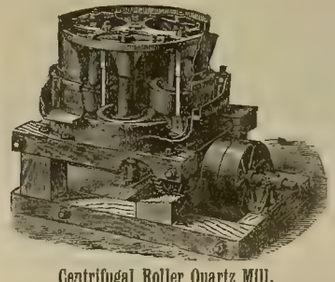
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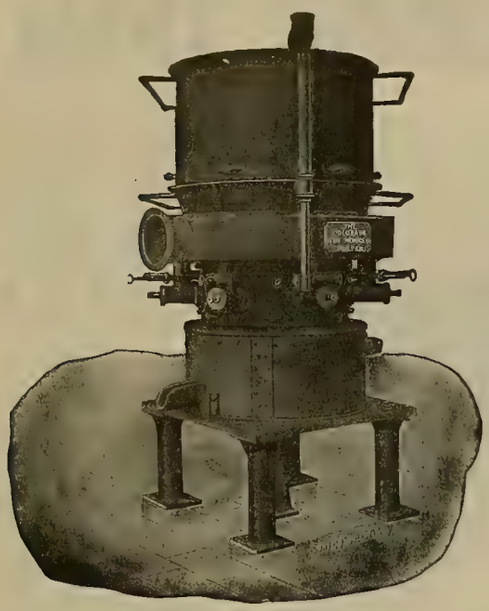
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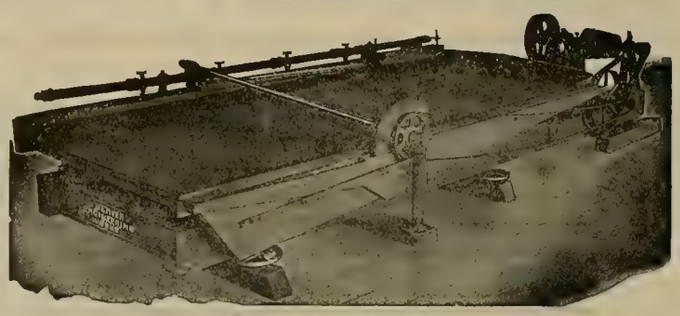
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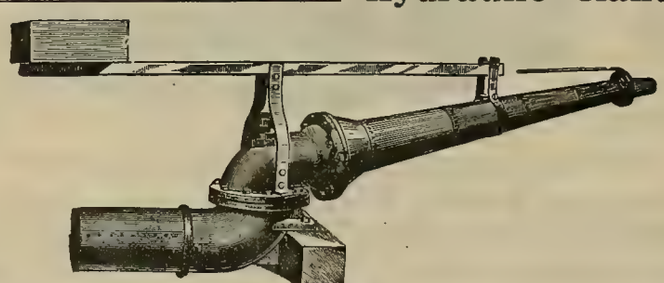
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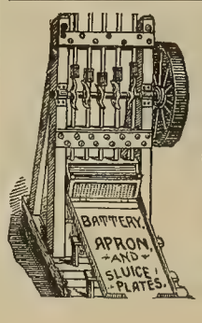
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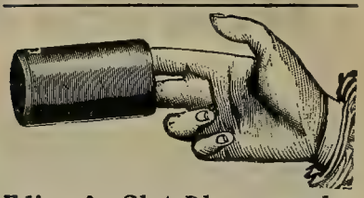
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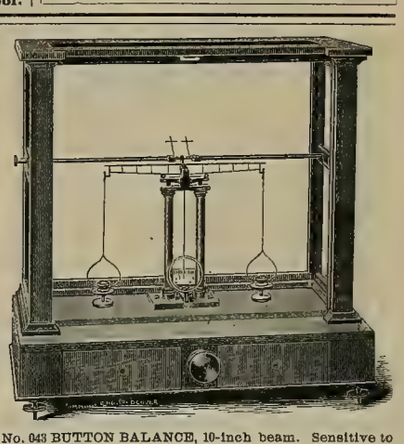
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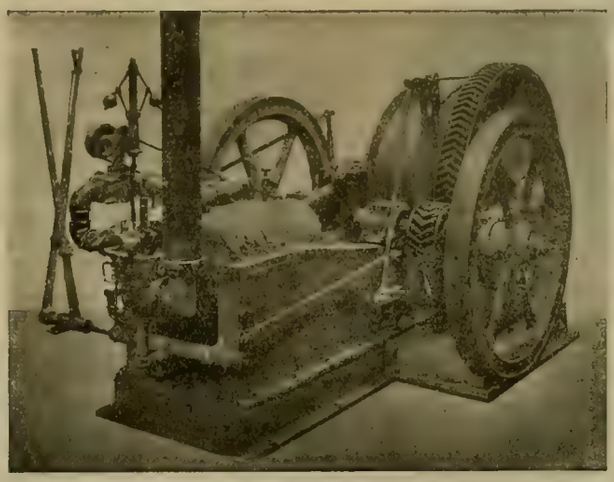
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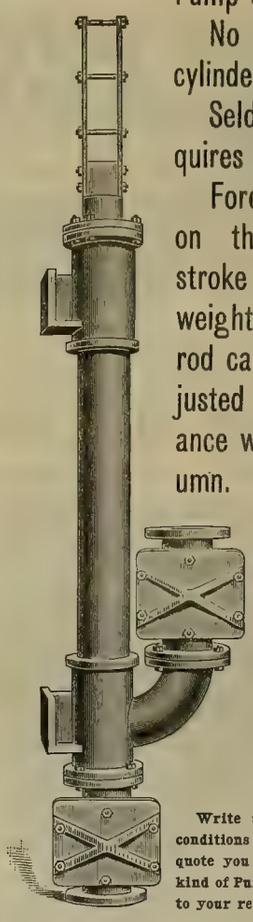


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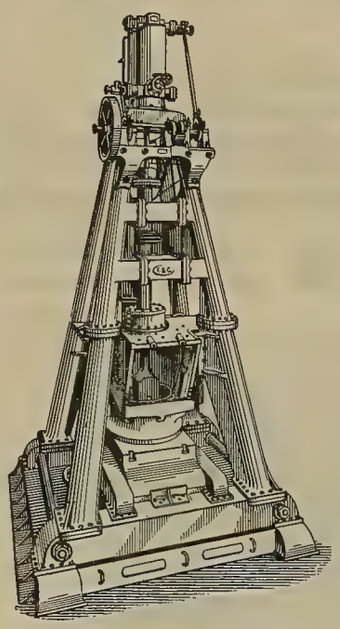
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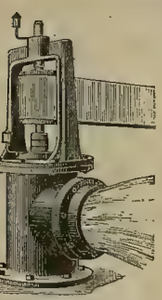
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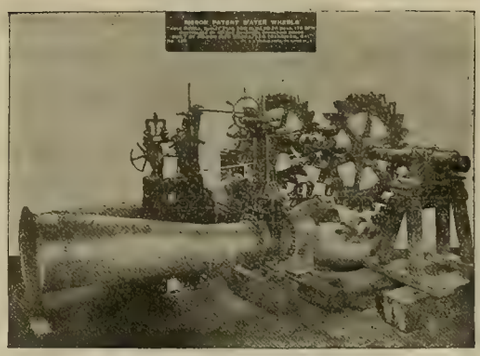
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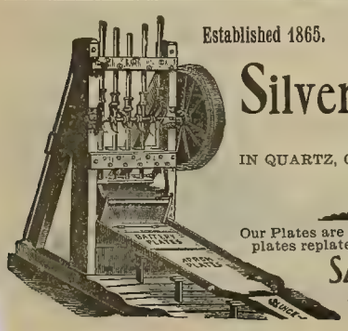
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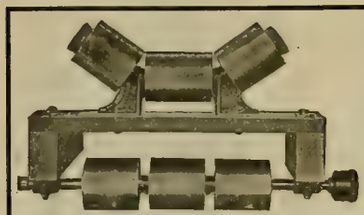
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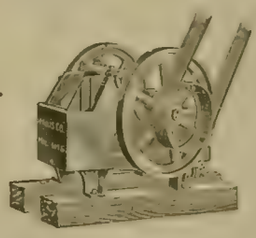
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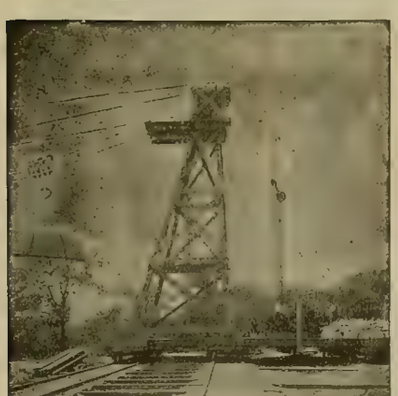
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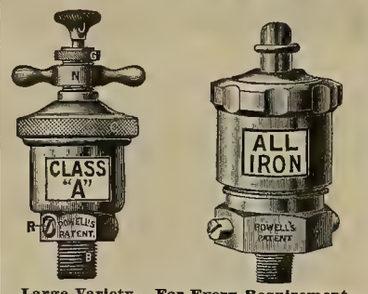
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Notice is hereby given, that at a meeting of the Board of Directors, held on the 25th day of November, 1899, an assessment (No. 21) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 217 Sacramento street, San Francisco, California.
Any stock upon which this assessment shall remain unpaid on the 2nd day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.
By order of the Board of Directors.
CHARLES BOVONE, Secretary.
Office—217 Sacramento street, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras county, California.
Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of November, 1899, an assessment (No. 3) of ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 24 Post street, San Francisco, California.
Any stock upon which this assessment shall remain unpaid on the 9th day of January, 1900, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 20th day of February, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.
By order of the Board of Directors.
E. P. HEALD, Secretary.
Office—Heald's Business College, 24 Post Street, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Placer County, California.
Notice is hereby given, that at a meeting of the Board of Directors, held on the 6th day of December, 1899, an assessment (No. 22) of one-half cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 31, No. 214 Pine street, San Francisco, California.
Any stock upon which this assessment shall remain unpaid on the 6th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 27th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.
By order of the Board of Directors.
GEO. W. DIXON, Secretary.
Office—Room 31, No. 214 Pine street, San Francisco, California.

SAVAGE MINING COMPANY.—LOCATION OF principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.
Notice is hereby given, that at a meeting of the Board of Trustees, held on the 8th day of December, 1899, an assessment (No. 99) of ten cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 50, Nevada block, No. 309 Montgomery street, San Francisco, California.
Any stock upon which this assessment shall remain unpaid on the 10th day of January, 1900, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 30th day of January, 1900, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.
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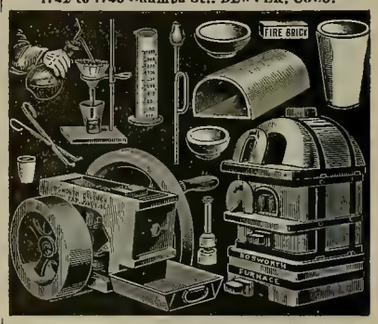
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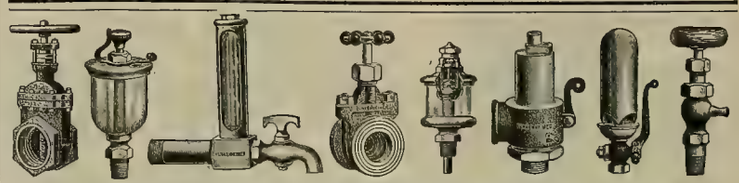
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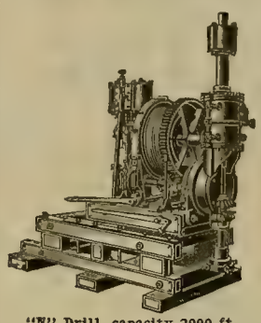
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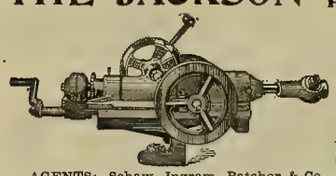
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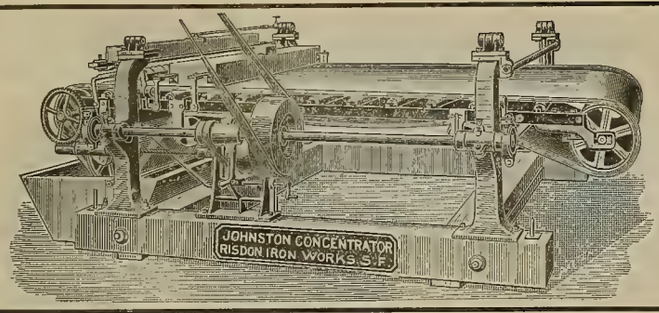
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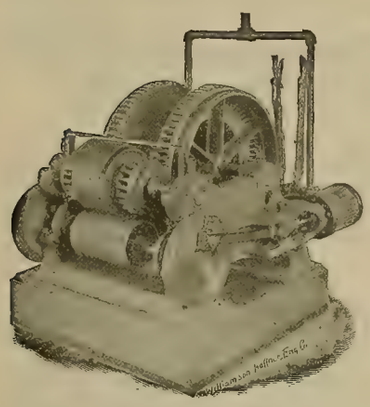
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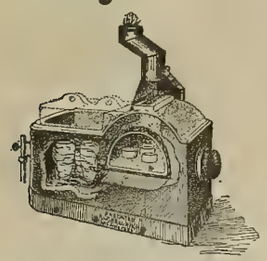
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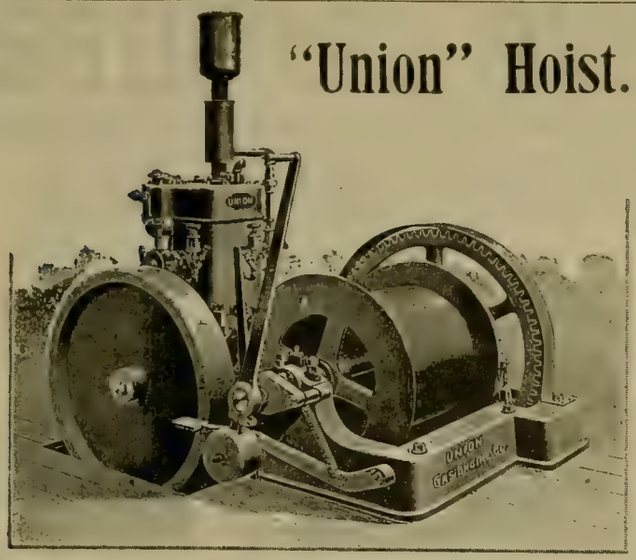
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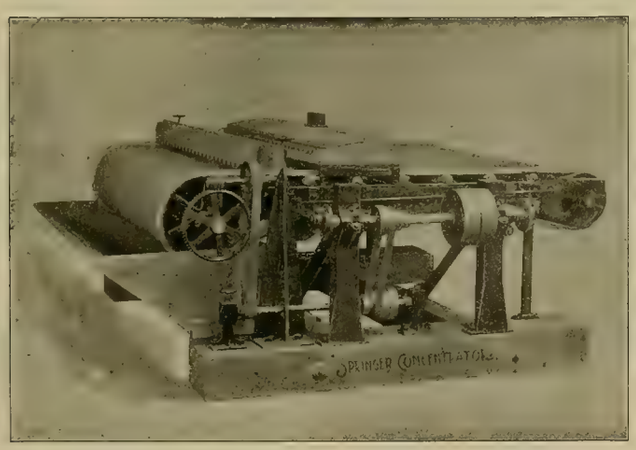
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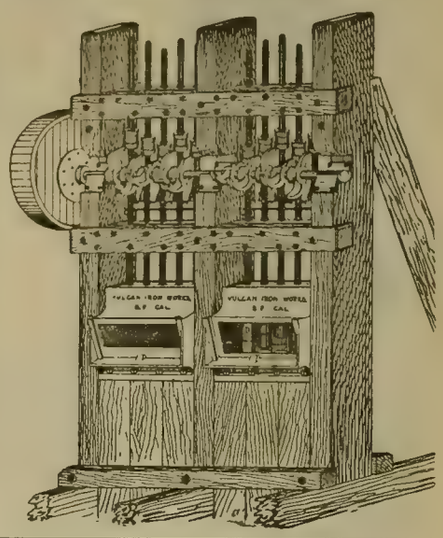
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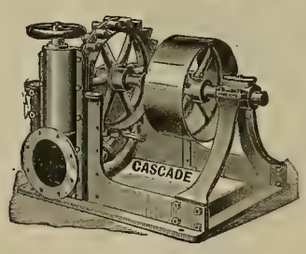
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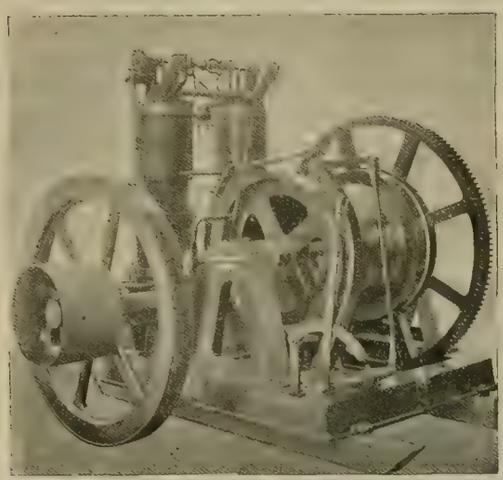
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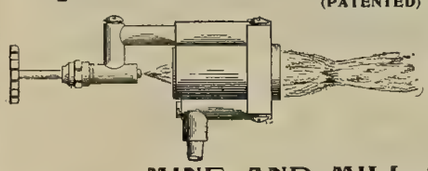
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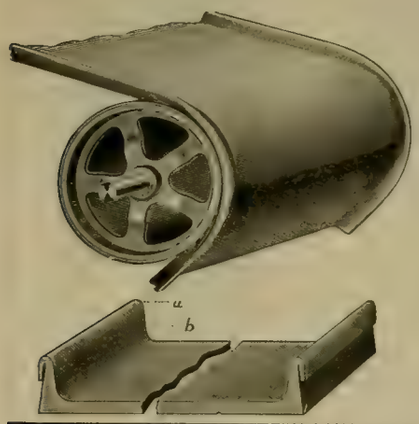
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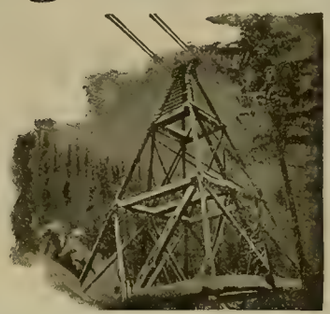
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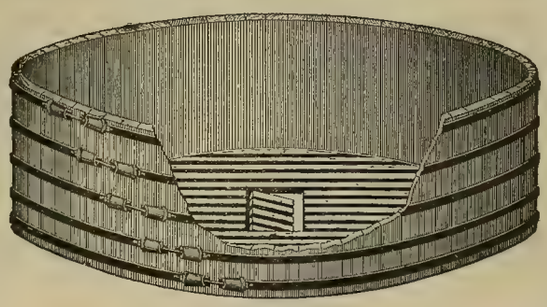
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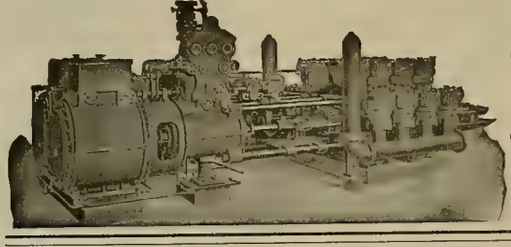
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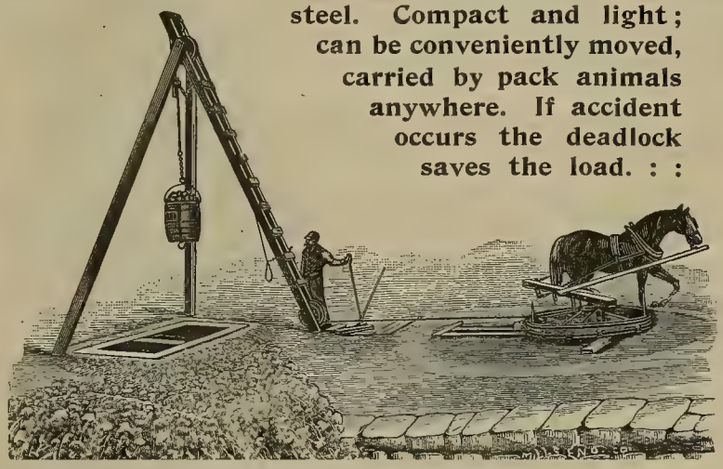
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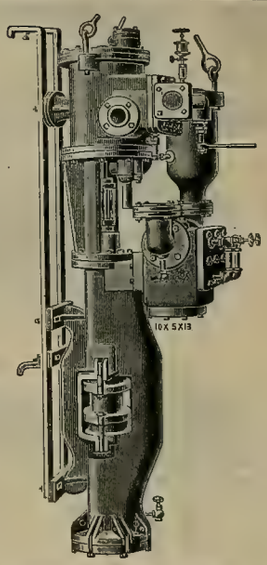
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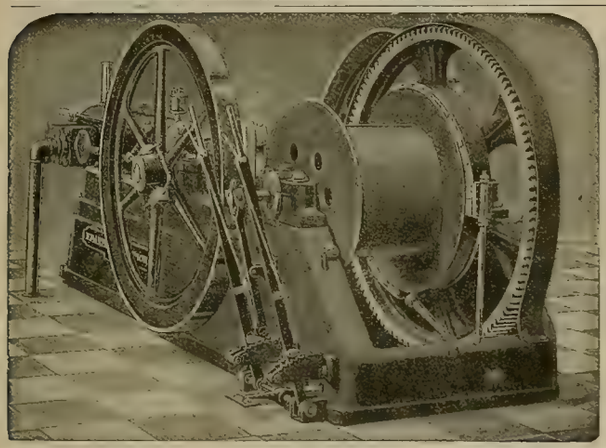
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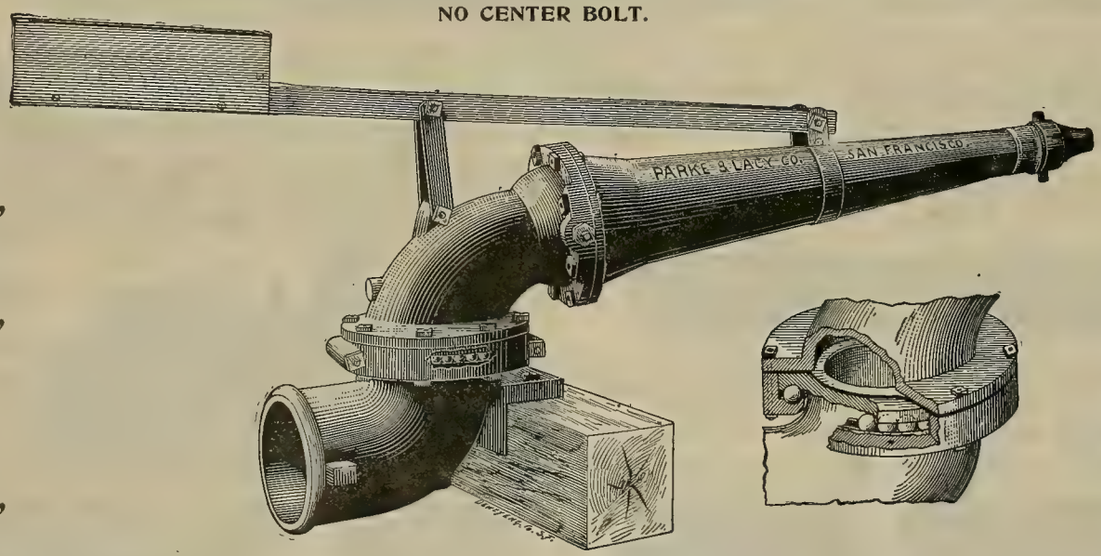
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INDEX VOLUME LXXIX

OF THE —

Minin Scientific Press.

FROM TO DECEMBER, 1899.

A

PAGE.

Aaron 311
Aband , How Relocated. 115
Absor d and Cyanide....285
Abuse ers 293
Acaci Timbers. 487
Accid es, Causes of....226, 255, 691, 743
Achi Metallurgy. 318
Acid 255
*Acc f Bitumen 631, 665
Acro e Pitch....257
Add Neff at California Miners' Con-
ve 489
Adi Gas Engines.. 283
Adv ing....486
Ad Business View of It 570
Ag 264
* A Lining Vats....637
* A sor....203, 259, 518, 546, 693
....407
n Mines.... 87
Tunnels....35
* g Camp, Lower California....577
* ast from St. Michael to Point Bar-
....748
A Lands....686
l Mill....143, 310, 714
.13, 65, 96, 123, 151, 177, 205, 289, 319, 345, 465, 521, 551, 581, 611, 638, 667, 694, 722, 750
Millions....86
& Sons....264
hts to Mineral Land....35, 59
& Co....95, 208, 264
pper and Antimony....441
f....311, 576
hinum and Manganese....543
per and Lead....143
....515
Separation From Bauxite....255, 311
, New Demand for....494
....318, 348, 553
ical Conductivity....3, 92, 203, 515
Wires for Electric Road....6
Corundum....687
oldered....180
ction in U. S....227, 487
nating Apparatus....491, 575, 637
ated Copper Plates....8, 69
....687
nt to California Constitution....543
s Lead in Iron and Steel Production....285
n Inventive Genius....718
Min Engineers.. 34, 59, 198, 227, 337, 338, 372, 373, 374, 375, 459.
g Machinery....403
er Lumber Co....316
el & Wire Co.'s Exhibit....541
l Co....264
a as a Fire Extinguisher....494
ess in Reduction of Copper Ores....181
ia M Co....171
zing Slimes....256
Grecian Mines....543
r channels, Age of....487, 571
site States....603
e in San Diego Co., Cal....35
Barometer....87, 631
ite....115
ing Steel....311
ed Silver....743
e Cement....349
te to Cyanide Poisoning....59, 209, 311
onial Compounds....227
e....371
ratus for Purifying and Recovering
als....407
or Mining Precious Metals....381, 575
or Roasting Refractory Ores....381
or Washing Placer Soil....231
or Thawing Frozen Ground....315, 519
For Separating Sulphur From Ores....546
For Dry Placer Concentration....546
For Thawing Explosives....546
For Raising Bituminous Sand....575
For Regulating Furnace Discharge Area..575
For Raising and Lowering in Mines....607
onite....225
Principle in Dams....525
ean Rocks....515
h Rock, Removal of....204
se....143
ona Copper Mines....86, 515
Mines....18, 41, 65, 96, 123, 151, 177, 205, 233, 261, 289, 319, 345, 382, 409, 438, 465, 495, 521, 551, 581, 611, 638, 667, 694, 723, 750.
And Utah Railroad....236
Mining Law....371, 459
Placer Mines....310
ona's Petrified Forests....746
ansas Mines....261
ose Rocks....603
angement of Wheel on Shafting....327
hor Plate, Price of....87
Plate, New....441
rastra in Mexico....401
anging Mine Samples....4
tesian Well Attachment....7, 259
ificial Paving Stone....515
Draught and Smokestacks....283
Ice, How Made....403
bestos....403
spen, Colorado, Mines....492
say of Ore; Ratio of Gold to Silver....571
Of Foreign Lead Ore....318
Values of Ore, Concentrates and Tailings..571
ssaying Furnace....518
System at Swansea....603
ssessment Work....3, 59, 115, 171, 199, 255, 311, 371, 403, 431, 543, 571, 631, 686, 687.
ssessing Corporation Stock....375, 403
ssessable vs. Non-assessable Stock....630
tlin District, B. C....226, 235
tmosphere That Destroys Life....603
tmospheric Pressure....171, 603
tomic Weight, What It Is....3, 283
Attachment for Wheelbarrows....407

B

Babbit Metal, How Best Melted....203
*Bailing Tank....520
Ballarat, Victoria, District....631
Baldwin Locomotive Works....236
Barbour, T. J....126
Base of Explosives....571
Battery Plates, How Best Built....283, 715
Feeding of Quicksilver....283
Barrier Reef, What It Is....115
Barrel Chlorination....1
Bauxite....311, 543
*Beach Mining at Cape Nome, Alaska....456, 462
Gold, Recovery of....431
Sand, Magnetic Separation of....543
*Belt Conveyors....550
How Best Arranged....389
Transmission, H. P....143
Belt Machines for Batteries....431
Benefits of Concentration....2-2
Benjamin, E. H....68, 264, 342
*Best Mfg. Co....568
Bingham, Utah, Mines....339
Bi-Chloride of Mercury....543
*Bi-Metallic Hoist, Granite Mountain, Mont....657
*Bitumen Deposits....631, 665, 691, 721
Blake, W. P....374
*Blast Furnace....287
Furnace, Capacity of....339, 666
Black Sand, How Best Treated....87
Blankets in Concentration....402
Blasting by Knox System....35
Cost of....515
Soft Ground....371
Powder, How Not to Handle It....571
By Electricity....664
Blue Lakes, Cal., Power Line Construction....6
Board Feet in Stick Timber....687
Boiler Evaporation, How Determined....143
Incrustation, Removal of....201
*Steam....7
*Boring Tools Used in Diamond Drilling....369, 378
Bonus for Metal Discoveries....715
*Bonanza Mill, Sumpter, Or....200
Mine, Tuolumne, Cal....115
Boothe, C. B....180
Book Notices....208, 292, 321, 384, 468, 752
*Boundary District, B. C., Mines....349
Boring Holes in Soft Ground....173
By Diamond Drill....146
Borax in California....35, 87
Bornite....227
Bowie, A. J....321
Brazilian Sand....318
Mines....9, 37, 171
Bradley, F. W....669
Bratnober, H....153
Brayton, A. P. Sr....347, 553
Breaking Soft Ground....255
Bridge, Average Life of....265
*B. C. Mine, Greenwood, B. C....340
British Columbia Mines....15, 42, 98, 125, 142, 163, 176, 179, 207, 225, 264, 291, 309, 321, 347, 384, 411, 439, 467, 497, 515, 523, 553, 582, 612, 640, 696, 725, 751.
*Prospectors....85, 169, 661
*Coal Mines....253
Contract System....197
Mining Salaries....691
*Browne's Vacuum Bailing Tank....520
*Briquettes, Apparatus for Making....7, 747
Broken Hill Sulphides....292, 543
Bromine Process....459
Browne, Ross E....553
Bucyrus Co....208
Buffalo Hump Region....34, 258
*District, Idaho....258
Bulkheads and Dams in Mines....3
*Bullock, M. C., Mfg. Co....378
*Bull River, Kootenay, B. C....253, 309
Business Not All Barter....497
Operation of a Mine....58
Butters, Chas....180

C

Cadmium, Separation from Iron....318
Calaverite....35
Calcareous Travertine....115
*Calorimeter....260
Calumet & Hecla....630
*Calmalli, Lower Cal., Mines....401
*Calcining Furnace....91, 407
Call Loans....459
California at the Paris Exposition....549
Aggregate Yield for 50 Years....370
Annual Gold Output for Thirteen Years....742
Auriferous Sulphides, Concentration of....340, 379.
Borax....35, 87
Corporation Stock Assessable....339, 371
*Canal Construction....436
Deep Mining....59, 404
*Drift Mining....604, 605
Early Mining Claims....487
Fissure Veins....371
Gold Belt, Mines of....92, 121, 174, 284
*Gold Dredging....33, 36
High Mines....113
*Irrigation System....576
Leather....236
Mines..13, 41, 65, 96, 123, 151, 174, 177, 205, 233, 261, 289, 319, 345, 382, 409, 438, 465, 495, 551, 581, 611, 638, 667, 694, 723, 750.
Mining Law Unrepealed....170, 171, 199, 202, 714
Mining Decisions....2, 170, 171, 255, 311, 603, 687
Mineral Producing Counties....33
Mineral Product and Values for 12 Years..352, 353.
*Oil Yielding Formations....144, 172
Pocket Mines....283
Petroleum....142, 144, 255, 371, 430, 543
Quicksilver Mining....1, 371
Quicksilver....459
Riparian Rights....227
Roscoelite....93
*Soldiers....341
*Shasta Co. Copper Belt....690
State Miners' Association..87, 114, 283, 403, 459, 486, 489, 490.
State Mining Bureau....114, 235, 613
Water Shortage....86, 430, 542
Wide Tire Law....654
Cam Shafts....283
*Cam or Pulley Fastener....463
Caminetti Act Constitutional....255
Canadian Mining Institute....143
Mines....68, 235, 321, 411, 468, 582, 725
Canada's Deepest Mine....143
*Canal Construction in California....436
Capitalization and Dividends....142
*Cape Nome, Alaska...457, 462, 514, 521, 602, 611, 748
Carbonate Oxide....283
*Carbonate Hill, Leadville, Colo....713
Carborundum....403
*Carson Hill, Cal....713
Carbide Components....468
Carlyle, W. A....321, 640
Carpenter, F. R....440
Carson, Nev., Mint....311
Cassell's Chlorination Method....687
*Caving System of Mining....660
Cause of Mine Accidents....226
*Cell for the Precipitation of Metals....119
Cement Made from Slag....487
Cement for Tin....35
*Centennial-Eureka Mine, Utah....657
Centigrade Thermometer....403
Century Development Co....58
Century's Progress....742
Cerium....403
Cerro de Pasco....631
Cerro Pintada Mines....58
Charcoal in the Cyanide Process....458, 517
Charcoal as a Precipitant of Gold from Auro-Cyanides....122, 458
Charcoal as a Gold Precipitant in Cyanide Solution....607
Cheap Deception....570
Cheap Mining and Milling....577
Chinese Coins and Coinage....82
Mines....180, 207, 348
Chinese Wall, Removal of....547
Chuckblocks for Screen Frames....715
*Cheap Mining and Milling, Overland Mine, Utah....380
'Cheap" Assaying....371
Chlorine Gas, How Generated....87
Chlorination by Electrolysis....687
Chlorite....283
Chrome Iron in Cal....459
Characteristic Mines of the California Gold Belt....92, 121, 174, 284
Check Valve Pressure....283
Chemical Elements....143
Grouping of Metals....715
Features of Gold....722
Chilean Nitrate Shipment....487
* Chicago Drainage Canal....406
Chilcoot Pass....39
Chromite....35, 311
"Chute" and "Shoot"....311
Christy, S. B....468
Chrysocalla....657
Cinnabar Ores....227, 543
Circular Inch....35
*Clark Patent Tube Mill....721
Clear Lake, Cal., Electric Plant....39
Clark, W. J....669
Clark, W. A....95, 153
Clastic Rock....143
Clement, V. M....153, 208, 524, 640
Coal in the Yukon....321
Coarse Crushing Experiment....122
*Coal Washing in Washington....691
* Mining Devices....317
* Waste, Utilizing....747
Cobalt and Nickel....121
*Cochrane Heater and Purifier....208
Cœur de'Alene Labor Troubles....2, 199, 514
Coffee Creek, Cal., Mining District....689
Coinage at Denver Mint....311
Colemanite....431
Colombia, S. A., Mines....94, 613
Columbite....283
Collier, J. H., Jr....404
Color of Gold....199
Colorado's Deepest Mine....459
Colorado Springs Mining Exchanges....227
Colorado Electric Power Co....293
Eight-Hour Law Unconstitutional....86
Fuel & Iron Co....264, 292
High Mines....113
Iron Works Co....180, 236, 348, 726
Largest Gold Nugget....715
Labor Law....34
Mine Wages....39
Mines 14, 41, 65, 97, 124, 153, 178, 206, 234, 262, 290, 319, 346, 382, 410, 438, 466, 496, 522, 545, 552, 581, 611, 638, 668, 694, 723, 750.
Mine Managers....282
Mining Decisions....430, 431, 459, 654
Roads to Mines....310
Prosperous....226
Smelters....370
Zinc Shipments to Wales....255
Copper in Maine....631
* Belt of Shasta Co., Cal....690
Bearing Water....115
Coin Imported....115
Chloride....371
Commercial, Rarely Pure....227
Deposits of Vancouver Island....375
Deposit near Prescott, Arizona....115
For U. S. Mintage....283
In South Africa....516
King of Arizona....311
Large Masses of....9
Mines in Arizona....86
Ores, Where Occurring....459
Ore Reduction....181
Ore in Fossil Fish....171
Output....69, 115
Ore in Texas....543
Ores of Boston & Montana Co....543
Production at Houghton, Mich....236
Production of Arizona....515
Percentages at Lake Superior Mines....631
Plates, How Cleaned....8
Prices of....2, 34, 114, 142, 170, 570
* Queen Mine, Arizona....432, 433, 460
Some Properties of....120
Statistics....175, 515
Stamping at Lake Superior....430
Sulphides....339
Tubes and Sheets Direct from Solutions....574
Weight of....3
Water, Butte, Mont....143
* Compressed Air Locomotion....741
Compressed Air Mechanical Haul....
Machinery Co....
* Combined Knife and Candlestick, California....
Compressed Air in Mines....in Californ....609
Comstock Tunnel Co....115
* Commemorative Scroll....311
Commercial Copper Rarely Pure....227
Comstock Pumping Association....236
* Commercial Development of the Gas Engine....64
* Continuous Process of the Slimes Treatment....90
Convergence of Veins....35
Contact Veins....487
* Concentrating and Amalgamating Machine....91, 287.
* Table....381, 609
Sulphide Ores in Cal....543
*Concentrator....287, 348, 381
Concentrators, Proportion of for Batteries....431
Concentration of Auriferous Sulphides in Cal..340, 379.
Tests....430
Of Ores....288, 311, 514
Benefits of....262
"Concentrates"....Every issue
Conglomerate Deposits....255, 403
* Congress Mine, Arizona....
Contract System in British Columbia....197
* Conservation of Water....120
Contract Work in Mines....311
Concentric Decomposition of Rocks....403
* Cooling Device for Furnace Walls....119
Coolgardie, Australia, District....69
Co-operative Milling....685
Cost of Milling Ore, How Determined....255
Sinking Shafts....283
Cornell's Hydraulic Laboratory....61
* Corrosion of Rocks....5
Corundum....59, 87, 94
County Mining Bureaus....59
Corundum Land Concessions in Canada....576
Cost of Concentrating Sulphide Ores in California....543
Cracking in Brass....199
Creede Mines, South Dakota....376
Cripple Creek, Colo....487, 602, 613, 688, 715, 716, 744
Tunnel Enterprises....464
Crosscutting Ore Veins....487
Crosscut Tunnels, When Not Advisable....255
Crosscuts Through Hard Ground....87
* Crow's Nest Collieries....253
Crucible Steel, When Invented....543
Crushing Rolls, Broad and Narrow....431
* And Grinding Mill....491
Wet and Dry....487
Cryolite....571
* Crusher and Pulverizer....607
* Cupel Cooler for Assay Furnaces....407
Cuban Mines....613, 696
* Cupel Machine....607
* Cupola Furnace....693
Cumarano Salts....722
Cyanide Dissolving Base Metals....543
And Gold Absorption....285
At the De Lamar, Nevada, Mine....459
Bullion, Notes on....40
Cost at Bodie, Cal....35
Experiments in South Dakota....311
Leaching Vats....171
Plant, Wentworth, Lucknow, N. S. W....672
* Plant, First in British Columbia....225
Plant in Australia....120
Poisoning....550
Process, Johnson's Pneumatic....487
Process at De Lamar Mine, Mercur, Utah..487
Process, Experimental....87, 631, 636
Process and Charcoal....458, 517, 636
Process and Copper....199
Poisoning, Antidote....59, 94, 209, 311
Process, When First Introduced....715
Retorts in El Dorado Canyon, Nev....87
Slimes, Flux for....255
Solution Filtration....550
Solutions, Gold Precipitated from....149
* Tanks....150, 631
Treatment, Uncertainty of Adaptability....609
* Working at the Taylor Mine, El Dorado Co., Cal....488
Cyanite....283
Cyaniding and Organic Matter....636
* At Gilt Edge, Montana....408
In Australia....64
Losses in....636
Prior to Amalgamation....349
Prior to Amalgamation....517
Refractory Tailings....631
* Slimy Ores and Tailings....4

D

Daly, Marcus....68
Dam and Debris Committee, Report of California Miners' Association....490
Dam Construction....59, 115
Damming the Ottawa River....4
Dams and Bulkheads in Mines....3
In Torrential Streams....59
Damourite....283
Daniell Cell....283
Dardanelles Arrastra, B. C....309
"Day," Kinds of....631
Decision, Buxton vs. Golden Reward, S. D....602
Calhoun vs. Ajax, Colorado....658
Deep Mine Pumping....543
*Deep Mining at the Utica Mine, California....404
In Nevada Co., Cal....406
In California....59, 404, 406, 487
In South Africa....255, 314, 344
Deepest Diamond Drill Hole....283
Deepest Mine Shafts in Colorado....543
Deidesheimer, Ph....468
DeLamar, Idaho, Report M. Co....206
Utah, Cyanide Process....487
De Beers Diamond Mine....108
Demolition of the Chinese Wall....497
Demand for Labor....198
Denver, Colo., Stock Exchange....59
Engineering Works Co....153, 292, 669
Denniston, E. G....264
Department of Mineralogy and Mining....718
Depth of Ore Formation....687
Derby, C. C....696
Deskyne, Lieut....236
*Desk Telephone, New Type of....637
*Destruction of Forests in the Sierra Nevadas....228
Determination of Cost of Milling Ore....255
Detonators, Kind Best for Blasting....715
*Device for Forcing Water Out of Wells....637
*For Operating Mine Shaft Doors....463
Developed Mines vs. Prospects as an Investment....719
Development of New Mining Property....542
Diamonds, Microscopic....604
*Diamond Drill Boring....146, 378
For Prospecting....255, 378
Mine Explorations....378
Diamond Mining in Brazil....9, 37
Mines of Kimberly, S. A....687
*Direct Acting Air Compressing Engine....437

* Illustration.

THE VOLUME LXXIX.

(From Preceding Page)

PAGE.

*Dividing Engine, Automatic 492
Dickie, Geo. W 669
Diffenbach Electrolytic Process 199
Diorite 431
Distribution, Grade and Size of Battery Plates 715
Ditch Regulations 311
Direction of Powder's Explosive Force 35
*Discharge Gate for Tanks 518
Discharge Pipe Connection in Mine Shafts 171
Dividends From the Transvaal 441
Before Starting 310, 430
And Capitalization 142
Declared 5, 82, 99, 126, 153, 180, 283, 292, 321, 348, 384, 411, 468, 497, 523, 553, 583, 614, 654, 669, 696, 725, 752.
Dividend Paying Mines 311
Divining Rod Miners 114, 665
*Dorotha Morton Mine 225
Double-Barreled Tunnel 317
Dolomite 603
*Douglas, Jas 337, 373
Dodd, W. G 412
Don't 544
Dow, Geo. E 553
Drainage by Syphon 237
Provision for 87
Draining Wet Tunnels 494
*Dredger 491, 546, 719
*Dredging Apparatus 38, 491
*For Gold in California 33, 36
*For Gold in Boise Basin, Idaho 148
In New Zealand 148
*Drier 491
Drift Timbering 631
*Drift Mine in California 603
*Drill 546
*Drill Forging and Sharpening Machine 607
Drilling Contest at Denver, Colo 403, 412
Rock 317, 403
Drill Broken, Removing From Bore Hole 431
*Dry Concentrator 381
Dry Blowing Placer Machines 631
Drydock at San Francisco 696
Dry Gold Placers, How Best Worked 543
Dykes, Eruptive Not Sedimentary 143
Ducktown, Tenn., Copper Mines 543
*Dumoing Bucket 38
*Car 463, 491
*Dust Arrester 348
Durfee, W. F 583
*Dust Collector 122
Duty on Iron Ore 282
Duties on Metals 515

E

Earth's Average Density 571
Earthquakes 35
Earthquakes and Volcanos, Relation of 115, 125
*Eastern Oregon Mines 200, 435
East Murchison, Australia, Gold Mine 375
Edison General Electric Co 238
Edison, Thos. A 321
Edison's Gold Extraction Process 459
Eight-Hour Law in Colorado 86, 95
Ekman, A 237, 292, 468, 549
*Elk River, Kootenay, B. C 601
Electricity in Glass Manufacture 310
Electricity's Progress 630
Electrolysis, Causes of 543
In Chicago, Ill., Street Railways 725
*Electromagnetic Apparatus for Separating Ores 437
*Electrometallurgical Process for Extracting Metal From Ore 575
Electroplating Iron Vessels With Copper 487, 744
*Electric Rock Drill 315
And Horse Wagon Delivery 311
Blasting 515
Booster 143
Enterprise in Southern California 321, 571
Headlights 408
*Mine Haulage 434, 435
*Motor, Sperry Mills 197, 321
Power Transmission in Colorado and Utah 608
Plant, Clear Lake, Cal 39
Plant, Visalia, Cal 39
Power Transmission in California 403, 412, 571
Plants in United States 40
Pumps and Pumping 121
Plant, Gas Driven 637
Quantities and Their Equivalents 35
Shocks in California Mine 431
*Sawmill 316
Traction History 181
Transmission Plant, Losses in 35, 403
Transmission Plant, Most Notable 544, 571, 637
*Tramway, Placer Co., Cal 605
Welding of Rails 715
*Electrolytic Apparatus 147
Chlorination 687
Extraction of Zinc 199
Marine Salts Co 69
Metallurgy 5
*Ore Treatment 7
Copper 69
Separation of Cadmium From Iron 318
Refining of Auriferous Silver 380
Electrical Deep Mine Pumping 543
Blasting 664
Conductivity of Aluminum 3
*Display at Omaha, Neb 1
Equipment Cripple Creek, Colo 9
Development in Connection With Mine Work 339
Plant at Sault Ste. Marie, Mich 181
Power in California 95, 316, 32
Power at Utah Smelter 207
Project on the O. S. L. Line 640
Progress in Chicago, Ill 487
Welding 204
*Elevator for Gold Dredgers 147
*Emerson Shaft, Wildman Mine, Sutter Creek, Cal 578
Emmons, S. F 264
Engine Horse Power 403
Valves 311
Enthusiasm in Mine Promotion 34
Eruptions During the Tertiary Ages 115
Eureka-Idaho-Maryland Mine, Cal 431
Eucalyptus for Timbering 371
Evans, Geo. B 68, 292
Evans, J. P 347, 640, 696
Ewing, Thos 265, 440

PAGE.

*Excavating Apparatus 147, 518
*And Conveying Apparatus 147
*Scoop 7
*Exhaust Apparatus 63
Experiments With Liquid Air 635
Explosion of Steam Boilers 715
Exportation of Railroad Material 640
*Exploration of Mines by Diamond Drill 378
Experiment in Cyanide Poisoning 94
With Coarse Crushing 122
Experiences of a Working Miner ..5, 37, 61, 89, 117, 148, 174, 202, 260, 284
Explosive Compounds 40
Force of Powder 35
*Exposition at Omaha, Neb 1
Exports of United States 311
Extraction of Gold 286
Of Nickel From Its Ores 174
Exhaust of Steam Engine 199
Exaggerated Statements 370
Existence a Contest for Carbon 150
Extralateral Rights 199

F

Facts and Fallacies Regarding Liquid Air 462
Factors of Success in Mining 602
Fahrenheit Thermometer 403
*Fairfax Exploration Syndicate 225
"Fake" Advertising Schemes 87
False Bottoms on Mine Cars 35
Fastest Atlantic Steamship Run 115
Fault in Rock Formations 227
In a Vein 227, 311
*Feed Chute for Ore Separators 693
Water Heaters 311
*Feeding Device for Pulverizers 491
Federal Mining Law ..... 35, 59, 87, 171, 199, 227, 255, 257, 339, 371, 459, 543, 571, 631, 715, 743.
*Feustman, L. P 337
*Filter Press 147, 719
Filtration of Cyanide Solutions 550
Fineness of South African Gold Bullion 571
Fire Gilding 227
Protection at Mines 3
In Mining Towns 226
First Mineral Discoveries in Utah 403
Patent Issued 610
Fissure Vein 311, 371
*Fisher Automobile Truck 464
Flame, What It Is 403
Flash Powder for Photographs 687
Flask of Quicksilver 487
Floriston, Cal., Paper Co 95, 264
Flouring Quicksilver 339
Fluorite 115, 371
Flux for Cyanide Slimes 255
Foot Pound 35
*Folsom - Sacramento, Cal., Transmission Plant 316
Forest Ranger System 548
Reservations of Southern California 39
Reserves, Timber Rules 174
Problems in the West 377
*Destruction and Torrent Ruin 228
Forfeiture of a Mining Claim 255
Foreign Mining Corporations Must Obey State Laws 255
Lead Ore Assay 3-8
Foresight in Mining 57
*Fossils of Wyoming 141, 237
Forfeiture Notices 430
*Fraser & Chalmers 232, 236, 264, 384
"Friends of Labor" 2
Freezing, Prevention of in Compressed Air Pumps 691
Free Milling Gold Veins, B. C 176
Frontino & Bolivia Co.'s Mines 94
Frozen Deposits of the North 379
*Furnace for Roasting 7
*Controversy 380

G

*Gas Blast Furnace 637
Gas Engines, Advantages of 283
Driven Electric Plant 637
On Lifeboat 341
*Producer for Metallurgical Plants 231
Engine Exhaust 743
*Gasoline Mine Hoist 513
Calorific Value 311
Engines at High Altitudes 255
*Engines for Mines 113
What It Is 255, 371
Garnet for Abrasion 255
Gash Veins 199, 311
Galena in Limestone 227
*Gallows-Frame, Cripple Creek, Colo 281
Gates, P. W 412
Genesis of Ore Deposits 542, 747
Geological Conditions Keweenaw Point, Lake Superior 603
Geology and Mineral Deposits of Vancouver Island 519
Of San Bernardino Co., Cal 199
In Mining 602
Of Cripple Creek, Colo 603
Geysers in Yellowstone Park 53
German Zinc in America 203
General Electric Co 553
Gilpin Co., Colo. Mines 603, 687
*Gigantic Fossils of Wyoming 141
Gilsonite in Utah 631
Glacier, Work of 181
Glaciation in California 115
Glacial Drift 17
Glaucophane 515
Globe Arizona, Mines 634
Gold, Chemical Features of 722
Coated With Sulphide 687
*Deposits in Georgia 570
Deposited in the Metallic State 742
*Fields of Cripple Creek, Colo 688, 716
In Limestone 487
*Mining Machine 147
New Method of Detecting 575
Production for the Calendar Year 1898 495

PAGE.

Production of World for 26 Years 580
Smelting Electrical Process Not Successful 571
Amount of in U. S 115
Bearing Conglomerate in British Columbia 692
*Bearing Gravels of the West 60
Belt in Tulare and Kern Counties, Cal 122
Bearing Sands of Vermillion River 376
Coin M. Co., Victor, Colo 254
Color of 199
In Deadwood Building Material 431
Dredging on Snake River 3
*Dredging in California 33, 36, 515
In California in 1575 35
Production of Nevada Co., Cal 342
Extraction 3
Fields of Lucknow, N. S. W 176, 258
Mining in Brazil 9, 37
Precipitated From Cyanide Solutions 149
Production of the World 5, 8, 547, 686, 745
Precipitation by Zinc Dust 288
In the Philippines 487
Output of Transvaal 171
Veins of British Columbia 176
Amalgam 199
In Beach Sands 339
And Cyanide Absorption 285
Dredging in New Zealand 515
Largest Piece 715
Mines as Investments 282
Ore Treated by Cyanide or Chlorination 255
Pockets 283
In Kansas 171
In Gypsum 571
And Zinc, How Separated 403
Royalty at Dawson 631
Bearing Ores of Brazil 543
In Quartzite 457
Source of 40
Good Roads, Necessity of 686
"Good Will" of a Business 310
Good Mines and Good Miners 339
"Going" Mining Properties 310
Gravel Moved Per Inch of Water 35
Requirements in Hydraulic Work 255
Granulite 603
*Granite Mountain Mine, Montana 657
Granite Porphyry 311
Grubstake Decision 114
*Great Basin of Nevada 608
Greatest Artificial Heat Known 339
Electrical Transmission Plant 637
Extraction 286
Graphic Granite 311
Gravity Tramways 315
Greenstone 59
*Grupello, E. F 488
Granular Crystalline Rocks 487
Gypsum 199
In California Oil Fields 543
In South Dakota 171

H

*Hauling Lumber With Traction Engines 569
Hafod Smelter, Swansea 603
Half-Tones, How Made 117
Hall Mines Smelter, Nelson, B. C 225
Hague, J. D 292
Hammond, J. H 68, 126, 347, 613
Handling Ores on Shaft Stations 59
Harvey, F. H 39
Hawaiian Island Volcanoes 148
Hawaiian Railroads 553
*Headwater Workings of a California Irrigating System 576
*Heater for Thawing Frozen Earth 147
*Head Gear, Oneida, Cal., Mine 281
*Head Frames for Mines 88, 281
Head and Volume of Water 311
Heat in Ore Mines 286
Unit 35
Hematite 35
Heikes, V. C 95
Heintz, Geo. W 39
Hendy, Samuel J 468
Henshaw, Tyler 347
Heydon, A. T 379
*Hercules Gas Engine Works 113
Height of a Mountain, How Determined 715
High Price of Tin and Quicksilver 570
*Hill Sculpture Due to Erosion 713
Hidden Treasure Mine Channel, Width of 431
*Hidden Treasure Mine, California 603
High Five Mine 232
Highest Mine in the United States 339, 543
High and Low Grade Ore 114
*Lift Pumps 232
Speed Engine 311
Historical Automobile 4, 6
History of a Big Deal 722
*Hoisting Cage for Mines 75
*Machinery 38
*Works for Mines 88, 281
Speed Indicator 573
Home Mining Co., Leadville, Colo 713, 720
Homestake, S. D., Mine 87, 209
Honduras Placer Gold 59
Horno Castellano 631
How Low-Grade Ores Pay 285
Hodbarrow, Eng., Mines 197
Hounold, W. H 264
Horse in a Vein 715
*"Horseless Carriage," Latest 629
Hoffman, C. F 208, 292, 321
Horse-Power and Man's Strength 687
Of Water Supply 371
Supplied at Niagara 380
Howard, O. O., Jr 208
Howell, John 412
Hubnerite 403
Huntley, D. B 126, 208
Huntington, F. A 68
Hydrogen, Liquefied 687
Hydrous Magnesian Carbonate 515
*Hydraulicking in California 741
*Hyoraulic Dredger 287, 575
*Mining at Dahlonega, Ga 569
Mining Defined 87
Mining Suit 143, 199
Mining, Cheapest Reported 571
Mining Leases in the Yukon 631
Requirements in Gravel Work 255
Separators in Gold Mills 199
Hyposulphite of Soda 35

I

Ice, Manufacture of 403
Idaho Court Decisions 603
*Gold Dredgers 149
Mines ..14, 41, 65, 97, 124, 153, 178, 206, 234, 262, 290, 320, 346, 382, 410, 466, 496, 523, 552, 582, 612 639, 668, 695, 724, 750.
Idaho Northern Railway 39

PAGE.

Idaho's Population 115
Public Land 311
Influence of Forests Upon Storage Reservoirs 494
*Instrument Makers and Tools 492
Incandescent Mantels 318
Inclined Shafts More Expensive Than Vertical Ones 255
*Incline Retarding Conveyor 349
Increasing Mill Capacity 376
Independence, Colo., Mine 35
Index, Vol. LXXIX 769
Index, Vol. LXXVIII, MINING AND SCIENTIFIC PRESS 10
Indian Mines 582
Indicator for Hoisting Speed 573
Veins 634
*Induction Motor 197
Ink, Restoring Faded 311
Inking Press Rollers 743
Industrials and the Market 714
Investment in Mines 719
Injectors on Steam Boilers 37
International Congress Exposition 1900 ..... 376, 543
Mining Congress 515, 543
Inventive Genius of Americans 718
Iron, Best Kind for Magnets, etc 571
Plummets, Best for Mine Work 571
Rarely "Pure" 572
*Mountain Mine, Shasta, Cal 685
Ore Production for '98 ..... 180, 318
Ore Cheaply Mined 171, 227
Ore Output 34, 318
And Steel Prices 86, 198, 402
Tamping Bars 115, 118
And Steel Rope 199
Ore, Search for 204
Ore Deposits 459
Ores of the Ural 69
Duty on 431
How Polished 515
And Steel 349
*Irrigation in Wyoming 120
System in California 576
*Islands of Lower California 664

J

Jackson, D. H 264
Jackson Drill & Mfg. Co 264, 348, 553
James, W. M 321
Jarilla, N. M., Mines 86
Janin, Louis 468, 497
Japanese Metal Importations 39, 207
Treaty 153
Javelle Water 743
*Jeffrey Mfg. Co 349
Jeansville Iron Works 54, 158, 348
Jerome, Ariz. Mining Bureau 402
*Journal Box for Stamp Mills 91
*Box for Pulverizing Machines 753
Joints, How Welded 181
Jointing Planes in Rocks 332
Johnson Pneumatic Cyanide Process 487

K

*Kaolin in San Diego, Cal 441
Kentucky Mines 467
Kern River, Cal., Power Co 95
Kervin, P 68
Keyseat of Cam Shaft 283
Keystone Driller Co 236
Kimberly Diamond Mines 436
*King of Arizona Gold Mine 469
King, C. S 321
Kirby, E. B 208, 412
Klondike Yield 142, 311
Knox System of Blasting 35
Kobrich, Karl 284
Kootenay Ore Bodies 201, 230
Krennerite 293

L

Labor, "Friends of" 2
Legislation 34, 35
Lacy Manufacturing Co 180, 236
*Laccolites and Their Relation to Ore Deposits 745
Lake Superior Power Co 69
*Lake Windemere, B. C 485
Lakes, Arthur 440
*Lamp Bracket for Miners' Caps 147
Land Commissioner's Rulings 115, 171, 174, 630
Lane, C. D 440
Large Dividend Payers 6
Lumber Order 348
*Largest Gasoline Mine Hoist 513
Ocean Steamers 635
Piece of Gold 715
Pump 687
Stamp Mill in Canada 311
Steam Whistle in the World 497
Steel Shaft 317
Vessel Afloat 265
Wagon in Arizona 431
Lateral Extent of Vein or Lode Locations 227
*Latest Mining and Metallurgical Patents ..7, 38, 63, 91, 119, 147, 175, 203, 231, 259, 287, 315, 343, 381, 407, 437, 463, 491, 518, 546, 575, 607, 637, 663, 696, 719, 753.
Laurium Mines in Greece 543
Law of Wages 431
Lawyer's Fees in Golden Cross Case 86
Lead Ore Assay, When Foreign 318
Production, U. S 98, 199
Leadville, Colo., District 86, 318
*Ledoux, A. R 337
*Leffel, Jas. & Co 39
Legitimate Mining 58
Let There Be Light 370
Leasing System 310
Libelous Matter 59
Lien Land Selections 714
ife, Average, of a Bridge 285
Lifeboat Fitted with Gas Engine 341
Limitations of Liquid Air 310
Lindley, C. H 264, 468, 553
Liquefied Ozone 687

PAGE.

Liquid Air 232, 310, 371, 462
Air, Experiments with 635
Air "Metallurgists" 542
Asphalt 143
Locating a Mill Site 631
A Mining Claim 115, 227, 311, 459, 715
Tunnel Site 403
Location of Oil Lands 714
Lode, Definition of 743
* Loder Smelting Furnace 720
Long Distance Pumping Plant 115
Lowest Electric Power Transmission Line 403
Los Angeles, Cal., Valuation 30
Co., Cal., Mine 173
Losses in Electric Transmission Plant 35, 403
Lost Mines Illusive 115
Lower California Mines 68, 98, 401, 411, 468, 497, 577, 582, 669
Low Grade Ores, How They Pay 285
Lucknow, N. S. W., Gold Fields 258
Luck vs. Judgment 2
Luminosity of a Nernst Lamp 6
Lyddite 603

M

MacDonald, Bernard 292, 640, 696
Machine Drills 371, 403
Machine Drill Stoping 374
* Machine for Forging and Sharpening Rock Drills 259
Mackay, Jno. W. 264, 640
Magnetic Concentration of Ore 341, 635, 647
Iron 571
Needle's Variation 59, 283
* Magnetic Separator 63
Separation of Beach Sand 543
Magnesite 171, 311
Magnetite 403
Magnitude of Mining Operations 602
Magnt, Utah, Deposit 199
Malachite 715
Management of Mines 226, 457
Manila Hemp 583
Manganese 311, 431, 459, 548
Manganin 603
Manjak 150
Manufacturers' and Wholesalers' League 321
* Manufacturing Asphalt from Petroleum Residue 463
Manufacturing Industries of San Francisco 202
* Manufacture of Lead Oxid 753
Markets ..... Every issue
Marloid 603
Mass. Inst. Technology 69, 153
* McDougall Dredging Plant 60
Mead, L. R 468
Meadow Lake, Cal., District 283, 631
Means, J. H 384
Mean, Thos. 153
Measurement of Ore in Place 339
* Measuring Gas and Liquid Fuel 261
* Mechanical Drier 381
Haulage by Compressed Air 285
* Mechanism for Pumping Oil Wells 63
Melones Mine, Calaveras Co., Cal 283
Melting Point of Various Substances 35
Members A. I. M. E., Names and Addresses 372
Mercur, Utah, Gold-Bearing Deposits 255
Mercury, Native, in Quicksilver Mine 199
Merrill, C. W 553
Metal-Bearing Conglomerates 117
Metallic Copper, Cost and Price 199
Manganese 631
Metal Market 602
Metals, How Grouped Chemically 715
Metallography 311
Metallurgy's Advance 34, 318, 436
Metallurgy, Electrolytic 5
Metallurgical Machinery 116
Metasomatism 143
Metamorphism of Rocks 311
Meteoric Shower of Nov., '99 525
Method of Detecting Gold 575
* Method of Working at the Taylor Mine, Cyanide Plant, El Dorado Co., Cal 488
* Method of Working Drift Mines in California 603
Mexican Mining Land Ownership 715
Smelting Furnace 631
Mexico's Mineral Resources 69
Mines ..... 42, 98, 125, 153, 207, 263, 291, 321, 347, 411, 468, 523, 552, 583, 613, 640, 699, 696, 725, 751.
Railroads 236
Mica 283, 371
Co. Consolidated 180
In South Norway 229
Michigan Mines, 14, 97, 125, 179, 206, 234, 291, 383, 410, 467, 496, 612, 660, 668, 695, 724.
Miners' Wages 143
Milling Ore, Cost of 255
And Reeding on U. S. Money 311
Mill Practice at the Ymir, B. C., Mine 517
Capacity, Increase of 376
Concentrates 431
Screens 431
Millsite Location 631
Selection 310
* Mine Car Check Holder 437
Accidents, Causes of 226
* Bucket, Self-Dumping 93
Contract Work 311
Development 431
Drainage 431
Drainage by Syphon 227
* Exploration by Diamond Drill 378
Flooding 35
* Gate 753
* Head Frames 8
* Hoist 513
* Locomotive 348
Management 142, 226, 457
Pumping 199
* Signaling, System of 748
Surface Sampling 516, 549
Timbers, How Best Lowered 431
Timbering 459
* Transit 38
* Miner's Lamp 119
Miners' Inch 115
Rock Drilling Contest 283
Union 2, 487
Minnesota Mining Methods 171
Mines 262
"Mineral," English Court Definition of 255

PAGE

* Mineral Extracting Machine 259
Land, Appropriation of 631
Production of United States in '98 ..... 143, 251, 255
Resources of Mexico 69
Springs, How Acquired 403
* Separator 231
Soap 431
Veins, Local Enrichment of 143
Veins, Walls of 609
Wool 743
* Mines of Ouray Co., Colorado 545
And Oil Stocks 542
Dividends ..... 15, 82, 99, 120, 153, 180, 208, 235, 263, 292, 321, 348, 384, 411, 468, 497, 523, 553, 583, 614, 654, 669, 696, 725.
Inspector for California 687
Incorporations 82, 99, 126
Most Economical Kind to Work 122
Of the California Gold Belt 22
Of Ophir 721
Samples, Arranging 4
Why Offered for Sale 254
Mineralization of Zones 282
Mineralogy and Mining, Dept. of 718
* Mining Dredger 119
* And Metallurgical Patents 7, 38, 63, 91, 119, 147, 175, 03, 231, 259, 287, 315, 343, 381, 407, 437, 463, 491, 518, 546, 575, 607, 637, 663, 696, 719, 753
And Metallurgical Progress 717
And Milling, Cheapest in California 577
* And Milling at the Overland Mine, Utah 380
* Apparatus 693
As a Present Investment 714
* By Caving 664
* Caisson 607
Claim, Forfeiture of 255
Claims on Forest Reservations 59
Conditions, Past and Present 430
Definitions 257
* Drill 546
Engineers and Experts 631
Experts, Real and Bogus 514, 630
Failures Due to Inexperience of Managers 742
Foresight Needed 57
* In Aspen District, Colo 492
* In British Columbia 169, 253, 485, 601
Incorporations 17, 54
Industry a Thriving One 486
In Spain 227, 543
In the Transvaal 458
* In Lower California 401, 577
Iron Ore 227, 660
Iron Ore in Minnesota 71
Law 2, 3, 35, 59, 143, 658, 687
Leases 310
* Machine 203, 753
Machinery Prices 58, 199, 311
Operations in the Yukon Basin 519
Operations at Telluride, Colo 574
Salaries in British Columbia 6, 9
Town Fires 226
Shares, Value of 602
* Shovel 693
Why it is Safe 58
MINING AND SCIENTIFIC PRESS, 3, 59, 63, 118, 170, 171, 227, 255.
Mississippi River Jetties 341
Missouri Fatality from Striking 255
Missouri Mines, 14, 65, 97, 125, 179, 206, 226, 231, 262, 291, 346, 383, 410, 467, 496, 582, 721.
Zinc Mines 255
* Mixing Sand and Tailings 753
* Modern Instrument Makers and Tools 493
Motive Power at the Mines 580, 606, 633, 666
Molybdenite 227, 339, 371
Molybdate of Lead 403
Montana Electric Power & Mining Co 553
Mines, 14, 65, 97, 125, 152, 179, 206, 234, 263, 291, 320, 346, 383, 410, 552, 612, 639, 695, 724, 751.
Mining Law 87, 714, 715
Railroad Improvements 348
* Mother Lode Mine, Deadwood, B. C 340
* Morning Star Drift Mine, Placer Co., Cal 605
Momentum, What It Is 3
Mountain, Height of, How Determined 715
Copper Co 403
Mounting Plans on Linen 227
Mount Morgan Mine, Australia 487, 610
Moore, R. S 126
Monazite 171, 403
Mortars in Stamp Mills 227, 282, 283
* Moyie City, B. C 253
* Mule of Twentieth Century 692

N

Narrow Mortars in Stamp Mills 227
National Association of Gas and Gasoline Engine Manufacturers 207
National Export Exposition 95, 207
Natural Motive Force 293
Nature of Veins 662
Native Gold, Where Found 543
Navigation on the Great Lakes 666
Necessity of Foresight in Mining 57
* Nevada's Great Basin 608
Gypsum 440
Mines ..... 2, 3, 15, 42, 65, 97, 125, 152, 179, 207, 234, 263, 291, 320, 346, 383, 410, 429, 439, 467, 496, 523, 552, 583, 612, 639, 668, 695, 724, 751.
* Resources 429
New England Exploration Co 283
New Guinea Mines 263
* Newest Ideas in Automobiles 263
New Mexico Mines ..... 15, 42, 65, 97, 125, 152, 235, 291, 346, 383, 410, 439, 467, 497, 523, 584, 612, 639, 668, 695, 724, 751.
New South Wales Mining Industry 440
New Zealand Mines ..... 42, 99, 148, 179, 235, 263, 411, 497, 613, 725, 751.
Need of Enterprise 113
Neff, J. H 180, 489, 490
Neill, J. W 292
New Africa 436
Newhouse, Colo., Tunnel 487
Mexico's Deepest Mine 687
* Newest El Dorado 457, 462
Newell, F. H 39, 126, 171, 180
New Process 86, 255
*New Almaden, Cal., Quicksilver Mine 637
* New Type Desk Telephone 637
Nickel, Characteristics of 543
And Cobalt 121
Extraction From Its Ores 174
Mines of Oregon 543
Refining Works 431, 459
Supply of America 255
Separation From Copper 487
Nitrates of Chile 630
Nitro Powder's Explosive Force 35, 371
Nichols, R 39
Niobium 283
Nomenclature of Veins 662
"Non-assessable" Stock 198

Notes on the Occurrence of Quicksilver in Canada 288
On Gold Precipitation by Zinc Dust 288
* On Sampling, Analyzing and Treating Slimes 257
* On the Oil-Yielding Formations of California 144, 172
On Alleged Shortage in Cyanide Bullion 40
* On Power and Transmission 202
On Plate Amalgamation 373
On Geology and Mineral Deposits of Vancouver Island 519
On Mine Surface Sampling 516, 549
On the Ymir Mine and Its Mill Practise 517
Notices of Patents 16, 42, 68, 95, 126, 153, 84
Not Universally Understood 342, 570
North Carolina's Gold Yield 631
North Star Triple 339
Non Technical Account of Wireless Telegraphy 635
Norway, Mica in 229

O

Oak Bark in Boilers 69
Oakland Iron Works 54
Occurrence of Free Milling Gold Veins in British Columbia 176
Of Mica in South Norway 229
Oil Exchanges in San Francisco 282, 430
In Colorado 292
Locations 714
* Yielding Formations of California ..... 144, 172, 543, 603.
Output of Southern California 199, 255
Wells of New York, Pennsylvania and West Virginia 255
Wells, Cost of Boring 255
* Well on Fire in Southern California 236
* Well Pumping Rig 259, 315
* Oiling Device for Rock Drills 518
* Old Jordan & Galena Mine, Utah 435
Times and New 430
Oldest Iron Steamship 318
Gold-Bearing Veins 459
Ontario Mine, Utah 311
Open Excavations in Mines 715
Hearth Furnaces 231
Vat Chlorination 603
Ores of Rossland, B. C 743
Ore Bodies at Bunker Hill & Sullivan, Idaho, Mines 603
*Amalgamator 91
* And Tailings Cyanided 4
Bins in Mills 3
Bodies, West Kootenay 201, 230
Calcined 371
Concentration 288, 487, 514
Concentrating Machine 693
* Concentrator 63, 259, 287, 315, 348, 407, 575
Cost of Milling 255
* Crusher 119
Crushing Devices 687
* Ore Deposits and Laccolites 745
Deposits, Genesis of 542, 747
Deposits in Sedentary Formations 487
Deposits of Cripple Creek, Colo 371
Deposits of Ouray Co., Colo 631
* Feeder 546
Formation, Possible Depth of 687
For Mill Test 283
Handling on Shaft Stations 59
In Place, Measurement of 339
In Sight 458
Low-Grade, How They Pay 285
Mines, Heat in 286
Mixing High and Low-Grade 715
Of Iron Mines 318
Of Mercury 227
Pockets, Construction of 543
* Pulverizer 231
Rates for 1900 690
Reducing Machinery 486, 492
* Roasting and Calcining Furnace 175
* Roasting Furnace 203
* Separating Apparatus 175, 381, 407, 719, 753
Shoots 199
Shoots, Chimneys, Etc 718
Sorting 486
Testing Necessary 115
Unit 171
* Washer 175
Oregon Mines ..... 15, 42, 65, 98, 125, 152, 179, 207, 235, 263, 291, 320, 347, 383, 411, 439, 467, 497, 523, 552, 582, 612, 639, 668, 695, 751.
Organic Matter in the Cyanide Process 636
Osborne, H. Z 497
Output of Pig Iron 2-6
* Ouray, Colo., Mines 545
Overhead Wires, Factors of Safety 231
*Overland Mine, Utah 380
Overshot Water Wheels 311
Ownership of Mining Lands in Mexico 715
Oxidation, Depth of in Vein 115, 143
Oxide of Manganese 311
Oxygen, Antidote for Carbonic Oxide 743
Oxylignit 403
Ozone, Liquefied 687

P

Pacific Cable 284
Coast Freight Rates 39
* Tank Co 150
Paris Exposition 3, 283, 376, 602
Partinium 743
Patent, First Issued 610
Requirement for Mining Location 87
Office Progress 34, 198
Notices of Recent ..... 16, 42, 68, 95, 126, 153, 180, 208, 236, 264, 292, 322, 348, 384, 412, 440, 468, 497, 524, 553, 583, 614, 640, 669, 696, 725, 752.
List of U. S. ..... 16, 43, 68, 95, 126, 153, 180, 207, 236, 264, 292, 322, 348, 384, 412, 440, 468, 497, 524, 553, 583, 614, 640, 669, 696, 725, 752.
* Latest Mining and Metallurgical ..... 7, 38, 63, 91, 119, 147, 175, 203, 231, 259, 287, 315, 343, 381, 407, 437, 463, 491, 546, 575, 607, 637, 663, 753.
Pay Shoots of Ore 718
Panama Canal 153
* Parke, Lyman C 583
Parker, R. A 208, 347, 583
Parrott Smelter, Butte, Montana 143
* Parke & Lacy Co 380, 468
Parting of Silver and Lead 431
Patio Process at Guanajuato, Mexico 62
Palladium 515
In South Austra ia 608

Perambulating Smelter .....
Peroxide of Hydrogen .....
Permit System in Idaho .....
Petrified Trees in California .....
Petroleum Deposits in California .....
Geology 42, 144
Product of California, '98 255
Land, How Located 459, 603
For Furnace Fuel 487
How Rendered Uninflammable 571
Refined 743
Peacock Ore 227
Pearlite 321
Pegamoid 115
Peck, F. W 292
"Pegleg" Mine 310
* Pelton Water Wheel Co 113
Peruvian Silver Mines 543
* Peters, E. D. Jr 337
"Petrified" Men 732
Forests of Arizona 746
Phantom Millions of Alaska 86
* Phenomena Attending the Accumulation of Bitumen 632, 665, 691, 721
Philippine Islands, Number and Area 94
Islands, Resources of 631, 698
Phonolite 311
* Phosphate Mining Apparatus 203
Pictures, How Made 118
Pike's Peak Power Co 436
Peak, Colo., Electric Power Co 348
* Pioneering in British Columbia 85
Pillar System of Working Mines 87
Pitch, Across vs. Up 257
Placer Mines of British Columbia 515
Claim, How Patented 227
Claims, Extent of 227
Mines, When Cleaned Up 115
Mining Law 227
Ground, How Best Worked 403
Plans on Linen, How Mounted 227
Planes of Bedding 282
Platinum, Weight of 2, 743
Substitute for 293
Price of 459
In Arizona 630, 687
Plate Amalgamation 374, 516
Pneumatic Cyanide Process 384, 487
Pocket Mines of California 283
Popocatapeti Volcano Sold 95
Porphyry, What It Is 3
Portland Cement From Slag 6, 311
Power for Mining Operations 431
For 1000 H. P. Engine 743
Of Attorney 227
*And Transmission, Notes on 202
Losses on an Electric Transmission Plant 403
Possible Depth of Ore Formation 687
Postlethwaite, R. H 36, 126, 440
Poisoning by Cyanide 560
* Portable Drilling Machine 348
Powder Used in Coal Mining 732
For Flashlight Photographs 571
Prehistoric Rivers of California 544
Price of Mining Machinery 311
Precious Stones in U. S 95
Precipitation of Gold From Cyanide Solutions 149, 693
Prospect, Big Price for 283
Prospector's Automobile 603, 629
* Pan 437
Points for 515
Preconceived Ideas 255
Why They Want to Sell 2, 264
Venturesome 226
Prospecting Large Ore Zones 255
Progress in Metallurgy 436
In Ore Reducing Machinery 486, 492
Prendergast, Roger 39
Pritchett, H. S 468
Process of Treating Ore 491
Should be Adapted to the Ore 486
Ore of Extracting Gold and Silver 175, 231
Prominent Achievements in Metallurgy 318
Propylite 339
Profits of Gold Dredging 515
Progress in Mining and Metallurgy 717
Of the Century 742
Promoting Mining Enterprises 213
* Propeller Pump in American River Cal 541
Proof Gold, How Prepared 743
* Pulverizing Machine 38, 259
* Pulverizer 175, 348, 437, 491
* Pump 315
* Priming Device 119
Slip Joint in 199
*Suction Valve 7
Velocity of 687
Publication of Forfeiture Notices 430
Pulley, to Calculate Speed of 687
Pulverized Iron Ore 339
* Pumping on American River, Cal 541
Pumice 459
Pyritic Smelting 143, 339
Pyrrhotite 115
Pyrohesite 715

Q

Quartzite, What It Is 603
* Quartz and River Mining in Eastern Oregon 435
Mill Line Shaft 3
Mill Economy 199, 255, 283, 339
Quicksilver, Great Britain's Exports and Imports 543
In Oceanica 122
Mining in California 1, 515
In Serpentine 603
* Why Appreciating in Price 636
Mine at New Almaden, Cal 636
Quicksilver's Highest Price 35, 227, 515
Purity, How to Test 8

R

Railway System of the United States 468
* Ore Pulverizer 753
Rails, Length of 403
Railroad Building by Music 293
Construction in South Africa 180
Grants 403
*To the Klondike 572
Rafting Lumber by Sea 39
Rand Deep Levels 314, 344
Rand-Victoria Mine Shaft 255
Rapid and Slow-Drop Stamps 199
Rate and Amount of Wages 34
Rates of the Utah Commissioners 87
* Raising Water From Mine Shafts 63
* Ralston, W. C 342, 347, 373, 490, 640
* Rand, Theo. D 337
Raymond, Cal., Granite 39

(Continued on Next Page.)

O VOLUME LXXIX.

THE C (from Preceding Page)

PAGE.

*Dividing Engine, Automatic 492
Dickie, Geo. W 669
Diffenbach Electrolytic Process 199
Diorite 431
Distribution, Grade and Size of Battery Plates 715
Ditch Regulations 311
Direction of Powder's Explosive Force 35
*Discharge Gate for Tanks 518
Discharge Pipe Connection in Mine Shafts 171
Dividends From the Transvaal 441
Before Starting 310, 430
And Capitalization 142
Declared 5, 82, 99, 126, 153, 180, 283, 292, 321, 348, 384, 411, 468, 497, 523, 553, 583, 614, 654, 669, 696, 725, 752.
Dividend Paying Mines 311
Divining Rod Miners 114, 665
*Dorotha Morton Mine 225
Double-Barreled Tunnel 317
Dolomite 693
*Douglas, Jas 337, 373
Dodd, W. G 412
Don't 544
Dow, Geo. E 553
Drainage, by Syphon 237
Provision for 87
Draining Wet Tunnels 494
*Dredger 491, 546, 719
*Dredging Apparatus 38, 491
*For Gold in California 33, 36
*For Gold in Boise Basin, Idaho 148
In New Zealand 148
*Dryer 491
Drift Timbering 631
*Drift Mine in California 603
*Drill 546
*Drill Forging and Sharpening Machine 607
Drilling Contest at Denver, Colo 403, 412
Rock 317, 403
Drill Broken, Removing From Bore Hole 431
*Dry Concentrator 381
Dry Blowing Placer Machines 631
Drydock at San Francisco 696
Dry Gold Placers, How Best Worked 543
Dykes, Eruptive Not Sedimentary 143
Ducktown, Tenn., Copper Mines 543
*Dumoing Bucket 38
*Car 463, 491
*Dust Arrester 348
Durfee, W. F 583
*Dust Collector 122
Duty on Iron Ore 282
Duties on Metals 515

E

Earth's Average Density 571
Earthquakes 35
Earthquakes and Volcanos, Relation of 115, 125
*Eastern Oregon Mines 200, 435
East Murchison, Australia, Gold Mine 375
Edison General Electric Co 236
Edison, Thos. A 321
Edison's Gold Extraction Process 459
Eight-Hour Law in Colorado 86, 95
Ekman, A 237, 292, 468, 549
*Elk River, Kootenay, B. C 601
Electricity in Glass Manufacture 310
Electricity's Progress 630
Electrolysis, Causes of 543
In Chicago, Ill., Street Railways 725
*Electromagnetic Apparatus for Separating Ores 437
*Electrometallurgical Process for Extracting Metal From Ore 575
Electroplating Iron Vessels With Copper 487, 744
*Electric Rock Drill 315
And Horse Wagon Delivery 311
Blasting 515
Booster 143
Enterprise in Southern California 321, 571
Headlights 408
*Mine Haulage 434, 435
*Motor, Sperry Mills 197, 321
Power Transmission in Colorado and Utah 608
Plant, Clear Lake, Cal 39
Plant, Visalia, Cal 39
Power Transmission in California 403, 412, 571
Plants in United States 40
Pumps and Pumping 121
Plant, Gas Driven 637
Quantities and Their Equivalents 35
Shocks in California Mine 431
*Sawmill 316
Traction History 181
Transmission Plant, Losses in 35, 403
Transmission Plant, Most Notable 544, 571, 637
*Tramway, Placer Co., Cal 605
Welding of Rails 715
*Electrolytic Apparatus 147
Chlorination 687
Extraction of Zinc 199
Marine Salts Co 69
Metallurgy 5
*Ore Treatment 7
Copper 69
Separation of Cadmium From Iron 318
Refining of Auriferous Silver 380
Electrical Deep Mine Pumping 543
Blasting 664
Conductivity of Aluminum 3
*Display at Omaha, Neb 1
Equipment Cripple Creek, Colo 9
Development in Connection With Mine Work 339
Plant at Sault Ste. Marie, Mich 181
Power in California 95, 316, 32
Power at Utah Smelter 207
Project on the O. S. L. Line 640
Progress in Chicago, Ill 487
Welding 204
*Elevator for Gold Dredgers 147
*Emerson Shaft, Wildman Mine, Sutter Creek, Cal 578
Emmons, S. F 264
Engine Horse Power 403
Valves 311
Enthusiasm in Mine Promotion 34
Eruptions During the Tertiary Ages 115
Eureka-Idaho-Maryland Mine, Cal 431
Eucalyptus for Timbering 371
Evans, Geo. H 68, 292
Evans, J. P 347, 640, 696
Ewing, Thos 265, 440

PAGE.

*Excavating Apparatus 147, 518
*And Conveying Apparatus 147
*Scoop 7
*Exhaust Apparatus 63
Experiments With Liquid Air 635
Explosion of Steam Boilers 715
Exportation of Railroad Material 640
*Exploration of Mines by Diamond Drill 378
Experiment in Cyanide Poisoning 94
With Coarse Crushing 122
Experiences of a Working Miner 5, 37, 61, 89, 117, 148, 173, 202, 260, 284
Explosive Compounds 40
Force of Powder 35
*Exposition at Omaha, Neb 1
Exports of United States 311
Extraction of Gold 286
Of Nickel From Its Ores 174
Exhaust of Steam Engine 199
Exaggerated Statements 370
Existence a Contest for Carbon 150
Extralateral Rights 199

F

Facts and Fallacies Regarding Liquid Air 462
Factors of Success in Mining 602
Fahrenheit Thermometer 403
*Fairfax Exploration Syndicate 225
"Fake" Advertising Schemes 87
False Bottoms on Mine Cars 35
Fastest Atlantic Steamship Run 115
Fault in Rock Formations 227
In a Vein 227, 311
*Feed Chute for Ore Separators 693
Water Heaters 311
*Feeding Device for Pulverizers 491
Federal Mining Law ....35, 59, 87, 171, 199, 227, 255, 257, 339, 371, 459, 543, 571, 631, 715, 743.
*Feustman, L. P 337
*Filter Press 147, 719
Filtration of Cyanide Solutions 550
Fineness of South African Gold Bullion 571
Fire Gilding 227
Protection at Mines 3
In Mining Towns 226
First Mineral Discoveries in Utah 403
Patent Issued 610
Fissure Vein 311, 371
*Fisher Automobile Truck 464
Flame, What It Is 403
Flash Powder for Photographs 687
Flask of Quicksilver 487
Floriston, Cal., Paper Co 95, 264
Flouring Quicksilver 339
Fluorite 115, 371
Flux for Cyanide Slimes 255
Foot Pound 35
*Folsom – Sacramento, Cal., Transmission Plant 316
Forest Ranger System 543
Reservations of Southern California 39
Reserves, Timber Rules 174
Problems in the West 377
*Destruction and Torrent Ruin 228
Forfeiture of a Mining Claim 255
Foreign Mining Corporations Must Obey State Laws 255
Lead Ore Assay 3 8
Foresight in Mining 57
*Fossils of Wyoming 141, 237
Forfeiture Notices 430
*Fraser & Chalmers 232, 236, 264, 384
"Friends of Labor" 2
Freezing, Prevention of in Compressed Air Pumps 691
Free Milling Gold Veins, B. C 176
Frontino & Bolivia Co.'s Mines 94
Frozen Deposits of the North 379
*Furnace for Roasting 7
*Controversy 389

G

*Gas Blast Furnace 637
Gas Engines, Advantages of 283
Driven Electric Plant 637
On Lifeboat 341
*Producer for Metallurgical Plants 231
Engine Exhaust 743
*Gasoline Mine Hoist 513
Calorific Value 311
Engines at High Altitudes 255
*Engines for Mines 113
What It Is 255, 371
Garnet for Abrasion 255
Gash Veins 199, 311
Galena in Limestone 227
*Gallows-Frame, Cripple Creek, Colo 281
Gates, P. W 412
Genesis of Ore Deposits 542, 747
Geological Conditions Keweenaw Point, Lake Superior 603
Geology and Mineral Deposits of Vancouver Island 519
Of San Bernardino Co., Cal 199
In Mining 602
Of Cripple Creek, Colo 603
Geysers in Yellowstone Park 53
German Zinc in America 203
General Electric Co 553
Gilpin Co., Colo. Mines 603, 687
*Gigantic Fossils of Wyoming 141
Gilsonite in Utah 631
Glacier, Work of 181
Glaciation in California 115
Glacial Drift 17
Glaucophane 515
Globe Arizona, Mines 634
Gold, Chemical Features of 722
Coated With Sulphide 687
*Deposits in Georgia 570
Deposited in the Metallic State 742
*Fields of Cripple Creek, Colo 688, 716
In Limestone 487
*Mining Machine 147
New Method of Detecting 575
Production for the Calendar Year 1898 495

PAGE.

Production of World for 26 Years 580
Smelting Electrical Process Not Successful 571
Amount of in U. S 115
Bearing Conglomerate in British Columbia 692
*Bearing Gravels of the West 60
Belt in Tulare and Kern Counties, Cal 122
Bearing Sands of Vermilion River 376
Coin M. Co., Victor, Colo 254
Color of 199
In Deadwood Building Material 431
Dredging on Snake River 3
*Dredging in California 33, 36, 515
In California in 1575 35
Production of Nevada Co., Cal 342
Extraction 3
Fields of Lucknow, N. S. W 176, 258
Mining in Brazil 9, 37
Precipitated From Cyanide Solutions 149
Production of the World 6, 8, 547, 686, 745
Precipitation by Zinc Dust 288
In the Philippines 487
Output of Transvaal 171
Veins of British Columbia 176
Amalgam 199
In Beach Sands 339
And Cyanide Absorption 285
Dredging in New Zealand 515
Largest Piece 715
Mines as Investments 282
Ore Treated by Cyanide or Chlorination 255
Pockets 283
In Kansas 171
In Gypsum 571
And Zinc, How Separated 403
Royalty at Dawson 631
Bearing Ores of Brazil 543
In Quartzite 457
Source of 40
Good Roads, Necessity of 686
"Good Will" of a Business 310
Good Mines and Good Miners 339
"Going" Mining Properties 310
Gravel Moved Per Inch of Water 35
Requirements in Hydraulic Work 255
Granulite 603
*Granite Mountain Mine, Montana 647
Granite Porphyry 311
Grubstake Decision 114
*Great Basin of Nevada 608
Greatest Artificial Heat Known 339
Electrical Transmission Plant 637
Extraction 286
Graphic Granite 311
Gravity Tramways 315
Greenstone 59
*Grupello, E. F 488
Granular Crystalline Rocks 487
Gypsum 199
In California Oil Fields 543
In South Dakota 171

H

*Hauling Lumber With Traction Engines 569
Hafod Smelter, Swansea 603
Half-Tones, How Made 117
Hall Mines Smelter, Nelson, B. C 225
Hague, J. D 292
Hammond, J. H 68, 126, 347, 613
Handling Ores on Shaft Stations 59
Harvey, F. H 39
Hawaiian Island Volcanoes 148
Hawaiian Railroads 553
*Headwater Workings of a California Irrigating System 576
*Heater for Thawing Frozen Earth 147
*Head Gear, Oneida, Cal., Mine 281
*Head Frames for Mines 88, 281
Head and Volume of Water 311
Heat in Ore Mines 286
Unit 35
Hematite 35
Heikes, V. C 95
Heintz, Geo. W 39
Hendy, Samuel J 468
Henshaw, Tyler 347
Heydon, A. T 379
*Hercules Gas Engine Works 113
Height of a Mountain, How Determined 715
High Price of Tin and Quicksilver 570
*Hill Sculpture Due to Erosion 713
Hidden Treasure Mine Channel, Width of 431
*Hidden Treasure Mine, California 603
High Five Mine 232
Highest Mine in the United States 339, 543
High and Low Grade Ore 114
*Lift Pumps 232
Speed Engine 311
Historical Automobile 4 6
History of a Big Deal 722
*Hoisting Cage for Mines 75
*Machinery 38
*Works for Mines 88, 281
Speed Indicator 573
Home Mining Co., Leadville, Colo 713, 720
Homestake, S. D., Mine 87, 339
Honduras Placer Gold 59
Horno Castellano 631
How Low-Grade Ores Pay 285
Hodbarrow, Eng., Mines 197
Hounsold, W. H 264
Horse in a Vein 715
*"Horseless Carriage," Latest 639
Hoffman, C. F 208, 292, 321
Horse-Power and Man's Strength 687
Of Water Supply 371
Supplied at Niagara 380
Howard, O. O., Jr 208
Howell, John 412
Hubnerite 403
Huntley, D. B 126, 208
Huntington, F. A 68
Hydrogen, Liquefied 687
Hydrous Magnesian Carbonate 515
*Hydraulicking in California 741
*Hyoraulic Dredger 287, 575
*Mining at Dahlonega, Ga 569
Mining Defined 87
Mining Suit 143, 199
Mining, Cheapest Reported 571
Mining Leases in the Yukon 631
Requirements in Gravel Work 255
Separators in Gold Mills 199
Hyposulphite of Soda 35

I

Ice, Manufacture of 403
Idaho Court Decisions 603
*Gold Dredgers 149
Mines ....14, 41, 65, 97, 124, 153, 178, 206, 234, 262, 290, 320, 346, 382, 410, 466, 496, 523, 552, 582, 612, 639, 668, 695, 724, 750.
Idaho Northern Railway 39

PAGE.

Idaho's Population 115
Public Land 311
Influence of Forests Upon Storage Reservoirs 494
*Instrument Makers and Too 492
Incandescent Mantels 318
Inclined Shafts More Expensive than Vertical Ones 255
*Incline Retarding Conveyor 349
Increasing Mill Capacity 376
Independence, Colo., Mine 35
Index, Vol. LXXIX 769
Index, Vol. LXXVIII, MINING & SCIENTIFIC PRESS 10
Indian Mines 582
Indicator for Hoisting Speed 573
Veins 634
*Induction Motor 197
Ink, Restoring Faded 311
Inking Press Rollers 743
Industrials and the Market 714
Investment in Mines 719
Injectors on Steam Boilers 37
International Congress Exposition 90, 376, 543
Mining Congress 515, 543
Inventive Genius of Americans 718
Iron, Best Kind for Magnets, etc 571
Plummets, Best for Mine Work 571
Rarely "Pure" 572
*Mountain Mine, Shasta, Cal 685
Ore Production for '98 ....180, 318
Ore Cheaply Mined 171, 247
Ore Output 34, 318
And Steel Prices 86, 126, 402
Tamping Bars 115, 118
And Steel Rope 199
Ore, Search for 204
Ore Deposits 459
Ores of the Ural 69
Duty on 431
How Polished 515
And Steel 349
*Irrigation in Wyoming 120
System in California 576
*Islands of Lower California 664

J

Jackson, D. H 264
Jackson Drill & Mfg. Co 264, 348, 553
James, W. M 321
Jarilla, N. M., Mines 86
Janin, Louis 468, 497
Japanese Metal Importations 39, 207
Treaty 153
Javelle Water 743
*Jeffrey Mfg. Co 349
Jeansville Iron Works 54, 153, 348
Jerome, Ariz. Mining Bureau 403
*Journal Box for Stamp Mills 91
*Box for Pulverizing Machines 753
Joints, How Welded 181
Jointing Planes in Rocks 282
Johnson Pneumatic Cyanide Process 487

K

*Kaolin in San Diego, Cal 441
Kentucky Mines 467
Kern River, Cal., Power Co 95
Kervin, P 68
Keyseat of Cam Shaft 283
Keystone Driller Co 236
Kimberly Diamond Mines 436
*King of Arizona Gold Mine 469
King, C. S 321
Kirby, E. B 208, 412
Klondike Yield 142, 311
Knox System of Blasting 35
Kobrich, Karl 284
Kootenay Ore Bodies 201, 230
Krennerite 293

L

Labor, "Friends of" 2
Legislation 34, 35
Lacy Manufacturing Co 180, 236
*Laccolites and Their Relation to Ore Deposits 745
Lake Superior Power Co 69
*Lake Windemere, B. C 485
Lakes, Arthur 440
*Lamp Bracket for Miners' Caps 147
Land Commissioner's Rulings 115, 171, 174, 630
Lane, C. D 440
Large Dividend Payers 6
Lumber Order 348
*Largest Gasoline Mine Hoist 513
Ocean Steamers 635
Piece of Gold 715
Pump 687
Stamp Mill in Canada 311
Steam Whistle in the World 497
Steel Shaft 317
Vessel Afloat 265
Wagon in Arizona 431
Lateral Extent of Vein or Lode Locations 227
*Latest Mining and Metallurgical Patents ....7, 38, 63, 91, 119, 147, 175, 203, 231, 259, 287, 315, 343, 381, 407, 437, 463, 491, 518, 546, 575, 607, 637, 663, 696, 719, 753.
Laurium Mines in Greece 543
Law of Wages 431
Lawyer's Fees in Golden Cross Case 86
Lead Ore Assay, When Foreign 318
Production, U. S 98, 199
Leadville, Colo., District 86, 318
*Ledoux, A. R 337
*Leffel, Jas. & Co 39
Legitimate Mining 58
Let There Be Light 870
Leasing System 310
Libelous Matter 59
Lien Land Selections 714
Life, Average, of a Bridge 265
Lifeboat Fitted with Gas Engine 341
Limitations of Liquid Air 310
Lindley, C. H 264, 468, 553
Liquefied Ozone 687

PAGE.

Liquid Air 232, 310, 371, 462
Air, Experiments with 635
Air "Metallurgists" 542
Asphalt 143
Locating a Mill Site 631
A Mining Claim 115 227, 311, 459, 715
Tunnel Site 403
Location of Oil Lands 714
Lode, Definition of 743
* Loder Smelting Furnace 731
Long Distance Pumping Plant 115
Lowest Electric Power Transmission Line 473
Los Angeles, Cal., Valuation 30
Co., Cal., Mine 173
Losses in Electric Transmission Plant 35, 403
Lost Mines Illusive 115
Lower California Mines 68, 98, 401, 411, 468, 497, 577, 581, 699.
Low Grade Ores, How They Pay 285
Lucknow, N. S. W., Gold Fields 258
Luck vs. Judgment 2
Luminosity of a Nernst Lamp 6
Lyddite 603

M

MacDonald, Bernard 292, 640, 696
Machine Drills 371, 403
Machine Drill Stoping 374
* Machine for Forging and Sharpening Rock Drills 259
Mackay, Jno. W. 264, 640
Magnetic Concentration of Ore 341, 635, 687
Iron 571
Needle's Variation 59, 283
* Magnetic Separator 63
Separation of Beach Sand 543
Magnesite 171, 311
Magnetite 403
Magnitude of Mining Operations 602
Magni, Utah, Deposit 199
Malachite 715
Management of Mines 226, 457
Manila Hemp 583
Manganese 311, 431, 459, 548
Manganin 603
Manjak 150
Manufacturers' and Wholesalers' League 321
* Manufacturing Asphalt from Petroleum Residue 463
Manufacturing Industries of San Francisco 292
* Manufacture of Lead Oxid 753
Markets ..... Every issue
Marloid 603
Mass. Inst. Technology 69, 153
* McDougall Dredging Plant 60
Mead, L. R 468
Meadow Lake, Cal., District 288, 631
Means, J. H 384
Mean, Thos 153
Measurement of Ore in Place 339
* Measuring Gas and Liquid Fuel 261
* Mechanical Drier 381
Haulage by Compressed Air 285
* Mechanism for Pumping Oil Wells 63
Melones Mine, Calaveras Co., Cal 283
Melting Point of Various Substances 35
Members A. I. M. E., Names and Addresses 374
Mercur, Utah, Gold-Bearing Deposits 255
Mercury, Native, in Quicksilver Mine 199
Merrill, C. W 553
Metal-Bearing Conglomerates 117
Metallic Copper, Cost and Price 199
Manganese 631
Metal Market 602
Metals, How Grouped Chemically 715
Metallography 311
Metallurgy's Advance 34, 318, 436
Metallurgy, Electrolytic 5
Metallurgical Machinery 116
Metasomatism 143
Metamorphism of Rocks 311
Meteoric Shower of Nov., '99 525
Method of Detecting Gold 575
* Method of Working at the Taylor Mine, Cyanide Plant, El Dorado Co., Cal 488
* Method of Working Drift Mines in California 603
Mexican Mining Land Ownership 715
Smelting Furnace 631
Mexico's Mineral Resources 69
Mines ..... 42, 98, 125, 153, 207, 263, 291, 321, 347, 411, 468, 523, 552, 583, 613, 640, 699, 696, 725, 751.
Railroads 236
Mica 283, 371
Co. Consolidated 180
In South Norway 229
Michigan Mines, 14, 97, 125, 179, 206, 234, 291, 383, 410, 467, 496, 612, 660, 668, 695, 724.
Miners' Wages 143
Milling Ore, Cost of 255
And Reeding on U. S. Money 311
Mill Practice at the Ymir, B. C., Mine 517
Capacity, Increase of 376
Concentrates 431
Screens 431
Millsite Location 631
Selection 310
* Mine Car Check Holder 437
Accidents, Causes of 226
* Bucket, Self-Dumping 93
Contract Work 311
Development 431
Drainage 87
Drainage by Syphon 227
* Exploration by Diamond Drill 378
Flooding 35
* Gate 783
* Head Frames 8*
* Hoist 513
* Locomotive 348
Management 142, 226, 457
Pumping 199
* Signaling, System of 748
Surface Sampling 516, 549
Timbers, How Best Lowered 431
Timbering 459
* Transit 38
* Miner's Lamp 119
Miners' Inch 115
Rock Drilling Contest 283
Union 2, 487
Minnesota Mining Methods 171
Mines 262
"Mineral," English Court Definition of 255

PAGE.

* Mineral Extracting Machine 259
Land, Appropriation of 631
Production of United States in '98 ..... 143, 251, 255
Resources of Mexico 69
Springs, How Acquired 403
* Separator 231
Soap 431
Veins, Local Enrichment of 143
Veins, Walls of 600
Wool 743
* Mines of Ouray Co., Colorado 545
And Oil Stocks 542
Dividends 15, 82, 99, 126, 153, 180, 208, 235, 263, 292, 321, 348, 384, 411, 468, 497, 523, 553, 583, 614, 654, 669, 696, 725.
Inspector for California 687
Incorporations 82, 99, 126
Most Economical Kind to Work 122
Of the California Gold Belt 22
Of Ophir 721
Samples, Arranging 4
Why Offered for Sale 254
Mineralization of Zones 282
Mineralogy and Mining, Dept. of 718
* Mining Dredger 119
* Anl Metallurgical Patents 7, 38, 63, 91, 119, 147, 175, 03, 231, 259, 287, 305, 343, 381, 407, 437, 463, 491, 518, 546, 575, 607, 637, 663, 696, 719, 753.
And Metallurgical Progress 717
And Milling, Cheapest in California 577
* And Milling at the Overland Mine, Utah 389
* Apparatus 693
As a Present Investment 714
* By Caving 660
* Caisson 607
Claim, Forfeiture of 255
Claims on Forest Reservations 59
Conditions, Past and Present 430
Definitions 257
* Drill 546
Engineers and Experts 630
Experts, Real and Bogus 514, 630
Failures Due to Inexperience of Managers 742
Foresight Needed 57
* In Aspen District, Colo 492
* In British Columbia 169, 253, 485, 601
Incorporations 17, 54
Industry a Thriving One 486
In Spain 227, 543
In the Transvaal 458
* In Lower California 401, 577
Iron Ore 227, 660
Iron Ore in Minnesota 71
Law 2, 3, 35, 59, 143, 658, 687
Leases 310
* Machine 203, 753
Machinery Prices 58 199, 311
Operations in the Yukon Basin 519
Operations at Telluride, Colo 574
Salaries in British Columbia 6 9
Town Fires 226
Shares, Value of 602
* Shovel 693
Why it is Safe 58
MINING AND SCIENTIFIC PRESS, 3, 59, 63, 118, 170, 171, 227, 255.
Mississippi River Jetties 341
Missed Holes, Fatality from Striking 255
Missouri Mines, 14, 65, 97, 125, 179, 205, 226, 234, 263, 291, 316, 383, 410, 467, 496, 582, 721.
Zinc Mines 255
* Mixing Sand and Tailings 753
* Modern Instrument Makers and Tools 493
Motive Power at the Mines 580, 606, 633, 666
Molybdenite 227, 339, 371
Molybdate of Lead 403
Montana Electric Power & Mining Co 553
Mines, 14, 65, 97, 125, 152, 179, 206, 234, 263, 291, 320, 346, 383, 410, 552, 612, 639, 695, 724, 751.
Mining Law 87, 714, 715
Railroad Improvements 348
* Mother Lode Mine, Deadwood, B. C 340
* Morning Star Drift Mine, Placer Co., Cal 605
Momentum, What It Is 3
Mountain, Height of, How Determined 715
Copper Co 403
Mounting Plans on Linen 227
Mount Morgan Mine, Australia 487, 610
Moore, R. S 126
Monazite 171, 403
Mortars in Stamp Mills 227, 282, 283
* Moyie City, B. C 253
* Mule of Twentieth Century 692

N

Narrow Mortars in Stamp Mills 227
National Association of Gas and Gasoline Engine Manufacturers 207
National Export Exposition 95, 207
Natural Motive Force 293
Nature of Veins 662
Native Gold, Where Found 543
Navigation on the Great Lakes 666
Necessity of Foresight in Mining 57
* Nevada's Great Basin 608
Gypsum 440
Mines ..... 2, 3, 15, 42, 65, 97, 125, 152, 179, 207, 234, 263, 291, 320, 346, 383, 410, 429, 439, 467, 496, 523, 552, 582, 612, 639, 668, 695, 724, 751.
* Resources 429
New England Exploration Co 283
New Guinea Mines 263
* Newest Ideas in Automobiles 629
New Mexico Mines ..... 15, 42, 65, 97, 125, 152, 235, 291, 346, 383, 410, 439, 467, 497, 523, 582, 612, 639, 668, 695, 724, 751.
New South Wales Mining Industry 440
New Zealand Mines ..... 42, 99, 148, 179, 235, 263, 411, 497, 613, 725, 751.
Need of Enterprise 113
Neff, J. H 180, 489, 490
Neill, J. W 292
New Africa 436
Newhouse, Colo., Tunnel 487
Mexico's Deepest Mine 687
* Newest El Dorado 457, 462
Newell, F. H 39, 126, 171, 180
New Process 86, 255
*New Almaden, Cal., Quicksilver Mine 637
* New Type Desk Telephone 637
Nickel, Characteristics of 543
And Cobalt 121
Extraction From Its Ores 174
Mines of Oregon 543
Refining Works 431, 459
Supply of America 255
Separation From Copper 487
Nitrates of Chile 630
Nitro Powder's Explosive Force 35, 371
Nichols, R 39
Niobium 283
Nomenclature of Veins 662
"Non-assessable" Stock 198

Notes on the Occurrence of Quicksilver in Canada 288
On Gold Precipitation by Zinc Dust 288
* On Sampling, Analyzing and Treating Slimes 257
* On the Oil-Yielding Formations of California 144, 172
On Alleged Shortage in Cyanide Bullion 40
* On Power and Transmission 202
On Plate Amalgamation 373
On Geology and Mineral Deposits of Vancouver Island 519
On Mine Surface Sampling 516, 549
On the Ymir Mine and Its Mill Practice 517
Notices of Patents 16, 42, 68, 95, 126, 153, 180
Not Universally Understood 342, 570
North Carolina's Gold Yield 631
North Star Triple 339
Non Technical Account of Wireless Telegraphy 635
Norway, Mica in 229

O

Oak Bark in Boilers 69
Oakland Iron Works 54
Occurrence of Free Milling Gold Veins in British Columbia 176
Of Mica in South Norway 229
Oil Exchanges in San Francisco 282, 430
In Colorado 292
Locations 714
* Yielding Formations of California ..... 144, 172, 543, 603.
Output of Southern California 199, 255
Wells of New York, Pennsylvania and West Virginia 255
Wells, Cost of Boring 255
* Well on Fire in Southern California 236
* Well Pumping Rig 259, 315
*Oiling Device for Rock Drills 518
* Old Jordan & Galena Mine, Utah 435
Times and New 430
Oldest Iron Steamship 318
Gold-Bearing Veins 459
Ontario Mine, Utah 311
Open Excavations in Mines 715
Hearth Furnaces 231
Vat Chlorination 603
Ores of Rossland, B. C 743
Ore Bodies at Bunker Hill & Sullivan, Idaho, Mines 603
*Amalgamator 91
* And Tailings Cyanided 4
Bins in Mills 3
Bodies, West Kootenay 201, 230
Calcined 371
Concentration 288, 487, 514
Concentrating Machine 693
*Concentrator 63, 259, 287, 315, 348, 407, 575
Cost of Milling 255
* Crusher 119
Crushing Devices 687
*Ore Deposits and Laccolites 745
Deposits, Genesis of 542, 747
Deposits in Sedentary Formations 487
Deposits of Cripple Creek, Colo 371
Deposits of Ouray Co., Colo 631
* Feeder 546
Formation, Possible Depth of 687
For Mill Test 383
Handling on Shaft Stations 59
In Place, Measurement of 339
In Sight 458
Low-Grade, How They Pay 285
Mines, Heat in 286
Mixing High and Low-Grade 715
Of Iron Mines 318
Of Mercury 227
Pockets, Construction of 543
* Pulverizer 231
Rates for 1900 690
Reducing Machinery 486, 492
* Roasting and Calcining Furnace 175
* Roasting Furnace 203
* Separating Apparatus 175, 381, 407, 719, 753
Shoots 199
Shoots, Chimneys, Etc 718
Sorting 486
Testing Necessary 115
Unit 171
* Washer 175
Oregon Mines ..... 15, 42, 65, 98, 125, 152, 179, 207, 235, 263, 291, 320, 347, 383, 411, 439, 467, 497, 523, 552, 582, 612, 639, 668, 695, 751.
Organic Matter in the Cyanide Process 636
Osborne, H. Z 497
Output of Pig Iron 206
*Ouray, Colo., Mines 545
Overhead Wires, Factors of Safety 231
*Overland Mine, Utah 380
Overshot Water Wheels 311
Ownership of Mining Lands in Mexico 715
Oxidation, Depth of in Vein 115, 143
Oxide of Manganese 311
Oxygen, Antidote for Carbonic Oxide 743
Oxylignit 403
Ozone, Liquefied 687

P

Pacific Cable 264
Coast Freight Rates 39
* Tank Co 150
Paris Exposition 3, 283, 376, 602
Partinium 743
Patent, First Issued 610
Requirement for Mining Location 87
Office Progress 34, 198
Notices of Recent ..... 16, 42, 68, 95, 126, 153, 180, 208, 236, 264, 292, 321, 348, 384, 412, 440, 468, 497, 524, 553, 583, 614, 640, 669, 696, 725, 752.
List of U. S. ..... 16, 43, 68, 95, 126, 153, 180, 207, 236, 264, 292, 322, 348, 384, 412, 440, 468, 497, 524, 553, 583, 614, 640, 669, 696, 725, 752.
* Latest Mining and Metallurgical ..... 7, 38, 63, 91, 119, 147, 175, 203, 231, 259, 287, 315, 343, 381, 407, 437, 463, 491, 546, 575, 607, 637, 663, 753.
Pay Shoots of Ore 718
Panama Canal 153
* Parke, Lyman C 583
Parker, R. A 208, 347, 583
Parrott Smelter, Butte, Montana 143
* Parke & Lacy Co 380, 468
Parting of Silver and Lead 431
Patio Process at Guanajuato, Mexico 62
Palladium 515
In South Australia 608
Perambulating Smelter .....
Peroxide of Hydrogen .....
Permit System in Idaho .....
Petrified Trees in California .....
Petroleum Deposits in California .....
Geology 42, 144
Product of California, '98 255
Land, How Located 459, 603
For Furnace Fuel 487
How Rendered Uninflammable 571
Refined 743
Peacock Ore 227
Pearlite 321
Pegamoid 115
Peck, F. W 292
"Pegleg" Mine 310
* Pelton Water Wheel Co 118
Peruvian Silver Mines 543
* Peters, E. D. Jr 337
"Petrified" Men 722
Forests of Arizona 746
Phantom Millions of Alaska 86
* Phenomena Attending the Accumulation of Bitumen 632, 665, 691, 721
Philippine Islands, Number and Area 94
Islands, Resources of 630, 698
Phonolite 311
* Phosphate Mining Apparatus 203
Pictures, How Made 118
Pike's Peak Power Co 436
Peak, Colo., Electric Power Co 348
* Pioneering in British Columbia 85
Pillar System of Working Mines 87
Pitch, Across vs. Up 287
Placer Mines of British Columbia 515
Claim, How Patented 227
Claims, Extent of 227
Mines, When Cleaned Up 115
Mining Law 227
Ground, How Best Worked 403
Plans on Linen, How Mounted 227
Planes of Bedding 282
Platinum, Weight of 2, 743
Substitute for 293
Price of 459
In Arizona 630, 687
Plate Amalgamation 374 516
Pneumatic Cyanide Process 384, 487
Pocket Mines of California 283
Popocatapetl Volcano Sold 95
Porphyry, What It Is 3
Portland Cement From Slag 6, 311
Power for Mining Operations 431
For 1000 H. P. Engine 743
Of Attorney 227
*And Transmission, Notes on 202
Losses on an Electric Transmission Plant 403
Possible Depth of Ore Formation 687
Postlethwaite, R. H 36, 126, 440
Poisoning by Cyanide 550
* Portable Drilling Machine 348
Powder Used in Coal Mining 722
For Flashlight Photographs 571
Prehistoric Rivers of California 544
Price of Mining Machinery 311
Precious Stones in U. S 95
Precipitation of Gold From Cyanide Solutions 149, 693
Prospect, Big Price for 283
Prospector's Automobile 603, 629
* Pan 437
Points for 515
Preconceived Ideas 255
Why They Want to Sell 2, 264
Venture some 226
Prospecting Large Ore Zones 255
Progress in Metallurgy 436
In Ore Reducing Machinery 486, 492
Prendergast, Roger 39
Pritchett, H. S 468
Process of Treating Ore 491
Should be Adapted to the Ore 486
Of Extracting Gold and Silver 175, 231
Prominent Achievements in Metallurgy 318
Propylite 339
Profits of Gold Dredging 515
Progress in Mining and Metallurgy 717
Of the Century 742
Promoting Mining Enterprises 513
* Propeller Pump in American River Cal 541
Proof Gold, How Prepared 743
* Pulverizing Machine 38, 259
* Pulverizer 175, 348, 437, 491
* Pump 315
* Priming Device 119
Slip Joint in 199
* Suction Valve 7
Velocity of 687
Publication of Forfeiture Notices 430
Pulley, to Calculate Speed of 687
Pulverized Iron Ore 339
* Pumping on American River, Cal 541
Pumice 459
Pyritic Smelting 143, 339
Pyrrhotite 115
Pyrobesite 715

Q

Quartzite, What It Is 603
* Quartz and River Mining in Eastern Oregon 435
Mill Line Shaft 3
Mill Economy 199, 255, 283, 339
Quicksilver, Great Britain's Exports and Imports 543
In Oceanica 122
Mining in California 1, 515
In Serpentine 603
* Why Appreciating in Price 636
Mine at New Almaden, Cal 638
Quicksilver's Highest Price 35, 227, 515
Purity, How to Test 8

R

Railway System of the United States 468
* Ore Pulverizer 753
Rails, Length of 403
Railroad Building by Music 293
Construction in South Africa 180
Grants 403
* To the Klondike 572
Rafting Lumber by Sea 39
Rand Deep Levels 314, 344
Rand-Victoria Mine Shaft 255
Rapid and Slow-Drop Stamps 199
Rate and Amount of Wages 34
Rates of the Utah Commissioners 87
* Raising Water From Mine Shafts 63
* Ralston, W. C 342, 347, 373, 490, 640
* Rand, Theo. D 337
Raymond, Cal., Granite 39

(Continued on Next Page.)

TO VOLUME LXXIX.

THE [illegible]

(Preceding Page.)

PAGE.

*Rayb[illegible] 337
Reaumer[illegible]ometer 403
Recognizing Voice in Telephone 408
*Recovering Zinc From Refractory Ores 753
Reeding and Milling on United States Money ..311
*Red Boy Mill, Granite, Or. 200
Refrigerating Machines 403
Reiling, H. J. 236
Requisites of Mine Management 226
Removal of Chinese Wall 547
*Republic District, Washington 311
Republic Iron & Steel Co. 321
*Results of Forest Destruction in Europe 228
*Resources of Nevada 429
Revenue Stamps on Mining Deeds 283
*Refining Cupric Sulphate Solutions 463
Resolutions Adopted at '99 Convention California Miners' Association 480
Reviving Gas Wells 548
Rhodes, Cecil 497
Ricketts, A. H. 170, 171, 490
Rickard, T. A. 264, 321, 468
Riffle Arrangement for Black Sand Treatment. 87
*Plate for Ore Stamp Batteries 381
Right to Use of Running Water 227, 370
Rights of Property Holders Along a Stream. 370, 493
Riparian Rights 370
Risdon Hydraulic System 115
Iron Works 292, 311
Risks in Mine and Oil Stocks 542
Rix, E. A. 347, 696, 741
Rosario Mine, Honduras 339
Rolls for Crushing 255
Rope Transmission of Power 59
Tests 339
Ropp Furnaces 348
*Rothwell, R. P. 337
Ross, G. McM. 264, 440
Roscoffite in California 93
*Roasting and Oxidizing Furnace 437
*Furnace 7, 147
*Kiln 63
Of Sulphide Ores 339
*Rock Crusher and Grinder 203
*And Ore Breaker 753
*Drill Dressing and Sharpening Machine 287
*Drill Bit 91
*Drill 287, 518, 719
*Drilling Machinery 437
Formations, Fault in 227
Drilling Contest at Denver, Colo. 403, 412
Drilling 317
Metamorphism 311
Rocks, Melting Temperature of 87
*Rotary Cylinder Drier 175
*Furnace 119
Running a Blast Furnace 549
*Gear for Automobile Truck 629
Water, Right to Use of 227
Russia's Silver Smelters 487
Russell Process 431, 459
Rutile 459

S

*Sacramento Gas and Electric Railway Co. 316, 321
Safety of Mining 58
Salaries of Miners in B. C. 691
Saline Lands 403
Salt in Seawater 715
Sampling on Mine Surface 516, 549
Ore 115
Slimes, etc. 256
Works, How Cheaply Constructed 543
*Sand Creek, Kootenay, B. C. 309
Sand, Kinds of 431
San Francisco Mint Coinage 3
Charges 3
San Francisco's Manufacturing Industries 292
Santa Fe Headquarters 264
Satin Spar 35
Saw Cut in Wall Plates 371
*Saw Mill Run by Electricity 316
Sawing Stone 311
*Scenery of British Columbia 309, 661
Scheelite 371
Scientific and Judicial Geology 339
Century 742
*Screen for Stamp Mills 119
Seismograph 35
Selby Smelting & Lead Co. 59, 371
Section of a Mill Site 310
*Self-Dumping Bucket 93
Sequoias of the Sierras 265
Scott, H. T. 488
Scale, How Removed 743
Search for Iron Ore 204
Searls, Niles 68
Seawater in Gold Extraction 403
Secret Processes 255
Seismometer 318
*Separating Precious Metal[illegible]m Ores 231
Settling Ground, How Best[illegible]ered 143
Seven Devils Country 285
Seven Stars Mine 311
Shaft Sinking in Granite 371
Sinking, Cost of 283, 311, 543
Repairing 143
Timbers 227
Shallow Ore Deposits 339
Shortage in Cyanide Bullion 40
Siberian Mining Lands 686
Siemens-Halske Electrolytic Process 199
Sierra Pintada Placers 603
*Signalling in Mines 748
Silicious Sinter 515
Ores in South Dakota 339
Silver Chloride in Masses 487
Chloride Dissolution 631
In Native Ores 227
Mines of Cerro de Pasco, Peru 543
Prices of 686
Production for the Calendar Year 1898 495
Production of World 8, 495, 571
Reduction in Refining Charges 283
Smelters in Russia 487
*Silver King Mine, Nelson, B. C. 601
Silverplating, Mode of 515
Sinking Shaft on Small Vein in Granite 371
Siphon, Duty of 571
Skips and Cages 431
At the Kimberley Diamond Mines 543
Slimes, New Method of Treatment in Australia. 692
*Continuous Process of Treatment 90
*Sampling, Analyzing, etc. 256
Treatment of, in South Africa 631

PAGE.

*Slimy Ores and Tailings Cyanided 4
Slip of the Wheel 687
Slocan, B. C., Labor Troubles 542, 630
Slow and Rapid Drop Stamps 199
*Sluice Runway 231
Smelter Charges at Trail, B. C. 515
At Spokane, Wash. 371
Smelters' Wages in Utah 3
Smelting Ores 463, 570
*Furnace 348, 518
*Plant, Keswick, Cal. 685
Silver in Russia 487
Trust 3, 142, 170, 180, 264
Vs. Milling 570
Smokestacks and Artificial Draught 283
So a Nitrate in Chile 517
Solar Spectrum's invisible Rays 571
Attachment for Transits 721
System, New Planet in 571
Soldering Aluminum 181
Solvent for Iodide of Silver 403
Some of the Reasons 254
Source of Gold 49
South African Conditions 58, 262, 458
Diamond Fields 61
Dividend Paying Mines 283
Mine Water Supply 34, 36, 207
Mines, 2, 15, 42, 68, 99, 125, 153, 170, 180, 263, 321, 347, 411, 468, 497, 583, 613, 640, 669, 696, 751.
Mines 94, 515
Telegraph Line 264
South American Imports 468
South Dakota Mines. 3, 15, 42, 75, 98, 179, 207, 235, 263, 291, 321, 347, 383, 411, 439, 467, 497, 523, 552, 582, 612, 668, 724, 751.
Southern California's Oil Output 199, 255
Spanish Mining Methods 543
Specular Iron 199
Speed Hoist Indicator 573
Spenazuma Mining Co. 254
*Sperry Mills Electric Motor 197
"Spill Over;" What It Is 255
Spodumene 35
Spontaneous Combustion; Some Causes of 571
Square Inch 35
Stage Winding 92
Standard Electric Co. 153, 264
Stanislaus Co., Cal., Mines 311
Stamping Copper Ore at Lake Superior 430
*Stamp Mill 437, 491
Stamp Mills, Narrow Mortars in 227
*And Boiler Crusher 381
Mortars 227, 282, 283
Non-Revolving, How Best Treated 255
Of the Witwatersrand 255
Stamps, Rapid and Slow Drop 3, 199
Duty of 143
Standard Oil Co. 640
*Stanton, F. McM. 342
State and Federal Mining Law 257
State Supreme Court Decisions 571
Statistics of World's Gold Production 580
Steam Engine Exhaust 199
Boiler Explosions 715
Decreased Cost of Producing 715
*Dredge 38
*Stanhope 464
Wagons Hauling Borax 35
Steamers, Ocean, Twenty Largest 635
Stearine 143
Steel, How Annealed 311
And Iron Rope 199
At Liquid Air Temperatures 436
Cement from Slag 487
Cutting Mixture 3
For Rock Drilling 317
*Head Frames for Mines 88
*Ore Bin 603
Shaft Weighing 75 000 lbs 95
Stephens' Process 431, 465
Steteefeldt Furnace 543
Stibnite 227
St. Lawrence, Mont., Mine Accident 146
Stock Board Sales 80, 54
Gambling vs. Mining 570
Stoiber, E. G. 412
Stone, Controlling Factor in Value 571
Stone Sawing at Paris 311
Stopes, How Best Filled 35, 715
Stoping and Timbering 87
With Machine Drills 374
Storage Battery; What It Is 3
"Strike," First Recorded 35
And "Dip" 59
Strike of Non-Union Men 311
Stull Timbers, How Best Placed 171
*Submarine Tunnel 463
Subscribers to MINING AND SCIENTIFIC PRESS. 282
Substitute for Platinum 293
*Subterranean Rock Corrasion 5
Successes in Mining 115, 602
Sullivan Machinery Co. 384
Sulphate of Zinc 743
Sulphide Ore Concentration, Cost of 543
Sulphides at Broken Hill, N. S. W. 293
Concentration of 340, 379, 543
Of Manganese 603
Sulphur in Coal, How Estimated 87
Superheated Steam 311, 403
Supreme Court Decision on Valid Assessment Work 59, 571
Surface Sampling, Notes on 516, 549
Area in One Issue of This Paper 603
Water on Upper Levels 543
Sutro Tunnel 311, 631
Swelling Ground to be Avoided 227
Syphon Drainage of Mines 227
System of Mining by Caving 660
Of Mining in Spain 543
*Of Mine Signalling 748

T

Tabulated Mineral Production Value, United States, '97 and '98 254
Tailings at El Dorado Canyon, Nev. 255
Tamarack Mine Shaft 631
Tamping Bar in Colorado 35
Should Be of Wood 715
Tanks, Construction of 603
*For Cyanide 150
Tappets, Adjustment of 283
*Taylor Mine Cyanide Plant, El Dorado Co., Cal 488
Tariff on Metals 515, 715
Tasmanian Mines 613, 669
Tasmania's Mineral Output 87, 411, 468
Tatki 180
Taylor Jno. & Co. 696
*Tangential Water Wheel 381
*Tappet for Stamp Mills 259
Tailings, Disposition and Ownership of 571
Tattoo Marks, How Removed 743
Technical Education in Mining 170
Telediagraph 459
Telegraphing Pictures 459
Without Wires 316
Telluride Power Transmission Co. 292
Telluride, Colo., Mining Operations 574
Telluride of Nickel 715
Tellurides of South Dakota 631
*Telephone for Desk 687
Tellurium, Black 687
Native 371, 543
Temperatures Increase With Depth 87
Tempering Steel 199

PAGE.

Ten Broeck, A. H. 180
Tennessee Mines 347
Tesla, Nikola 440
Test of Quicksilver Purity 8
Tests of Concentration 430
Tetradymite 339
Tevis, Lloyd 125
Texas Mines 320
*Thawing Apparatus 497
Giant Powder 686, 715
The Carcuaze Tin Mine, St. Austell, Cornwall. 744
Theory and Theorists 402
Theory of Genesis of Ore Deposits 747
Thomson, Elihu 347
Three-Quarters of a Century's Progress in Mining and Metallurgy 717
Thermometers, Scale and Kinds 403
Thorium 403
*Thunder Hill Concentrator, B. C. 485
Tide Lands in Alaska 686
Timbers, How Best Handled 143
Timbering and Stoping 87
At the Utica Mine, Cal. 402
Settling Ground 143
Vein Walls 603
Timber, Preservation of 199
Used on Forest Reserves 174
Tin in the United States 255
Occurrence of 749
Ore in Colorado 403
Ores, Occurrence of 459, 543
Oxide in California 603
Price of 198, 283, 431
Purity of 743
Scrap, Use for 441
World's Production of 487
Title to California Oil Beach Mines 199
Ton, Gross and Metric 459
*Topics for Coal Miners 317
Tonge, Thos 497
Topography of California Oil Fields 543
Torrential River 721
*Traction Engine and Load in the Sierra Nevadas 569
Engines 35, 687
Train Resistance 743
Transandean Railway Line 265
*Transit, Solar Attachment for 720
Transmissisippi Congress 36
Transmission and Power, Notes on 202
Transvaal at the Paris Exposition 547
Gold Output 171, 255
Mine Troubles, 114, 170, 198, 310, 339, 371, 430, 514, 543, 570.
*Triple Piston Pump 7
Trachite 339
Translucent Paper 610
Trusts 58
Tufas for Building 603
Tunnel Claim Rulings 631
Decision, Colorado 658
Discovery of Vein 743
Exploitation 227
For Draining and Transportation 487, 494
Site Location 403, 631
To Drain Leadville, Colo., Mines 487
Through Cascade Mountains, Wash. 307, 348
Tunnelling in Placer Co., Cal. 371
Tungsten, Pure 743
Tungstite 371
Tungstic Acid and Its Ores 115
Turnplates of Steel 339
Turner, R. C. 413
Tutuila 570
Types of Engine Valves 311
*Of Head Frames 281
Of Feed Water Heaters 211
Of Veins 717
*Twentieth Century Mule 692
Census United States 687
Typical Prospecting Scenes 516
*Mining Scales 749
*Utah Mine 535

U

Uncertainty of Adaptability of Cyanide Treatment 609
Underhand Stoping 87, 603
Underground Mine Surveying 687
Workings at Leadville, Colo. 318
Unearned Dividends 430, 486
Union Miners in the Cœur d'Alenes 199
Union Gas Engine Co. 95, 513
Union Iron Works 91, 95, 654
Unit of Ore 171
*United Verde, Arizona, Mine 462
Unrepealed California Law 170, 171
*Unloading Means for Air Compressors 518
U. S. Coinage Law Amendment 669
Geological Survey 487, 690
Manufactures and Exports 153
Mining Law 35, 339
Ural Iron Ore 69
Uranium Ores 431, 743
Use of Running Water 227
Of Charcoal in the Cyanide Process 458, 517
Of Vats Instead of Zinc Boxes 546
Utah's Commission Rates 87
Utah Mines ..15, 42, 65, 98, 125, 152, 179, 207, 235, 263, 291, 320, 347, 383, 411, 439, 467, 497, 523, 552, 582, 612, 639, 668, 695, 724, 751.
Labor Law 35
First Mineral Discoveries 403
Smelter's Wages 3
Utica, Cal., Mine Timbering 402
*Utilizing Coal Waste 747

V

*Vacuum Bailing Tank 520
In Boilers 715
Vagaries of Geology 369
Valid Assessment Work 59, 311
Values of Alaskan and Yukon Gold 319
Value of Mining Shares 602
Valves Controlling Water in Pipes 255
*For Rock Drills 38
Pressure 283
*Vananda Mine, B. C. 225
Vancouver Island, Geology and Mineral Deposits 519
Vanderbilt Mining District, San Bernardino Co., Cal. 579
Variation of Magnetic Needle 59, 283
Veins of Gilpin Co., Colo. 687
Nature and Nomenclature 662
Vein Faults 227, 311
And Zone, Difference Between 171
Converging 35
Formation 199
Types of 717
Wall Timbering 603
Velocity of Light 143
Of Different Objects 715
Of a Stream 59

PAGE.

Venezuela Mines 180
Ventilation in Mines 3, 339
Venturesome Prospector 226
Ventilating Device for Mine Working 603
*Fan 601
Vermillion River Gold Bearing Sands 376
*Vertebrate Fossils of Wyoming 141
Vats Instead of Zinc Boxes 546
Victor, Colo., Fire 226, 254, 262
Visalia, Cal.'s Electric Plant 39
Volatile Ores 3 1
Volcanic Eruptions in the Grand Canyon 403
Volumetric Assay of Copper Ore 227
Volume and Head of Water 311
Volcanoes and Earthquakes, Relation of 115, 125
On Hawaiian Islands 148
Volcanic Channels Carrying Gold 59
Voorhies, E. C. 468
Vulcan Iron Works of S. F. 321, 403
Iron Works of Seattle 411

W

Wages, Rate and Amount 34
Wagmen, Theo. F. 95
Wales, Mining Methods in 170
Wall Plate, How Reinforced 115
Walls of Mineral Veins 603
Ward, R. H. 696
*Warden Oil Filter 412
Warming Quartz Mills and Battery Water 520
Warren, Arthur 264
*Washing Machines for Clay or Gravel 607
Washington Mines, 15, 68, 98, 153, 179, 207, 235, 263, 291, 320, 347, 384, 411, 439, 467, 497, 523, 553, 582, 612, 639, 668, 695, 724, 751.
State Mining Decision 661
Washoe Process 227
Water Blast, Mine Ventilation 339
Water Hammering, How Prevented 171
Water and Iron Sulphides 115
*Motor 719
Power Electric Plants in the U. S. 40, 316
Power Elevators 339
Power Required to Raise 1000 Gallons 87
Required in Stamp Battery 199
Running, Right, to Use of 227
Shortage in California 86, 542
Supply on the Rand, S. A. 34, 36
Volume and Head 311
Weight and Pressure 283
Watts, W. L. 114, 144, 172, 347, 468, 524, 553, 696
Welding by Electricity 204, 715
Joints 181, 720
*Well-Drilling Machinery 315
Wentworth Cyanide Plant, Lucknow, N. S. W. 572
Western Chemical Co. 468
Federation Miners 3
Westinghouse Electric & Mfg. Co., 54, 64, 95, 197, 434, 553.
West Kootenay Ore Bodies 200, 230
Wet and Dry Mines 487
Process of Extracting Silver from Haloid Salts 231
Tunnel Drainage 494
Wheel, Top or Bottom Going Faster 715
Wheele, Benj. Ide 95, 412
Wheels on Shafting 227
White Lead Composition 603
*White Pass and Yukon Route 572
White, Rogers & Co. 236
*Whitehorse Divide, Kootenay, B. C. 601
Why Mining Is Safe 58
Mines Are Offered for Sale 254
Prospectors Want to Sell 2
Sand Floats on Water 571
Wide-Tire Law of California 654
Widen Process 603
*Wileman Mine, Sutter Creek, Cal. 578
Wilfley, A. R. 264
Wilfley Table 95, 125
Wiltsee, E. A. 553
Windlass Shaft, Requirements of 171
Wing Dam 59
*Winnipeg Mine, B. C. 340
*Winslow, Arthur 342
Winzes, Proper Angle of 87
Wire-Wound Flywheels 6
Wireless Telegraphy 317, 459, 486, 525, 635
Wire Rope, How Preserved 143, 199
Tensile Strength, etc. 87
Tests 339
Wire Ropes 199
Wisconsin Mines 291, 467
Witwatersrand Gold Output 671
Meaning of, Etc. 487
Stamp Mills 255
*Wrench for Well-Drilling Tools 315
*Wurdemann Automatic Dividing Engine 493
Wolframite 403, 487, 665, 715
Wolframium 431
Woodbury, G. W. 321
*Wood's Propeller Pump 541
Working Miner's Experiences ....5, 37, 61, 89, 117, 148, 173, 202, 260, 284.
World's Production of Tin 487
Gold Production 520, 745
Pig Iron and Steel 689
Wright, Jno. M. 257
Wright L. T. 95
Wyoming Copper Producers 715
*Fossils 141, 237
Mines ....15, 68, 98, 125, 207, 235, 263, 320, 347, 384, 411, 479, 552, 582, 612, 640, 668, 696, 735, 751.

Y

Yale, C. G. 68
Yates, Jno. 314
*Ybarra G. M. Co. 401
Yellowstone National Park 115
Ymir Mine and Its Mill Practise 517
Yokes, Support, How Made 3
Yosemite Valley's Origin 374
Yuba Co., Cal., Electric Power Co. 180, 264
Yukon Region 3, 6, 235, 263, 291, 347, 519
*Railroad 572

Z

Zadig, H. 497
*Zebroid 692
Zeitler, Fred 490
Zinc and Lead Fields of Missouri, Kansas and Arkansas 487
And Gold, How Separated 403
Corrosion of 143
Ore Shipments 311, 371
Roofing Plates 692
Smelters 435
Spelter, Price of 199
Sulphide, How Reduced 175
Zone and Vein, Difference Between 171
Mineralization of 282